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Master's Thesis  
Academic Year 2017

Design and Implementation of  
“HOT” History Of Things

Graduate School of Media Design,  
Keio University

Rahma AlRashdi

A Master's Thesis  
submitted to Graduate School of Media Design, Keio University  
in partial fulfillment of the requirements for the degree of  
MASTER of Media Design

Rahma AlRashdi

Thesis Committee:

Associate Professor Kazunori Sugiura	(Supervisor)
Professor Sam Furukawa	(Co-Supervisor)
Associate Professor Kai Kunze	(Co-Supervisor)

Abstract of Master's Thesis of Academic Year 2017

Design and Implementation of  
“HOT” History Of Things

Category: Design

Summary

Are we able to understand the history of Everyday Things? This is the real motivation of this research. The purpose of this project is to find out how to enhance people's understanding of the history of Everyday Things in life. The author's approach was to investigate the main problem in one specific field, to visualize the possible solutions.

Qualitative and quantitative methods were used to validate the existence of the problem within school community. Based on the results of the problem validation process, the researcher proposed a new system to achieve the main objective of this project, where Things history could be recorded based on its usage. The proposed system consists of two main parts, the objects web-page and the second part is the admin panel. The author suggested four main features to achieve the main objective which are, item's main features, its history, reservation form and commenting system.

Based on the results of the user-test, the proposed system seemed to be quite successful. Users were interested to use the proposed system. The main features matches their requirements to understand the objects hidden stories.

Keywords:

History, Everyday Things, Objects, Reservation System

Graduate School of Media Design, Keio University

Rahma AlRashdi



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# Chapter 1

## Introduction

### 1.1. Background and Motivation

Far a way in front of the huge statue, over there at that ancient site, HE went to explore new things, to experience that part of the world. HE spent such a great time, enjoyed the moment while moving from one site to the other. Interested in everything, trying to catch the moment. The questions came to his mind about everything, HE could remember the name, date maybe, but wait, how about all other details? Searching for answers here and there, HE was lucky he found some answers, but only SOME general answers. HE decided to capture every single moment, using some of the useful things he had. HE bought some souvenirs as memorable THINGS to share his experience with friends and relatives...

... They liked what HE gave them, they asked for details, HE could share SOME details because HE himself missed a lot of the required details and information. Now, HE had no more time to share his experience, HE left, they hide their souvenirs somewhere and forgot about it...

Have you experienced such similar situation? People usually like to travel to see and experience new things. Most of the time they find themselves in front of historical and cultural objects, where they start wondering about its origin, why it was designed in that particular shape or ornamented with that kind of ornaments?... This is applied to all things we experience in daily life, feeling thirsty to learn more and understand the physical objects around us. Is there any answers for these questions? Is it possible to access all information whenever we

need them?

The problem to be solved in this project is “Are we able to realize the accurate history timeline of physical things in existence in our daily life?”. “Not everything that happens is preserved in our memory, as many past events are actually cast into oblivion” [33]. This project’s statement is “Design and Implementation of service based on the objects history timeline”. The author’s main intention is to help people understand history of things around them. Help them understand and be aware of thing’s history by accessing its related information and stories. One possible approach to reach this goal is through manually recording thing’s history based on its usage as well as all changes that occurred during its existence in a certain environment. First, let’s have a clear idea about everyday things, history and the methods that play an important role in understanding history.

## 1.2. History of Things

“What we consider “history” and thereby include in our textbooks is not a truly comprehensive record of everything that ever happened, but only a small part of it...” [33] This is true, most of the events in life were not recorded due to many different reasons. Our ability to recall memories is one reason. As a human being, we could remember things as it is while sometimes we could not. We might force ourselves to remember something at a specific time, but we could not, and then it pop-up to our minds later on , most of the time, in a wrong timing.. Another reason is, in my opinion, the importance of each event for individuals. What they experience as daily routine might not have the same importance as what they rarely experience in different situations.

The future could be shaped actively through history [20]. History did not influence the present only, it influences the future as well [20]. Understanding equipment past leads to the future improvements. History is written in textbooks but not available for people whenever they need it unless they are in a library or they own history books which they will not carry with them while traveling all around the world. According to Carr e.h “History is a continuing and unending dialog between the present and the past, with historian serving as guid and interpreter” [4]. In this case there should be a guid to explain object’s hidden history to people. There



is a need for a system to solve this problem and let people understand the world where they live in a more accurate and easy way. How about using technology as history guid?

In the following part, the author is going to explain some of the methods that were used in recalling or understanding history. The concept of each method will be implemented in the proposed system in one way or another as it will be explained briefly.

### **1.2.1 Oral History and Word of Mouth**

History could be realized through the interpretation of objects shape, material or function. Word of mouth or oral history plays a very important role in understanding object's histories and hidden stories. History narratives has been transferred from old generations to the new ones. It is worth noting that, historians were able to find rich and varied information through oral history [31].

People's narratives of the past helped historians and researchers in their studies and investigations. A new dimension was added to history through the life experience of people of all kinds [31]. Word of mouth could help in the history creation for everyday equipment. The commenting system will be used in this project as a method to get people's word of mouth. Users will get the chance to comment and share their thoughts and opinions about the equipment based on their experience. This will offer different views about each item, which could help future users decide what will be the best tool for their projects based on its requirements.

Most importantly, users comments can be used as data sources for admin users as well. Admin users will be able to check the status of the equipment and whether the user were able to use it successfully or not. Objects written descriptions and comments were used as an evidence to understand the context [11]. Admin users could also find out about any side effects on the items and repairs them or buy new ones. In fact, users comments could offer companies with great ideas to come up with products that can fit with users requirements.

### 1.2.2 History And Visualization

Cave drawings has helped archaeologists and historians in their researches. They were able to understand what tools were used and they realized how it were used. It helped them to realize the chronological order for some events based on their interpretation of the drawings. Cave drawings represents old people's visualization of life and events at that time. Visualization is powerful in making sense of information and communicating it to others [8]. It helped researchers to create a relationship between there discovery of physical tools and cave drawings stories. It is much easier for human brain to understand information and relationships through the use of visual imagery [10]. One important way for businesses to derive greatest benefits is through the use of visual representation for their data to communicate information clearly with others [8]. Most significantly, it is difficult for people to adopt some new options if they are familiar with the old ones. But with the use of visual data they might rethink of picking up new options based on what is mostly used by others. Visualization provides them with trends they have not tried before [10]. The visualization concept will be applied in the proposed system to provide users with some samples of visual data related to the Object they are willing to use.

### 1.2.3 Diversity of Sampling Ratio in Artifacts

Usually, people tend to search for object's old history to understand the reason behind its existence. Objects past history was measured and recorded using different time scale and different methods. This is because there was no exact duration or particular time for its occurrence [17] plus it is hard to retrieve the past events accurately.

On the other hand, physical object's new history could be recorded in a more accurate method. Stories and experiences can be recorded as it happened. This research took new perspective, it aims at recording objects stories and information for future use. The intention is to preserve Everyday Things related information and stories accurately as it happens. Using reservation systems that are designed to get all important details could be one solution to be proposed in the new system.

### 1.2.4 Learning History Through Objects

This research mainly focuses on the material things or objects which was produced by human being to be used in their daily life. These objects has hidden stories which was shaped by human use [11]. Dates and locations are such important factors in history. It can show how people's life changed over time and what kind of improvements occurred on the equipment they were using. In this project, these factors will be considered from the beginning for each object and recorded in a database. This will help in having accurate information instead of the estimated interpretations.

## 1.3. Everyday Things

How human relate to everyday things vary. Some people interact with the objects around them without paying attention to anything but their usage. Others are attracted to the way these objects were designed. On the other hand, there are people who relate emotionally with Everyday Things and have special memories attached with each entity in their environment.

How many hidden stories in the objects that people use in their daily life with out being aware of these stories. People are unconscious about object's history. They mostly have no idea about the very long journey for each object until it becomes what it looks like. Noteworthy, what is described as traditional heritage or cultural artifacts these days, was a brand new product or inventions one day. The same is applied to what is new today, will turn to be used as cultural artifacts in the future. Cultural artifacts were used as everyday life things. It has a special relationships with its owners at that particular time. If these artifacts could talk, it will tell a lot about that relation. Unfortunately, it could not, that is why historians are working hard to find more logical interpretations and explanations of what they found from the past. Historians logical interpretations, their imagination, word of mouth narratives and a variety of resources are working together to retrieve few parts of the history behind these cultural artifacts.

According to the English Thesaurus, the term "Things" refers to all physical items or objects around us. It could be artifacts, devices, tools or instruments. "What if everyday objects around us came to life?...and could respond with relevant

information?” [22] What if it could share its history and all hidden stories with its users?. “I can not give life to the dead, but I can give them voice” [7]. We could add value to things in life. Everyday life is full of things or objects, either personal items, technology or school items.

Technology is taking control over many things in life, either during production phases or in its actual usage in daily life. Technology has a great contribution in enhancing life. It could also be used in preserving Everyday Things history, and presenting it to the future generations accurately. Future generations then, could live the real history, enjoy it and learn from it.

## 1.4. Concept

History of Everyday Things is a really interesting topic. The main concept of this project is to help people understand the history of things and objects they deal with in their lives. The author’s main purpose on the one hand is to find out how to preserve the history of Everyday Things and on the other hand to help people build strong understanding and strong relationship with Objects/Things in their possession. Everyday Things vary. Things are everywhere and in different shapes , sizes and functionalities. Therefore, to come up with a successful solution, the author decided to start with one field and try out some possible solutions. This field will be decided after the problem validation process in chapter 3.

## 1.5. Contribution

This project proposes a new method for recording the history of the artifacts or Everyday Things that are used in daily life. The proposed system will not only help in recording artifact’s history but in fact, it will help its users in different ways. Here are the main contribution of this project:

- Exploring new methods for preserving artifacts and Everyday Things and recording its history as it happens in real life.
- Finding new methods to protect Everyday Things from damage and increase its lifespan. This could be achieved through organizing its usage and getting

users feedback, as it will be explained in later chapters.

- Adding emotional values to the physical Things and attaching it with its users in different ways.
- Find new ways for people to understand Everyday Things around them. Starting from the very tiny Things to the giant objects in life.
- Provide people with methods to share their experiences with others. These experiences varies from using useful tools or experiencing new places and other Everyday Things.

This research might reach some of these goals or most of them. As it will start by exploring Everyday Things in specific areas and then proposing the best solutions that could help in achieving the main objective of this work.

The objectives of this project will successfully be accomplished through proposing an online system for school equipment. In order to offer a useful system to serve both of the users and the equipment, the project's aim to provide solutions that could give students an access to the history and hidden stories of school equipment as well as create a method to store the equipment history based on its usage at school.

Providing users with all information and main features about school equipment as well as some tips on how to use it, providing them with the chance to see some samples of the works/projects from the usage history of the equipment, and making it possible for them to share their experiences and to learn from their school mates experiences are the key factors to accomplishing this project. Noteworthy, some important details related to the usage history will be stored from the reservation form which will be added to the proposed system.

Admin users as well will be provided with a system that could help them have a clear understanding of the equipment under their control. They will be able to view users feedback, check tools status, check all reservations and be aware of the equipment condition. The success of this project will be measured through the usability testing and user feedback after experiencing it within the school environment.

## 1.6. Thesis Objective

This thesis aims to enhance people's understanding of "History of Things" by showing its history timeline through the use of technology. The project details will be explained in this research. The primary goal of this project is the history timeline which could enhance students understanding of the physical equipment at school. Visualization technique will be used to show how it could be used to help students understand more about equipment and decide what is the best tool for their projects as well as helping admin users in controlling the usage of schools facility.

On the other hand, the equipment or Everyday Things will get significant benefits from this project, where it will be preserved and controlled in a more efficient way. In this project, the author is responsible for designing and developing web-page and admin panel to be used for Keio Media Design's facility.

## 1.7. Thesis Overview

This thesis consist of 6 chapters. The very first chapter is about the background, motivation, some important definitions and the objective of the research. Chapter 2 will be about the literature review and similar works. The creation of the web page and the timeline will be discussed in chapters 3 and 4. Chapter 3 will explain the problem validation phase and the main concept of the proposed system,as well as the system architecture, while chapter 4 is all about the implementation of the system along with the usability testing will be explained in details. The discussion of the usability testing and the future improvements will be explained in chapter 5.Finally the prove of concept, limitations and possible extension of the concept will be discussed in chapter 6.

# Chapter 2

## Related Works

### 2.1. The Role of Technology

Technology has a great role in making better lives. Almost, everything deals with technology in one way or another. Every thing in life has its negative and positive sides, therefore, applying technology and computer systems positively, could enhance our lives and make things useful and helpful.

As Calvo and Peters explained in their book “Positive Computing”, there are some factors of wellbeing, which were categorized into three categories, self, social and transcendent [3]. People have different goals while interacting with computer systems. In some situations, they tend to learn and experience new things to satisfy their own desires. There are moments where people like to share their experiences with others and fulfill some social desires.

Worth noting that, there are a variety of computerized systems that aimed at enhancing human lives. Technologists care about users, they want to improve users experiences and their lives [3]. One significant example is the computer reservation systems (CRS) which was initially designed for airline agency. SABRE.com was the first reservation system in 1953 [15]. This system were designed to make the flights reservations easier, and reach the customers globally. It was used to automate the process of seat reservations [28]. Since then, the number of the CRS increased gradually and were used not only for airline purposes. Different types of businesses start to use CRS to reach more customers and increase their benefits. From the early 1980s, airlines, banks, retailers and even health care businesses

have been investing in information systems which allows the sharing of information between different organizations [15].

Internet based systems provide the customers with efficient services as well as it creates further opportunities to offer other online services [19]. There are more services to be added to the online reservation systems. Therefore, the researchers must understand human behaviors and practices [26] to be able to develop a service that matches with their needs and requirements. Adding technological values to the physical objects could change human interactions with it and make it more valuable. It provide different ways of thinking and interacting with the physical world [26].

## 2.2. Everyday Things

Some of the Everyday Things has its own functionalities, while other objects works as representatives of some popular places or objects. Souvenirs for example, are very cheap and could be found every where. In fact, these souvenirs obtained its strength from the real popular objects [21]. People usually prefer things and objects over other objects, even if it has the same functionality. The shape of an object almost has nothing to do with its owners feelings. Noteworthy, they tend to keep some of these objects even if it gets old , broken or sometimes not functioning at all. This is because, only few objects preserve peoples memories and becomes as a reminders for them [24]. People likes it because of the way it makes them feel [21], these feelings and emotions could reflect people, places or events.

What matters is the memories and emotional value. People are attached to the objects and everyday things if it has some emotions and good memories [21]. An example of the importance of the objects based on its value rather than its shape or material is the printed documents. People are surrounded with tons of documents and papers, but they tend to take care of some documents more than the other ones. A degree certificate for example has a strong value compared to other piece of paper. The object's value is what makes it special. Everyday Things contains histories and stories that should be maintained and preserved.

In their project, Manohar and Rogers tried to create digital memories for Ev-



everyday Objects, especially the objects with special memories. They conducted different case studies. The main objective of one of these case studies was to find out how to build a social connection, on which , people can share objects stories with others. They thought that, object's hidden stories could help in understanding families history and culture. At the end of their project, they proposed an artifact that works as interactive memory box. The proposed artifact must work as family archive, where they could store all stories, memories and emotional valuable meanings [16].

It is clear from their project that, some of the Everyday Things are attached with emotions and hidden stories. Usually people like to share such special stories with others. This could allow the future generations to understand the history of their relatives. It is worth noting that, if people could preserve these stories accurately as it happens, this will contribute in creating a kind of real History of Things and cultures. Objects are not seen as having its own biography, but it reflects its owners or people's biography instead [25]. Mostly, historians tend to study and interpret the history of old generations. Organizations spent a lot of money and effort to support history and cultural studies because of its significant role in life. There must be another direction in history studies. There must be a real consideration of the present days real stories rather than focusing on the past heritage [25].

Current actions and stories will turn to be treated as histories of the past in the future. This request people to preserve these stories as it happens. Most significantly, researchers should spend an enormous effort to find out how they could help people preserve their thoughts and feelings about Everyday Things in their possession. Purkis's approach in preserving real life stories was through creating some displays inside the museum, that could explain the life stories of immigrants to Ireland. A collection of personal clothing, samples from Everyday Objects, photographs and some filmed interviews were presented. In his project, he was able to present stories of different cultures in one gallery which helped the visitors to relate more with the presented objects and its stories [25].

People, students and historians could learn a variety of things from Everyday objects. The stories of home objects are different than the hidden stories of the objects that are presented inside museums. While dealing with museum ob-

jects, students could engage more with its history, people's history and all related stories [14]. Everyday objects stores peoples drama and reflect it back to the learners [14]. A better understanding of the objects leads to a good design of the technologies that could help in storing and accessing its memory and hidden stories [24]. A research on AutoTopography aimed at understanding the principle behind (mementos) on which the researchers defined the mementos as everyday objects that are kept as reminders of people, places or events [24]. They chose homes and families as participants in this case study. From the field work they found that, individuals within the family chose some objects as mementos, like everyday things, photos and artworks. Based on their findings, the researchers advised those who might design some technologies for personal memories to create the technologies that can support active remembering [24]. Their advice must be applied to the technologies that might be created to explain the stories and history of Everyday Things.

## **2.3. Understanding History**

People's interaction with Everyday Things, and the association they have with it is the main significant thing in its existence [21]. Different components can be combined together to make a new use of technology [26]. Therefore, a combination of some features could help in creating a new systems that could contribute in enhancing human relation with the physical world around them.

### **2.3.1 Learning Through Chronological Order**

Human brain is capable to learn and understand new things. Sometimes it is difficult to understand complex information presented in text documents. Timelines can assist people in making sense of time data which is mostly hard to understand [12] Jansson applied the timeline technique at Ida Infront, to help managers understand how employees has worked on a specific case. During his project, Jansson created interactive timeline to make it easier for employees to get the required data [12]. The reason behind creating interactive timeline was because timeline can not fit with the screen size which will not allow them to see the entire timeline at once. Events where grouped by weeks, months , years and

users where able to use icons to differentiate between different kinds of events. Janssons work support the idea of using timeline technique in this project, where students could find object's details all organized through the use of the time-line.

### **2.3.2 Usefulness of Data Visualization**

As it has been explained in the first chapter, data visualization plays an important role in communicating information to others. It helps the human brain to understand relationships and comparisons easily. Visualization is helpful for people, business leaders, admins and other viewers to make comparisons according to the presented data. It could encourage them to make effective decisions as well. IBMs Watson Analytics is one example of how useful data visualization is for business users. Their visual-based data helped everyone with a very basic understanding of spread sheets to gain valuable knowledge as well as discovering correlations and insights from data [10].Netflix as well used visualization technique to improve its business. They successfully make product improvements and they where able to check and fix problems quickly [9] Data visualization improves its usefulness in communicating information to other people and it was used widely by big companies like P&G. They tend to visualize data to their executives and business leaders to clarify gaps and uncover hidden opportunities [9]. In this project, data visualization is used to support both students and admin users. On the one hand, admin users will be able to check equipment's related information. Students as well will easily check all projects that were created with each tool which might be presented in videos and images, on which they could realize what tool is suitable for their projects as it was explained in the previous chapter.

### **2.3.3 Comment System And Users Behavior**

Comment system provide users with a big chance to express their thought about products, content or anything they are consuming [5]. Many studies and researches has been conducted to test or measure the impact of community feedback on users behavior. It aims at investigating whether their feedback can change users thoughts or if it can help them to take the right decision. From daily life observation, it is clear how the community feedback on any product could encourage

or discourage people from buying that product. If they post positive comments in social media about any particular product, this will increase users desire to obtain that product. On the other hand, if community's feedback was negative, users will avoid that product and discourage others from using it. This negative comments can be used positively by the product producers on which they will be able to analyze them to understand the main issue, solve problems and improve their product quality. A research conducted by Justin Cheng [5] as a contribution to understand the role of feedback mechanisms which are used in online systems. Their project's aim was to develop a methodology for studying the subtle effects of community-provided feedback on the behavior of content authors [5]. They validate their results on comment-based news communities. One of the main findings was, negative feedbacks lead to significant changes in other peoples behaviors. A research conducted to understand the usefulness of users comments [29] shows that, community feedback on already rated comments can help in filtering new unrated comments or suggest another useful but still unrated comments [29]. This proves how useful community feedback is. One of their research questions was, can comment ratings be an indicator for polarizing content?.

An analysis of user generated comments on media objects shows that users comments on place related topics where they describe physical phenomena may be seen as useful information for other users. Unlike users comments on persons or events [18]. In their study, in one side they discussed the idea of usefulness in context of social media comments. Usually, before downloading mobile apps, people tend to review the comment section in App Store , or GooglePlay. Positive comments encourage people to download the desired app while on the other hand, negative comments might lead them to think of some other applications. A research by Dennis Pagano and Walid Maalej conducted to investigate how and when users provide feedback and its importance on the user community [23]. In their work they noticed that, users usually comment to share their experience, to show bug reports or to request additional features. Their study shows that, users comments can help developers to understand users needs. This supports the reason behind adding comment system in this research paper. This paper apply the comment system to allow users express their personal experience. Their experiences could provide the school community with useful data and rich information

about school facilities. This proves that, students comments on school equipment may be useful and helpful for other users.

## 2.4. Implementation of Reservation Systems

Reservation systems vary. It has been widely used to connect people to different services. Digital libraries for instant; are one of the important implementations of reservation systems. It was created to organize information resources and to make it possible for its users to access the desired information. Recently, digital libraries becomes more active and it tends to create a sense of communication and collaboration instead of just providing access to the stored information [6].

Digital libraries becomes more like a preservation systems that could store and archive information for long term access. Its goal as a preservation systems is to make its information accessible and available for users over a long period of time [27].

Based on the author's online observations, the online reservation systems are implemented in some schools and universities, while some other educational institutions depends on the traditional printed reservation methods to manage the usage of their equipment and all other facilities.

Tufts University(USA) [32] for example, is one of the universities where online reservation systems are used to manage their equipment. Their system allow students to check the available rooms, equipment and seating capacity and then proceed for the reservation form. Another example is the reservation system at BROWN-school of engineering [2]. This system provide the users with an overview and some images about the available rooms or space along with the roles and restrictions. Users could check the calendar and make reservations based on the available space and time. At Boston university, the computer sciences lab uses online systems for meeting rooms and equipment reservations [1]. Their system allow its users to check the calendars for each building/department. Users could make reservations by filling out the reservation form on which they should write their personal details and other required details like the subject, description, date and time.

The current situation at Keio Media Design(KMD), which provide the students

with a variety of equipment, that are stored in different locations inside KMD. Media Studio as an example [13] , has an online reservation system on which students could check some of the available tools and make online reservations. This system provide the students with some general details like the name of the item, its image and the quantity. There are no other details or explanations related to each item and the calendar shows the booked items in general. One more example from KMD is the Hacking Studio. This is where students can find 2D and 3D printers, laser cutters, and some other machines and devices. Unfortunately, the students can use these tools randomly, whenever they want to OR they might be asked to make a reservation before using some of the available equipment like the 3D printers. This reservation is manual, on which students should write the reservation details on a printed reservation form.

However, although the current reservation systems allow the users to make reservations and access to the available equipment, there are still many missing services. Users are not actively engaged in these systems. They just receive information and make actions( Reservation). They did not get the chance to check all available equipment with its details, and visuals are not widely used. No examples on what can be done with these equipment or how to use them. Noteworthy, no real life experiences shared with the users and at the same time they do not have the chance to share their own thoughts and experiences. In educational communities, students usually learn from each others experiences and they like to exchange word of mouth about the tools and equipment they have used before. They usually ask their classmates for recommendations before using any tool.

Most significantly, there is a lake of storing the important details of each available equipment. Admin users are not able to perfectly control these equipment or to understand its status and its condition. It is difficult to know if an item was returned successfully or delayed, they mostly can not contact the users or get their opinions/ comments after using each tool. There must be a real consideration of the missing services to fulfill the users requirements, and achieve the main objective of this research.

# Chapter 3

## Design

### 3.1. Research Problem

The main problem the researcher is trying to solve in this project is “ Are we able to understand history of physical things in our life?” Are we able to have a clear idea about its hidden stories? What it has been used for? How or where it was used? etc. Our life is full of physical things which we deal with from the moment we open our eyes to start a new day. Therefor, the researcher decided to start with one field to test the main problem.

Being in Media Design university means dealing with a variety of tools and equipment. Cameras, printers, 3D printers, laser cutters, computers, etc. In this case the problem could be formulated specifically to suit with the physical things inside the campus, “ Are School students able to understand history of things and equipment which they usually use during their school life?”. Is it possible for them to know what projects it has been used used for? What kind of accessories they can use with it? How does the final output looks like? Was it used in the creation of any big or real projects? etc

School Tools and equipment are also defined as physical things which has its own life cycle. These tools has history and its history could be recorded based on its usage. It could be stored by its users on which they could explain its condition and productivity. Most importantly, is there anyone controlling these tools and tracking its status since its existence at school? If so, is it possible for the responsible person to get users feedback? Are students able to get some

information about the tools they are planning to use for their projects? Or even to report any issue related to the reserved item? Is it easy for them to select the right tool immediately? Are they interested to know what output was created using each tool? These questions refer to two different groups of people within school community. The person who is in charge of controlling the equipment and the students reserving these equipment for school projects.

This means that, the researcher must target two categories, tools controllers and its users. Getting feedback from the targeted audiences would be helpful to understand how they deal with the current issue. For this purpose the researcher conducted different surveys for each group to test the idea before proceeding on to the implementation. Both surveys contain a variety of points which all related to the main issue in one way or another.

## **3.2. Problem Validation Process**

Qualitative and quantitative methods were used to investigate the existence of this problem within school community. The researcher started by observing how school students usually get access to the required equipment for their projects. There are different booking systems used to control the renting process of these equipment which was also within the researcher's observation list. A questionnaire has been conducted to validate this problem, to understand if the student are aware of the history as well as the life story of the equipment which they tend to use during their school life.

### **3.2.1 Field work 1: Observations And Interviews**

There must be a clear understanding of the current situation to validate the problem as well as to understand its dimensions. The researcher started by observing school facilities in different locations like 6th floor equipment, Hacking Studio and Project Room. (Figure 3.1) showing some 3D printers from the Hacking Studio. Currently, if any student want to use the 3D printer they should write their name and other details in the printed reservation table (Figure 3.2). There are some printed tips on how to use the printers located in one place with the reservation table which could help students understand how to use that printer



as it can be seen from (Figure 3.2) and (Figure 3.3).

During this field work, the author conducted some face to face interviews. One of the participants is Mr.Kazuma Suzuki, a research student.He used to work as Students Assistant (SA) in Hacking Studio and he spent most of his time working inside Hacking Studio even after graduating from the Master's course. When the author asked him about how students usually use the equipment? He said that there is a tour for new students on how they can use Hacking Studio tools for their projects and the SA students also assist them if they ask for help. Unfortunately, most of the students didn't use the equipment properly and if they caused any damage like if they broke the device or the machine they do not inform the SA about it. Most of the equipment are free at any time for them to use, and this is good for the students but on the other hand it makes it difficult to control the equipment.

Another question was, Is it Possible for the SA to know how the machine were broken or by whom? Mr.Kazuma said it is difficult for the SA to know. If the students came and explain the situation to the SA, SA students will help them solve the problem or they will let them use another device while they fix the damage, But they didn't ask for help or inform the SA which make it really hard to control the equipment. It is worth noting that, the machines are very expensive and if anything was broken they spent a lot of money to fix it or to buy new accessories.There should be a good way to control these equipment.

George is another participant in this field work. George is a Master student who is working as SA also in Hacking Studio, his responsibility is to assist the students while using the PCB Router. He said that this machine is locked and it has only 3 keys to open it, and he have one of the keys. When any student wanted to use this machine they should ask him and he will then open it and explain how to use it.He said there is no problem with this machine and no damage because SAs always control it and make sure the users have clear idea about it before they let them use it and this machine is used probably once a month.

For some equipment, the users should use booking system to reserve an item for their projects. While observing the current booking systems at school the author checked how it works and how it help students find the right tool (Figure 3.5). The author also checked what information are available for SA students and if it

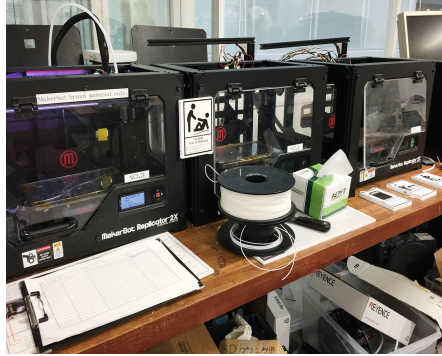


Figure 3.1: 3D printers in Hacking Studio

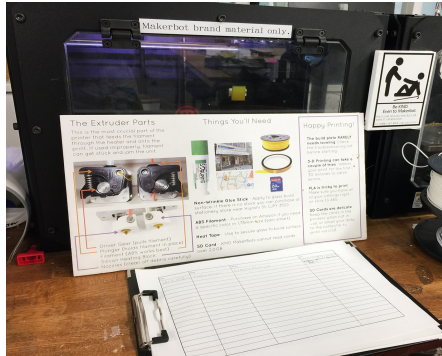


Figure 3.2: Information on how to use the printer and the reservation table

helps them to have a clear idea about the tools condition or not, as it can be seen from (Figure 3.4). Students could check the status of the equipment in general from the calendar as it can be seen in (Figure 3.6).

### 3.2.2 Field Work 2: Survey

#### Target Group: equipment Users

A total of 30 participants participated in this validation phase. All participants are students at Keio Media Design University(KMD) , Masters students (first and second years students) and PhD students. They have different backgrounds and experiences as they came from different majors like; Business , Communication, Multimedia Design etc.

It is worth noting that, the participants have experienced the equipment at KMD



Figure 3.3: Important tips for users

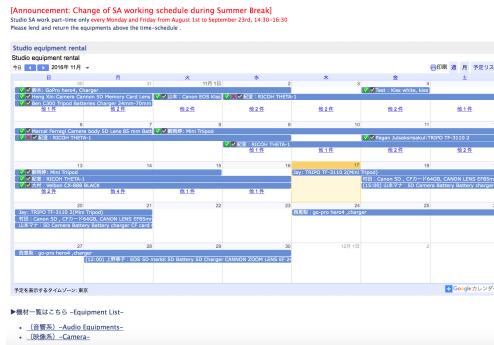


Figure 3.4: Screen shot of the current booking system of KMD Media Studio



Figure 3.5: Screen shot of the current booking system of KMD Media Studio : equipment list

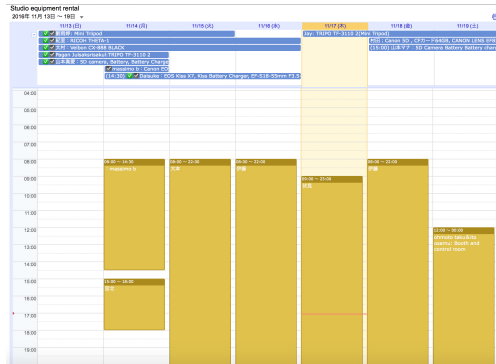


Figure 3.6: Screen shot of the current booking system of KMD Media Studio : Reservation Calendar

from their very first semester. They used the Hacking Studio equipment, mainly the 3D printers and laser cutters as well as some other tools from the Media Studio and 6th floor. The first question works as an ice breaker to understand if users are familiar with the equipment rented in 6th floor at school. Only 11 out of 30 students are aware of the 6th floor facilities. Mostly they tend to use cameras and its accessories like the tripods, SD cards, etc.

- What do you think about the current booking systems at school?

Responses vary, for some of them the booking systems are very basic and it doesn't provide any information about the current status of each item. Others commented on how complicated the current systems are and the lack of information and explanation provided. Some of them complains about not being able to find any information related to the equipment usage as well as the description of how to use these items.

- What kind of information you would like to find in the equipment booking systems at school?

Most of the participants are willing to have some information about the main features of the rented items as well as some tips and guidelines on how to use it. There were some suggestions to have booking system similar to the one used to book meeting rooms at school but they suggested to have an online system for the equipment itself. Most interestingly, they need to check the age of the item to

make a good decision. Being able to see the projects that were created using these equipment is a dream for most of the students and they are waiting for this dream to become true. Almost 85% of the participants wanted to check the availability of each item and when they could reserve it to be able to make their plans and set their projects timing.

There are questions to test if the students used to collect any information about the items they want to use. In this part, the researcher started with one tool as an example. The chosen tool is the camera because the camera is the mostly used item at school. In some situations the students will need to create a short movie for one of the projects. They went to borrow a camera from 6th floors equipment room on which the responsible SA provides them with different cameras, but the students are not familiar with cameras. How they are going to make the choice?

- What kind of questions you will ask?

Almost 50% of the participants shared the same answer for this question. They will explain the movie they are planning to create and then they will ask SAs for recommendations. The main reason is that, they are not familiar with cameras and they don't know how to select the best one for their project. Some other participants are willing to go for the easy to use camera so they can use it easily and finish their works without any difficulties. Most interestingly , some participants said that they will ask about the functionality and best choice for each environment either daytime or dark environments. Camera features and shooting resolution are the main concern for almost 30% of the participants. It is important for them to check the main features of each camera like the technical details, ability to record sounds, ISO level, storage, battery life..etc They would prefer to have explanation sheet with some comparison between all provided cameras.

- How do you tend to find the main features or description of that camera?

33% of the participants usually search for cameras features using Google where they could get a huge amount of information and visuals that could help them understand more. Others used to search online through official websites, forums or any online platforms. On the other hand there are around 10% of them tend to get information and explanations from people and specialists around them while

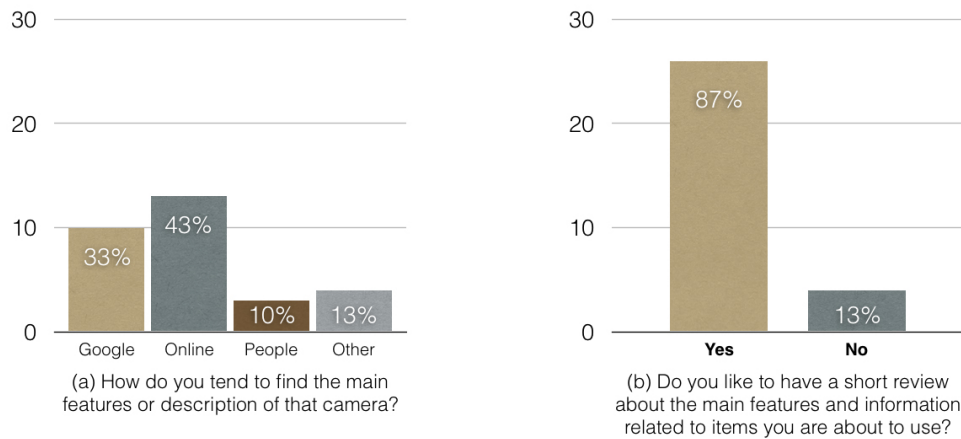


Figure 3.7:

the rest of the participants used to read manuals or explore the camera themselves. Figure 3.7(a)

- Do you like to have a short review about the main features and information related to items you are about to use? Why?

Almost 87% of the participants are interested to have some description or short review of the main features and information related to the items they are going to use. On the other hand, only 13% of them said they would like to try and find the important information on their own. Figure 3.7(b)

The following questions are specifically about school equipment to know how students collect or find information related to the tools they want to use for school projects. This is to be able to understand how they deal with the examined situation.

- How do you usually find or get information about school items?

Around 35% of the participants usually get information from friends, sensei, senpai, SAs or Teacher Assistants (TAs). 30% used the internet to search about that particular item. On the other hand, the rest of the participants are not interested to get information or explanation, they just borrow items and use them immediately. Figure 3.8 (a)

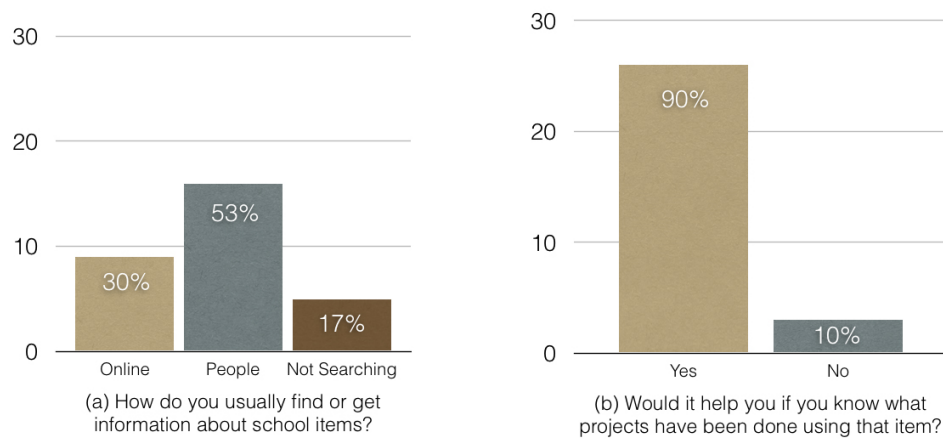


Figure 3.8:

- Would it help you if you know what projects have been done using that item?

Only 10% of the participants are not interested to see the projects which have been created using the same item they are looking for. On the other hand, and most interestingly about 90% of them are excited to get the chance to know what projects were conducted with that particular tool. Figure 3.8 (b)

- How about getting the chance to see that projects?

Almost 93% answers with yes. They thought this will be very helpful to have some references while choosing an equipment for their projects. They are willing to see the final output and compare it with other tools especially if it was used perfectly in some difficult environments and conditions. Figure 3.9 (a)

Questions to test if the participants are willing to learn from others experiences.

- Do you usually ask for recommendations before using any item from school?

54% of the participants always ask for recommendations before using any tool at school, while around 39% of them are not interested to get recommendations from others. Only 7% answered with sometimes because it depends on the tool and the situation. Figure 3.9 (b)

- Do you usually trust people's comments?

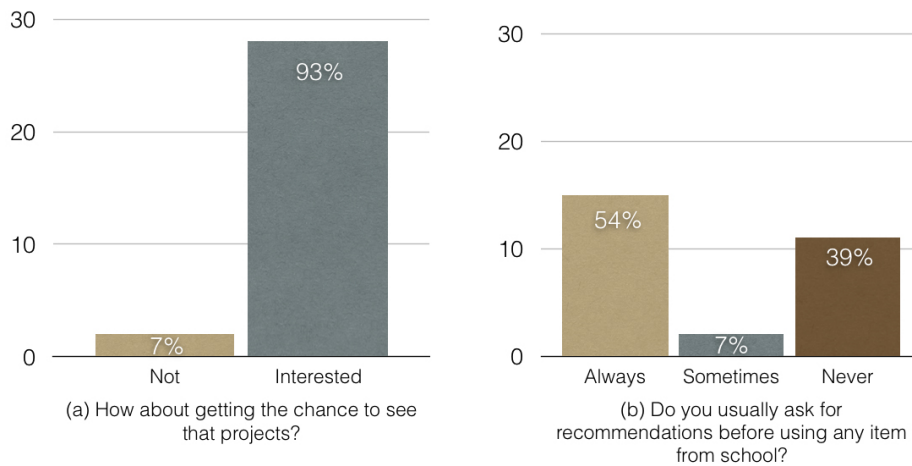


Figure 3.9:

Most of the participants trust people’s comments and here are some of their reasons: others comments make it easier to know a product, “Sometimes I made decisions based on those comments or I expect they have used the item previously”. Others tend to take the average , or if people comment positively with the same opinion then they will trust them. Some participants might trust any comment if it was followed by supporting comments under it. The platform on which they find the comments also could influence users to trust it or ignore it. If the comments are in an official website or forum then they will trust people’s opinions smoothly.

The following questions were used to test if they are willing to share their experiences with others

- Do you like to share your experiences with others? why?

Almost 57% of the participants likes to share their experiences with their friends, classmates and others. The reasons vary, it could be because they like to help others when they undergo the same experience ,or to help them save their time and avoid using the tools which is not functioning properly and check another useful tools. They are willing to help beginners as well because they usually tend to use professional equipment for simple productions. Some participants are willing to share their experiences only if others asked them or they could share it verbally



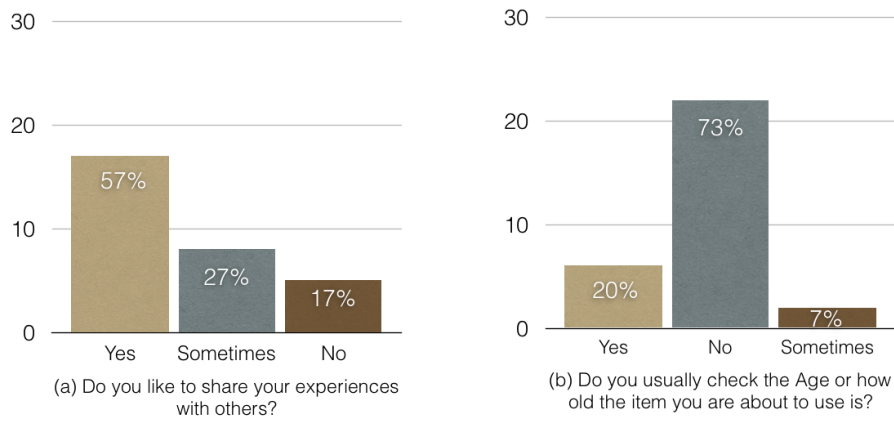


Figure 3.10:

without the need to write anything. Overall most of the participants tend to share their experiences with others very often. Figure 3.10(a)

Questions to test if they care about the age of the tools or equipment they want to use

- Do you usually check the Age or how old the item you are about to use is?

It is clear from the results that, almost 73% are not interested at all to check the age of the equipment. On the other hand the rest of the participants might check the age of the item just because of curiosity or to understand if it has been used too much. Figure 3.10(b)

- How much the age of the camera can make a difference in your choice ?

They don't care about the age of the item if it is still functioning perfectly. At the same time they might go for the new model because of the features and the final output could be much better than the old camera. For some participants, the camera must be 5 years old or less. It is clear from their answers that, the age doesn't matter if the camera works properly or they might make comparisons between the available models and make their decision based on that. If for instance, the old camera is complicated then they will go for the new one. Few of them would choose the new camera because it might be easier or at least they will be able to produce good works using that camera.

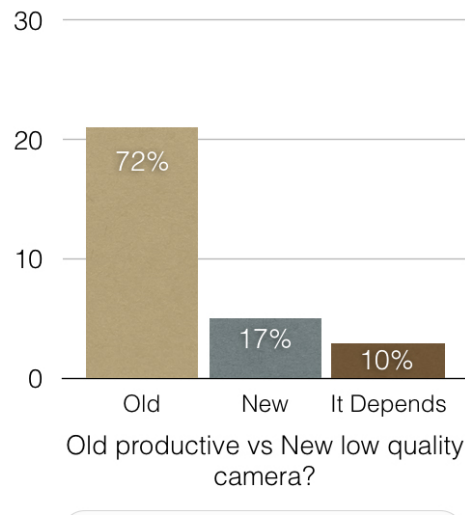


Figure 3.11: Old productive vs New low quality camera

- Old productive vs New low quality camera?

Productivity comes first, this was the answer of more than 72% of the participants. The rest of the participants might go for the new one because it could be reliable, has new technological features or they might become familiar with its features easily and therefore avoid extra problems. For some of them, they thought the new cameras has good sensors quality and it must be easy to set up. Figure 3.11

- The last question was for participants thoughts and suggestions

They suggested to have a user friendly booking system for school equipment which could be used easily by beginners. They gave some comments about the current booking systems as well as some suggestions to have Interface with easy navigation. For some participants, they wish if there would be one system for school meeting rooms, equipment and everything they use during their school life. Finally, there is a suggestion to have an inventory system for 6th floor equipment.

### Target Group: equipment SAs

The second part of the survey field work was for SA students. There are few SAs at school therefore the researcher were able to conduct the survey with 3

participants. It was necessary to include SA students in this field work to have a clear idea on how they manage the tools and what scenarios they have with the users while using these tools and the booking systems.

- What do you think about the current booking system? What would you like to change in the current booking system?

For the first and second questions, the participants thought that, the current booking systems are complicated and it needs some improvements to make it easier and more user friendly. They would like its usability to be enhanced to make it more effective.

- What are the most important thing you would like to have in the equipment booking system?

SAs are willing to add some important features to the current booking systems. They would like to have a list of the available equipment to help students to check what items they can use from that department. They also would like to have the possibility to check the rented items and all reservation details to be able to manage them in the right way. Some of them suggested to add more features and information to make their job clear and easier. And the last thing is to have this system in both english and Japanese.

- Are you satisfied with the calendar ? Do you think that, students can understand the written details inside it?

All participants are satisfied with the calendar and the way it works. They can understand it easily but they said it might take some time if the user use it for the first time.

- Do you think students can understand the written information in current booking system?

Two of the participants answered with yes. Students can understand it because SAs used to explain everything to them every semester. One of the participants thought that it is hard for the students to understand the written information in the current booking system.

- What kind of information students usually ask for?

Students usually ask the SAs about the available equipment and they ask for some explanations on how to use these equipment because they have not used them before.

- Do students return items on time?

Mostly, the students used to return the equipment on time but sometimes they do not.

- Are you able to follow the delayed items?

The SAs used a very traditional method to track the rented equipment. They use sticky notes on which they write the reservation details and the due date. They keep checking these post its everyday to make sure they are not missing any item unreturned. Some participants said that they sometimes missed the due date and didn't track the delayed items.

- What are students comments about any tool when they return them?

They sometimes commented on the amount of time they have for each equipment, they thought the time is not enough. But mostly they just return the items without giving any comments.

- Do they ask for explanation about the main features of the equipment?

Yes they do, some students ask about the main features or how to use the items but others just reserve the equipment and leave.

- Do they tend to use the old items or the new ones?

Students mostly reserve any item that fit with their requirements without asking about the age of the item. They tend to use both new and old but some times they go for the new one especially for new easy to use cameras.

- Are you able to know if an item was broken or lost? How?

One of the participants said he never check the equipment when students returned it to them while on the other hand the rest of the participants said they have check list to check every tool immediately when users returned it back.

- Would it help if you could find users comments about each item? (eg. This item doesn't work properly, I like this tool, could not understand how to use it or this item was broken and there is something missing...etc)

Participants said they used to answer users questions when they ask about anything prior to the reservation. They are willing to know the users comments if it is about the condition of the rented equipment. They thought that will be great and helpful for them to manage and control the tools perfectly.

- What kind of details do you think must be included in any booking system at school?

Participants are missing a variety of important features in the current booking systems. They would like to be able to track the rented tools and to be able to contact the users if they were behind the due date. They would like to make it possible for the users to check the availability of each item and for how long they could borrow any particular item. They are also willing to have more information on how to use an item or at least its main features. Some of the participants want to get access to the users contact information like their email account, phone numbers and their names. Most interestingly, they wanted to have notification alarm to notify them when it is the due date for any booked item.

### **3.2.3 The Proposed Solution**

It is clear from the results of the problem validation field works that there is a problem in understanding the history of the physical things inside school. The students are willing to be able to learn more about the items and its main features, find a list of all available items and check its availability during that particular time and to see some projects that have been created using school equipment. Students are also willing to have an easy system to make their reservations and they are interested to share their experiences with others and learn from them at the same time.

Moving to the Students Assistant (SAs), they wanted to be able to control the equipment in a different way to reduce the damage and increase its usability and its life time. SAs are not able to track the delayed equipment in an convenient

way and they are willing to have a modern method to control the reservation process instead of using the traditional ways like the post-its or the printed reservation table like the one used in the Hacking Studio (Figure 3.2). Based on the results of the problem validation process the researcher decided to create a system that could help equipment users build clear understanding of the tools they are about to use, understand its history and get to know how the outcome might look like. This system could help in recording the equipment history based on its usage and users experiences. To make things easier for students, the researcher decided to help them with a convenient method on which they could spend less effort and get helpful outcome. The author proposed a new booking system which could enhance the relationship between students and school equipment. This is the common and the most useful way to solve the current problem. Students are more likely to use booking systems to borrow any equipment and at the same time their reservation could be recorded within the items history immediately.

### **3.3. Designed Artifact**

Equipment web-page was designed to achieve the main objective of this project which is enhancing students understanding of the history of things or schools' equipment. The history timeline, item description and and the comments features will help school members to relate more with school artifacts through the ability of posting their personal experiences as well as getting useful information and following the history timeline of each item. The next part of this chapter explains the designed system deeply and the formulated hypotheses.

#### **3.3.1 Design Concept: HoT**

From the problem validation process, the researcher were able to understand how school community interact with the available physical things or equipment. Based on this understanding, the author proposed a new system that could solve the main problem of this project which is “ Are School students able to understand history of things and equipment which they usually use during their school life?”.

The proposed system is the History of Things web page (HoT). The goal of HoT system is to help school community understand the history of the physical things and equipment. At the same time, HoT is designed to record the history of the equipment based on its usage and its life-time within school community. HoT tried to achieve this through web page that consist of four main parts, item's main features, its history, user comments and finally the reservation form.

The displayed information in the item's main features part forms its identity. This is were users can find the name, model number and all technical features. The History part is the most important part. This is where users will be able to learn about the past of the item and they could access all projects that have been created using this item. The comments part is where HoT users could share their experiences with others and learn from others at the same time. Finally the reservation form, this is where they should go if they decided to use any particular item. Using this reservation form, some important details will be stored within the item's history. There are some additional features that can contribute in the items history like the pop up calendar for each item and the availability indicators beside the items image.

### **3.3.2 Design Process And Architecture**

Website development is not just interactive interface decorated with colors and typography. There are a variety of elements working together to give the website its functionality. In the next part the author is going to explain the system architecture of the designed artifact.

#### **Process Model**

To understand how everything works in this system there is a need to explain its process model. The process model explains how the data is processed and how it flows within the database tables to gather the desired information. In the next part the author explained the main parts of the process model which are the Functional Decomposition Diagram and the Data Flow Diagram.

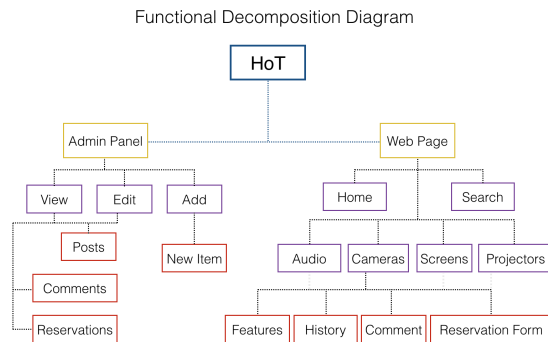


Figure 3.12: Functional Decomposition Diagram(FDD)

## Functional Decomposition Diagram

The system's decomposition diagram simplifies its functionality. This diagram explains the top down system structure. It started from the main element and continues to each individual element on which it represents their relationship to each other. As it can be seen from the (Figure 3.12), the functional decomposition diagram started from the title of the project/web page. The second main entities are the Admin Panel and the Web Page. The admin element flows down to show the main responsibilities and functions of the admin user which are, add new equipment/edit data and view item reservations ,user comments as well as the main content of the web page. On the other hand, the web page element represents the users main functions on which they could search, browse the main content, reserve an item, view equipment general history and share their own comments.

## Data Flow Diagram(DFD)

Data flow diagram (DFD) is one of the former steps of any system design. This graphical diagram shows the input and output information which flows from the system or enter to the system and it shows where this data going to be stored. (Figure 3.14) and (Figure 3.13) show the DFD of the user and Admin users.



### Admin DFD

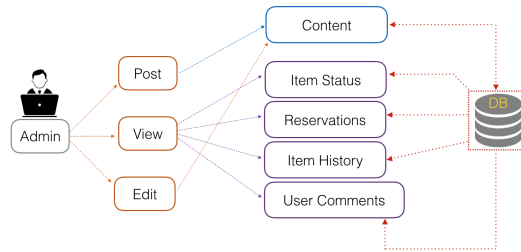


Figure 3.13: Admin Data Flow Diagram(DFD)

### User DFD

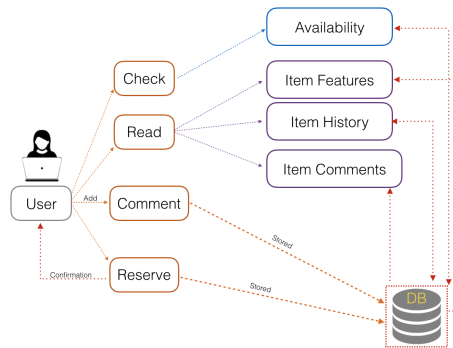


Figure 3.14: User Data Flow Diagram(DFD)

## History Time-line

The proposed system was built as a dynamic website called History of Things (HoT). A working prototype was developed to realize the main idea of this project. This dynamic website is supplied with all necessary functions to achieve the objectives of this research. The front end of this website was developed using html,php,css and jquery with Adobe Dreamweaver and Brackets. A jQuery plugin were used to make an interactive, historical timeline (Timeliner.js by Tarek Anandan) [30] In this project, history timeline is created as a management system to help both students and admin users to understand school equipment history. Admin users will be able to realize the most used items as well as the time where students demand increases for each item. This system could help them organize and follow any delays. To examine the effectiveness of history timeline of school equipment, a prototype has been created for one item. Based on observation, mostly the students need to create promotional videos for their projects, therefore they used school cameras to create high resolution videos. Based on that, the first timeline was created for school cameras. As the main objective of this project is to enhance peoples understanding of history of things. This system was created to help two types of users, school students as well as the admin users.

The timeline consists of list of years and items that has been purchased during any particular year within the timeline. This timeline started from 2007 the first year of KMD as graduate school. The researcher spent some time collecting the items and its important details which matches the requirements of this project. The most important information people must find in order to understand the history of anything around them are the years,months and dates on which an item was bought and used at school. Items names and its main features are also one of the necessary things for people to know. The fact that, some items are old and were used in variety of projects or activities inside the school which added some extra details to items lifetime. These details are also important in one way or another for users to have a clear idea about that item and how successfully it was used. To summaries, the main details which were targeted in this project about each item are the date, item name, main features and main events or projects produced by that item. These are all necessary to build the basic structure of the timeline while other details will be added through the future use of each item.

Students could understand the history of each camera, its age, features and how many successful projects were created using that particular camera. This could guide them to choose the camera which can fit with their projects requirements.

### **Comment System**

As mentioned before, word of mouth plays a very important role in understanding history. This is called as oral history, where people usually tell and explain events based on their experiences and on what they have heard from the previous generations. It is necessary to involve people to tell their personal experiences about using any tool or services. Social media and many different forums tend to give their users the chance to express their feelings and opinions about a variety of things. People are willing to share or write their experiences if they are not forced to do so. The proposed system uses commenting system to allow students to express their personal experiences while using any particular item and sharing it with their friends or other users within the school community. Future users as well could benefit from this commenting system. They will be able to find some information and explanation about the desired item, which will save their time by getting real information instead of asking for recommendations. Commenting system in other product stores and online systems as mentioned in previous chapter, proves how users could use other people's feedback to make any decision towards the items they are about to use.

### **Search System**

People tend to use search systems to fulfill a specific needs or purposes. In this online system, search function is used to help users to find the desired items quickly. They could search for items and its related information through the use of this feature. This will help them to find what they are looking for in a very short time. In addition, they could narrow down the search results by searching in each category which will bring results from the same category. Key words will be added for each item, therefore whenever they search using any of the keywords they will get the intended results. It will also show results based on the content itself.



Figure 3.15: User Data Flow Diagram(DFD)

## Reservation Form

Like any other booking systems, reservation forms are used to get some important details from the users. These details were created to fulfill the requirements of the booking system in general. In this project, the reservation form is used as a tool to make it possible for the users to reserve an item and then to store the reservation details in the history of each item see (Figure 3.15). Users will not be able to use any item with out filling all important details within this reservation form.

## Item Availability Feature

A new feature added to this online system which could help users to confirm whether an item is booked or available. A little blinking word is written under each item's image which show its status at that time. This could save users time while getting a quick idea about the availability of the items they are looking for.

## Calendar For Each Item

Having calendars in any online system is important. Calendars assist users to check the date and time on which they are planning to borrow an item or service. Usually these calendars are placed in one page while users go back and forth to check the dates that matches with their requirements. In this proposed system, a small calendar will be attached for each item on which users could check the availability of each item immediately. They do not have to chose an item and then to go back to the calendar to see if that item is available or not. Through

the attached calendars users will be able to define dates on which that particular item could be booked or the available amount of time they will have for each item.

### **Review or Description Feature**

Usually, users tend to understand more about products or items before using them, at least the main features to decide whether they will use it or they need to find something else. Most often, users tend to ask others if that particular device is useful or useless. They also read about products information and consumers choices. Users mainly ask about the main features like quality, resolution, powerful or not and the speed of productivity, which will be summarized in the item features part.

## **3.4. Hypotheses And Expectations**

Some expectations and hypotheses were established in advance. The main hypothesis in this project is:

“ By properly managing everyday objects, their history will be preserved accurately’

There are a number of expectations as well:

- Through this new system, the awareness of objects identity will increase.
- Through this new system, the interest in sharing experiences can be raised.
- Through the use of the proposed system, Objects hidden stories will be revealed

The main hypothesis were formulated based on the main objective of this project, which is to enhance people’s understanding of history of things in daily life. While the expectations were formulated to test the objective of the current case study, which is related to students understanding of history of everyday objects within school community.

The new system aimed at enhancing users understanding of the history and hidden stories behind objects they tend to use. When they start to use this system they will get access to more information related to the objects which will enhance their relation with each object through having clear understanding of its identity. They will get the chance to express their feelings and experiences through the commenting system which will allow them as well to learn from others experiences, this could increase their interest in sharing experiences. Users will be able to learn more about each object as its stories will be stored based on its usage, and all works that were created using that object will be shown in one place which means that the hidden stories will be revealed.

Good management of the objects and everyday things could lead to a good preservation of its history, as its history will be stored based on its usage. This hypothesis will be evaluated through a comparison between users understanding of the stories and all related information of each object in the current situation and after the implementation of the new system. The amount of stories, works, usage information of each object will help in proving that the good management of the objects could lead to a good preservation of its history.

# Chapter 4

## Implementation and Evaluation

The implementation was divided into two sections. User interface and admin user panel. The UI design of both sections will be explained in this chapter, followed by the evaluation methods and some explanations about the usability testing process.

### 4.1. User Interface

#### 4.1.1 Time-line

Years are presented in rectangular blocks and under each block the users will find list of items that were bought during that year. Items were listed within the timeline on which old items located on the bottom part of the timeline while the new added items positioned on the top part. All items will be organized automatically as each new item will be listed on the top part. To make this timeline more accurate, the exact date on which any item were bought or the date they started to use it at school will be added for each item. By clicking on the items name the view will be extended to show some important details for that item. The purchase date, short introduction and a small image presented in square shape at the right side of the items introduction. As it can be seen from the (Figure 4.1) under each item's picture there is a plinking availability indicator which shows the current status of that item. Items that has the availability indicator as "Available " means that, this item is available and you can take it

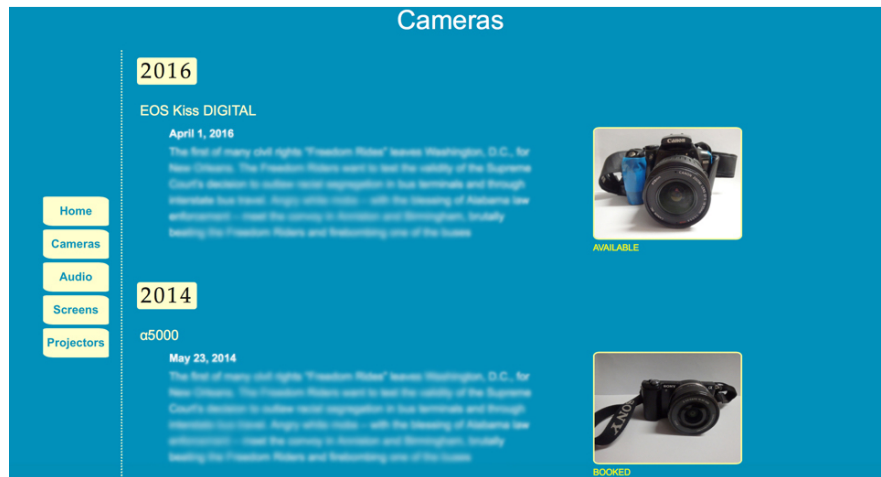


Figure 4.1: Availability indicator (Available , Booked)

immediately after your reservation. On the other hand, items with the availability indicator as “Booked ” means that, this item has been booked by another user and it is not available right now.

When ever the user hover on an item’s image, a small calendar will pop up on which they could see the days were that item is booked or available. The booked days will be highlighted in yellow while on the other hand the free or available days will remain normal with no highlights. This could save the students time by checking each item’s calendar immediately without the need to move from the item’s page to the calendar page. Users could also decide from this stage if they will go on and continue exploring the history of that item or they will need to move on and check other available items. They could also compare between the available days of each item and match them with their own schedule and then decide what can work well with their time limitations.(Figure 4.2) Users could navigate to the item’s profile by clicking on the picture which is located beside that items introduction. This will take the user to to the item’s profile where they could find extra information about that particular item. Inside each item’s page users will get the chance to use four different functions which will be explained in the coming subsections.





Figure 4.2: Pop up Calendar for each item

## 4.1.2 Item Description or overview

In this section, users will be able to read more about that particular item, either general description or the main features. (Figure 4.3). The information presented in this part were summarized from the items original website or any other related website. Admin users will take the main important details and add it to the items profile with the main site link which could allow users to visit the main source for more information. They will just summarize the key points and the main features that could create a clear understanding for this system users.

## 4.1.3 Item History

This part is where users could see information related to that item based on its usage at school. (Figure 4.4) This will show the project name, date and user name. Users could check the projects that were created through the use of that item. To do so they will find a blinking indicator which is named as “History”, by clicking on this indicator or the image under items history section, users will navigate to the history page. Information will be added to the history page immediately based on the usage and the reservation of that item. History page plays a very



Figure 4.3: Information and main features

significant role in this system.(Figure 4.5) The design of the item history timeline is similar to the main timeline. This timeline is vertical and consists of the name of the item and list of years. The years list was created based on the usage of the item during its lifetime at school. Users could view all projects created with that item. Once they click on the year the view will be extended horizontally to show the projects name, date and title. Users could check the real project through the URL links or in some cases it will be linked to a small picture within the same year's view. These projects vary based on the item's category, if this item is video camera, users will be able to check all short movies or videos that were created using the same video camera. On the other hand, if the item is a still camera, then the user will be able to check the full sized picture in high resolution. This feature could support users and encourage them to take strong and clear decisions of the appropriate tool for their projects.

#### 4.1.4 User Comments

As explained in previous chapter, oral history is an important method for exchanging history between generations.This is why the commenting box was added to this online system. Commenting system in the items page was created to help users get quick understanding about that item based on real life experiences.



Figure 4.4: Item history

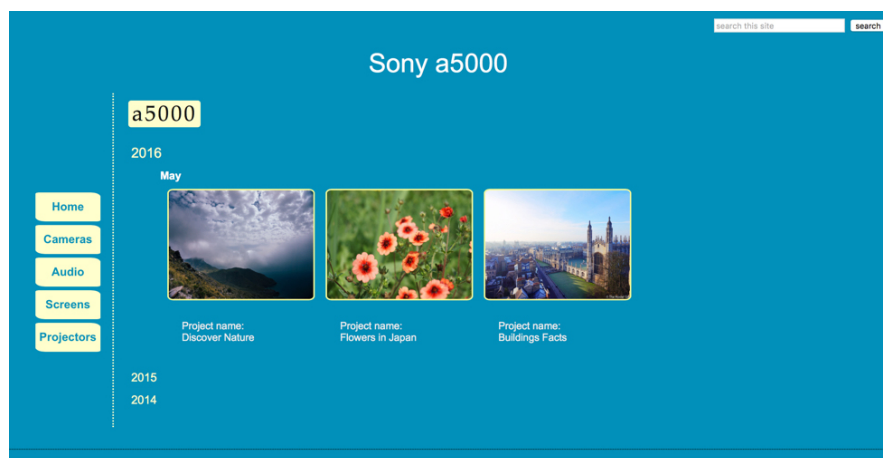


Figure 4.5: Works created using this item

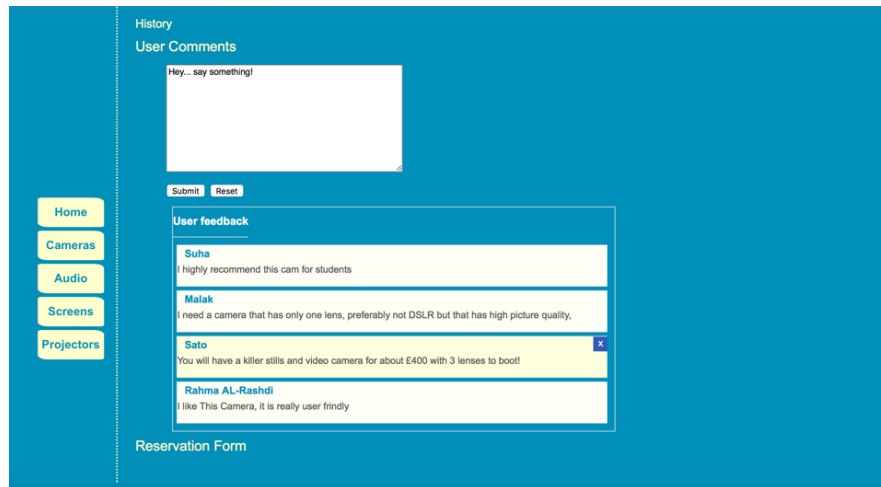


Figure 4.6: Commenting system for user comment

Users comments will be reviewed by the admin users as well to check related problems or issues related to the same item and therefor take the necessary actions to enhance the functionality of that item. By clicking on “User Comments ” the view will be extended to show the commenting box where users could express their opinions and personal experiences.(Figure 4.6). Users could write and submit their comments which will be send to the database and directed back to the items profile under the comment box where users just expressed their thoughts. These comments will be presented with the user name and the date will be added automatically. It will be organized chronologically where new comments will appear on top of the other comments. Users could also reset their comments before submitting by clicking on the “Reset ” button.

#### 4.1.5 Reservation Form

Reservation form is significant for users to be able to reserve and use an item. There are some specific fields the users will have to fill out. These fields are also important for the history timeline of each item. As has been described before, item history will be recorded based on its usage within the school community. The reservation form is the immediate and direct method to get necessary details for each items history.(Figure 4.7).

All fields are required to make sure that the history details are recorded accu-

The image shows a web form for item reservation. At the top left, there is a red asterisk and the text '\* required field.' Below this, the form contains several input fields: 'Item Name:', 'Project Name:', 'Student Name:', 'Student ID:', 'Email:', 'Date:' (with two sub-inputs separated by '\* to \*'), and 'Time:' (with two sub-inputs separated by '\* to \*'). A larger text area labeled 'Purpose:' is located below the date and time fields. At the bottom left of the form is a 'Submit' button. A blue callout box with a white border points to the 'Submit' button, containing the text: 'Item reserved successfully... You can receive your item from 6th floor ; UHYO sensei Office'.

Figure 4.7: Item reservation form

rately. Users will start by writing item name as well as the project name which will be stored inside the database and redirected to the item profile exactly under the history section. Then, users are required to add their name, student ID and email address which are important details for items history as well as the admin users to check or follow an item if there is any delays. Users are required to write the purpose behind their reservation of that item either for personal practice or real project ..etc. This is important to get some details about how successful an item is based on its life time at school. Finally, users can confirm this reservation by clicking on submit button on which a notification will pop up to show them the location and the room number where they can take that item from if they finish this reservation successfully.

## 4.2. Admin Panel

### 4.2.1 Admin login

Admin users must log in/out to manage and update the content of the web-page. Only authorized admin users could access this page and apply necessary changes. This is an important step to insure the security of the web page. In this



Figure 4.8: Admin login page

project, admin users are required to write their username and the user password. (Figure 4.8) shows the admin login interface.

### 4.2.2 Home page

When admin user login successfully, there will be a welcome word followed by the name of the user on the top part of the navigation side bar. Admin home page is divided into three main parts, Title bar, navigation bar and main content area. While navigating through any linked page on the navigation bar, the content will appear within the content area. (Figure 4.9) Admin user will have different options to manage the content of the main webpage as well as to manage the equipments itself. They will be able to view all posts, insert new post, view users comments as well as viewing the reservation process.

### 4.2.3 Insert New Content

The Insert new post link will direct the admin to another form. (Figure 4.10) shows the insert new content form. Using this form, admin could add new content to the timeline webpage. The very first thing they should add is the year. If they added new year to the timeline then the item will be added under that

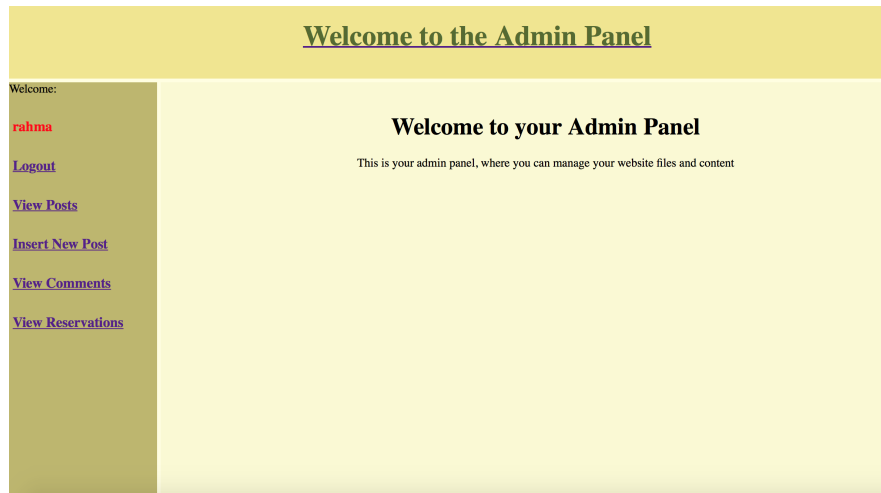


Figure 4.9: Admin home page

year. In some situations, admin might add new item under the year that they already added to the time line, in this case the new item will be listed under the existed year. The date on which this item is added to the timeline will be added automatically by the system. The second important detail for the timeline is the name of the item. The category of the item will specify under which page that item should be directed. If the new item is an camera, then the new item with its content will appear inside the Cameras Time-line. Key words must be added for each item which is supposed to help users find the desired information while using the search system. In addition, the admin could add an image for the new item by clicking the choose “file” button on which the admin will be directed to select that item’s image from the computer files. Item image will be presented inside the timeline and it directed to the images folder inside the web-page resources folder to be saved. The last thing is the content of the item which includes the item’s review and its main features. Few lines of this content will be shown within the timeline while the full content will appear in the item’s profile page. To post this new item and its related information inside the timeline web-page, the admin should click the publish now button. An alert message will appear if the item is posted successfully or if there is any empty field inside the form.



Figure 4.10: Insert new content page

#### 4.2.4 View posts

To make it easier for admin users to manage the web-page content, a table was created to allow them check all posted content. This table show the timeline basic information like the year, item name, category, images and the content or the descriptions they added for each item.(Figure 4.11) Most importantly, they could delete any item using this table on which that item will also be removed from the database and the timeline as well. To make it more flexible to manage items content, Edit option has been added on which admin users could edit each items content or replace the images and do all necessary changes.

#### 4.2.5 Edit Posts

By clicking on the edit option, the admin user will be directed to the “edit posts” page (Figure 4.12). The old content will appear inside this form and they could select any part and do all necessary changes. After editing the items content, they should press update now button and the content will be updated on both the timeline web-page and the database at the same time.



**Welcome to the Admin Panel**

Welcome:

**rahma**

[Logout](#)

[View Posts](#)

[Insert New Post](#)

[View Comments](#)

[View Reservations](#)




View All Posts								
Post No	Post Date	year	item_name	item_category	Post Image	item_content	Delete Post	Edit Post
28	29	2013	HC-V210M-1	Camera		38x Optical Zoom Lens Back Side Illuminated MOS Sensor 2.7" Tilt-able LCD Screen Full HD 1920	<a href="#">Delete</a>	<a href="#">Edit</a>
27	29	2009	HDC-HS100-1	Camera		The HS100's intuitive design not only feels good; it is also very easy to shoot with. The feature th	<a href="#">Delete</a>	<a href="#">Edit</a>
26	29	2009	HDC-HS100-1	Camera		The HS100 provides the standard	<a href="#">Delete</a>	<a href="#">Edit</a>

Figure 4.11: View all content page

**Welcome to the Admin Panel**

[Logout](#)

[View Posts](#)

[Insert New Post](#)

[View Comments](#)

[View Reservations](#)

**Edit Content Here**

Year:

Item\_Name:

Category:

Post Keywords:

Post Image:  no file selected

Item\_Content:

Figure 4.12: Content editing page

**Welcome to the Admin Panel**

Welcome:

**rahma**

[Logout](#)

[View Posts](#)

[Insert New Post](#)

[View Comments](#)

[View Reservations](#)

View All Reservations									
Reservation ID	Item name	Project Name	Student Name	Student ID	Student Email	Purpose	Time Stamp	Returned	Delayed
51	HC-V210M-1	Creato	Rahma Ahme	76543646	rama@me.com	Creating some short films for the real project	2016-05-29 18:46:44		
45	Proxima	Play	Malik	768678547	malik@mali.com	check unity 3D game check unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D gamecheck unity 3D game	2016-05-28 18:33:42		
41	Nikon	Okies	Maria	7549583	mar@her.com	as you like	2016-05-27 16:17:18		

Figure 4.13: View all reservation page

#### 4.2.6 View Reservations

The new feature in this system is that, admin users could check if items were returned on time or not. If students did not return an item then an alert indicator will appear for that item under the “delayed” field. This is what admin users need to take an action based on the item status. They could contact the user who reserved that item and ask him to return it immediately. This table will help admin users view the reservation process for each item. All reservation details will be presented in an organized way. This table could show the history timeline for each item. The Time-stamp will show the exact date and time on which an item was reserved.(Figure 4.13) Students name, email, and student ID will be shown to the admin so they can easily check and follow that item. They could check the purpose that item was used for as well as the real project name. All of these tiny details are significant in the history timeline of each item. It is significant to realize one of the main goals for this project which is to record the accurate history of things in daily life.

#### 4.2.7 View User Comments

One important thing admin users should get from this system is the users feedback. To manage each item and understand its history timeline, admin users

Welcome to the Admin Panel					
Welcome:					
rahma					
Logout					
View Posts					
Insert New Post					
View Comments					
View Reservations					
View All Comments					
Post No	Comment Date	Student Name	Item_name	Item_category	Student Comments
64	2016-05-29	demooooo	HDC-HS100-1	Camera	check the functionality
64	2016-05-29	demooooo	HDC-HS100-1	Camera	check the functionality
64	2016-05-29	demooooo	HC-V210M-1	Camera	check the functionality
63	2016-05-29	demooooo	HDC-HS100-1	Camera	check the functionality
63	2016-05-29	demooooo	HDC-HS100-1	Camera	check the functionality
63	2016-05-29	demooooo	HC-V210M-1	Camera	check the functionality
62	2016-05-29	demo	HDC-HS100-1	Camera	test test test
62	2016-05-29	demo	HDC-HS100-1	Camera	test test test
62	2016-05-29	demo	HC-V210M-1	Camera	test test test
61	2016-05-28	hi	HDC-HS100-1	Camera	her
61	2016-05-28	hi	HDC-HS100-1	Camera	her
61	2016-05-28	hi	HC-V210M-1	Camera	her
31	2016-05-27	Me	HDC-HS100-1	Camera	Can you hear me?
31	2016-05-27	Me	HDC-HS100-1	Camera	Can you hear me?
31	2016-05-27	Me	HC-V210M-1	Camera	Can you hear me?
30	2027-05-16	Rahma	HDC-HS100-1	Camera	Hello from the same side
30	2027-05-16	Rahma	HDC-HS100-1	Camera	Hello from the same side
30	2027-05-16	Rahma	HC-V210M-1	Camera	Hello from the same side
12	2016-05-20	Rahma Al-Rashdi	HDC-HS100-1	Camera	here we have another comment
12	2016-05-20	Rahma Al-Rashdi	HDC-HS100-1	Camera	here we have another comment

Figure 4.14: View all comments page

will need to check all positive and negative feedback from the users. To achieve this in an easy way, the admin could access the view comments link which will direct him to “view all comments” page.(Figure 4.14). Users comments about any item will appear on this page. This page consists of a table that contains all important details. The admin could check item’s name, its category and users comments. The date of the comment and student name will also be added into this table. Suppose there is one feedback about a broken item, admin user will be able to see the comment date and the name of the student who added that comment and get more information about the broken item. Through this the admin could take the appropriate decision, they could fix that item, replace it or order a new item.

### 4.3. Evaluation Method

A combination of quantitative and qualitative methods were used to evaluate the effectiveness of the new system. As it has been explained before, the new system consists of two parts: HoT web page and the Admin Panel. Two different questionnaires conducted to collect data from two different target groups. The HoT web page questionnaire was designed to evaluate users reactions while experiencing the new system. It asks various questions to know if users understand

the purpose of the system and their opinions about the graphics and the navigation system. The questions also asked the participants if they could find what they were looking for or if there is anything missing they couldn't find. Some parts of the questionnaire were designed to know if users liked the system and they are willing to recommend it to their friends or not. Some other questions to evaluate some additional features like the pop-up calendar for each item. The rest of the questionnaire was about users opinions, suggestions on how to improve this system and finally their overall feelings about HoT system.

The second part of the evaluation was designed to test the Admin users (SAs) and collect some important data from their experience while using the Admin Panel system. Like the previous questionnaire, this started with some questions about users opinions about the graphics and the navigation system. There are some questions to know if this system could help them control school equipment or not, or if they are missing some important features that they would like to have in this system. Some other questions to understand what they think, their suggestions on how to improve this system and what they like/ dislike about it. The last part was designed to measure their overall feelings while using the new admin panel. All questions will be explained in later parts of this chapter along with the results. In the next part the researcher will discuss the limitations, the evaluation target group and the evaluation settings.

### **4.3.1 Limitations**

The evaluation phase was conducted to evaluate users reactions while experiencing the new system. In fact, this phase was conducted to test the first prototype of the proposed system. This prototype was not functioning like a real finalized system due to the limitation of the project time as well as the technical background of the author. Instead, the author explained how it is supposed to work and then let the participants experience it themselves, at least the well functioning parts. Another issue was the number of the participants to test the admin panel, because there were only few SAs who were able to participate in this evaluation.

### **4.3.2 Target Group**

The proposed system was designed to be used at Keio University, Graduate School of Media Design (KMD). Therefore, all participants were students from KMD. There are 20 participants from different grades, First and Second year master students and others from Doctoral program. The participants have experienced the equipment reservation systems at school and they have used some tools for their projects. Some of them are a bit familiar with some tools while others are not confident to use any tool without having someone to assist them. There were a total of 5 participants from KMD SA students to test the Admin Panel system.

### **4.3.3 Evaluation Settings**

The evaluation test was conducted using the author's personal computer. This testing process took place in some meeting rooms, classrooms as well as the project rooms where the researcher selected the participants and asked them if they have some free time to try this new system. Participants tried to experience the new system individually on which the author explained the overall functions. Then they have some time to use it, experience it freely and navigate through the whole system while answering the questions of the questionnaire. The whole process took around 10 minutes per participant.

## **4.4. Usability Testing**

### **4.4.1 Booking System Usability Testing Results**

As mentioned before, There were a total of 20 students participated in this evaluation from within KMD. The participants were Masters first and second year's students and others from Doctoral program.

- What do you think the purpose of this site is? What do you think about the user interface design?

The first question was designed to understand if users can understand the real purpose of the system. The purpose of the new system was clear for all participants.

They thought this system works as a booking system that provides students with information about the equipments. Some of them do not find it clear enough as a system to show history timeline of the equipments. Moving to the user interface design (UI). Participants found it simple and clear. It represents everything in an easy to understand and find way. They liked the flow of the structure. On the other hand, some participants commented on the design colors and graphics on which they suggested more improvements to make it more attractive.

- While navigating, was it easy to go back to the home page? And How helpful is the navigation system in General?

Almost, 17 out of 20 of the participants found it easy to go back to home page, while the rest of them suggested to have some more enhancements to make it even easier. For the navigation system in general, most of the participants said it was easy and helpful. For some of them, it was clear because the system was categorized based on the type of the equipments and under each category was another organized categories based on the names and the years of the equipments. Overall, they are satisfied with the navigation system but they are expecting some improvements in the history part. Some suggestions was about adding filtering feature for faster searching.

- Could you find what you were looking for? Was there anything missing you were expecting to see?

All participants were able to find what they were looking for while trying this system except one user who found the process not clear enough and thought it takes a bit of time. Nothing was missing for almost 4 of the participants. On the other hand the rest of them suggested some important features which could fulfill their needs while using this system. They want to know for how long they will be allowed to use each item. Some participants wanted to find more technological information and references for each item or to have video introduction to teach them how to use the equipment. For the reservation part, they would like to make it possible to reserve more than one item at once with out the need to repeat the whole process separately. For others it is helpful to have some comparison between the equipments so they can choose the best one which can fit with their project

requirements. And finally they wanted to have contact information to be able to contact the responsible people if they need to.

- What would encourage you to return to this system in the future?

The responses to this question vary. Most of the participants are interested to use this system in the future to see what projects have been created using school equipments from time to time which will be added to the history of each item. Others will use it because it is easy and convenient, user friendly and it allows them to check the availability for each item. Users comments are one of the main things which could attract them to use this system in the future. They are also interested to check the main features and all related information for each item. The chronological order of the equipments is also one of the reasons to use this system.

- What do you think about having a calendar for each item?

All participants liked this new feature on which they will be able to check the availability of each item from the pop-up calendar. They are willing to have such function in the equipments booking system because this will help them save their time and make decisions based on the status of each item. One of the participants suggested to have a calendar which show the availability of the item and its accessories at the same time.

- What do you like best? What do you like least?

There are different features that attracts participant's attention while trying this system. Most of them liked the history part, especially where they could see other users projects or the works that have been done using the available equipments. Others liked the comment system because it allow them to learn from other users experiences and it gives them the chance to share their own opinions. The calendar style and the availability indicators attracted the users attention as well. For some users, the best thing is the possibility to make online reservations. The best thing for others was the provided information about each item as well as the possibility to see list of all available items in one system. Others where interested while using the system because of the left bar which provides them with good space for the

rest of the content as well as the floating menu which make the navigation process easy and friendly. The rest of the users liked the timeline and the colors of the UI more than anything else.

On the other hand, there are some features that were liked the least. Users didn't like to have too much text in the items features and description part, they prefer to have the key points or table with the most important features. Others are not satisfied with the design color code or the font type. Some participants thought that it is not important to have the date categorization. Some other issues like, the colors of the reservation form as well as having this form in different page, or the logo being hidden while scrolling. Finally they dislike the banner design and they suggested some improvements on the graphics and visual design in general.

- In your opinion how can we improve this website?

Participants suggested some smart and useful ideas to improve this system like the idea of sending emails as reminders to the users to return the equipments on time. Another creative idea was to add comparison of the main features for items from the same category like cameras. They also suggested to have a list of all available tools in the home page or to create thumbnails for each item with short information under its photo. For some participants, they wanted to have everything in one page with the scrolling feature. The background color of the system is one of the things that needs some kind of improvement to make it more attractive.

- Would you recommend this website to your friends? How is it compared to the current booking systems at school?

All participants are willing to recommend this system to their friends and classmates to help them find the right tools for their projects. When it comes to the comparison between the current systems and the new one, participants said that the new system provides them with more information and it could help them learn from others experiences and share their own thoughts as well as the ability to see samples of the projects in the history of each item. For some users the new system is more specific, easier, useful, simple and much better than the old systems. They are interested to use the new system because it is clear and user friendly while on the other hand the old systems are complicated and hard to understand. No one



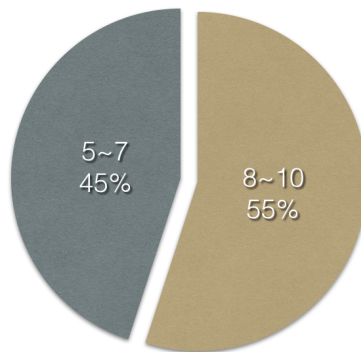


Figure 4.15: Users rating score out of 10

has rated this system with a number less than 5 out of 10. Almost 55% of the participants rated this system from 8 to 10 out of 10, while 45% rated it from 5 to 7. (Figure 4.15)

- How easy to use do you find this system? If you could change one thing in this system, what would it be? and why?

Most of the participants found it easy to use this system, they thought it is convenient and easy even for non technical users. Others found it easy but requires some improvements to make it better. For some of them, the pictures and the displayed description helps them a lot, while others believe that the left bar helped in making this system more organized. On the other hand, the system was a bit hard and complicated for some of the participants as they explained, it is sometimes hard to locate the devices or to know what links takes to where and they would prefer to have the information presented in tables.

The things to be changed in this system vary. Each one of the participants wanted to change one thing to enhance its usability. Some of them thought that, the user interface design needs more improvement especially the color combination as well as making the graphics more sophisticated. Others suggested to minimize the text information and display the main key points only. Others requested some description on how to use the equipment as well as its compatibility.

There are some opinions related to the navigation bar and the pull down effect to

make it better than what it looks like now. Some of the participants wanted to have some interactivity in the web page and they want to move the reservation form to be in one location in the item page itself. Most interestingly, there are some requests to add features like the ANA inquiry system or the chart feature like e-commerce website as well as adding a rating system for each equipment.

- What is the main thing you would like to find in this system?

The main things users are looking for while using school booking systems are, technical information and specifications about the item. The available equipments presented in an easy way to check. They are willing to have review and ratings for each item which could encourage them to use an item or to avoid it. Some participants wanted to have some explanation about the best tool for their projects and when that tool will be available. Others wanted to be able to book rooms, tools or anything they can use at school all in one system.

- Do you have any other comments? Suggestions ?

As it has been mentioned above, users commented on the amount of text used in this system and they wanted to have less text and more visuals. They suggested to be able to reserve several items in one time. Some participants wanted to have more information in the items history like what were the best projects it was used for. Others wanted to have key words feature to help them find what they want easily. Some ideas were on making this system able to show the popular items and adding some tutorials on how to use each item as well as adding a policy which allow users to ask some questions like, I broke this tool, what should I do?. Overall they commented on how much they like the project and how helpful it is going to be and they wanted to have it as a responsive website to be able to use it in their smart phones and their PCs at the same time.( This is going to be in future work as I will explain later)

- User Satisfaction: Users overall feeling about this system

The author's approach to measure the participants satisfaction and their overall feelings about the proposed system was to create a set of different points on which they could respond using one of the available options, Strongly disagree, disagree,

# User Satisfaction

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The home page was attractive		2	9	9	
The site was easy to navigate			3	11	6
It was easy to find the information I needed		1	1	11	7
I was satisfied with the information displayed in home page		3	5	9	3
I was satisfied with the information displayed for each item		2	4	12	2
Having a calendar for each item is really useful			3	2	15
Being able to see works created with the same item is overwhelming		6	5	3	6
The website is well organized			4	11	5
I would highly recommend this site to others			2	11	7
It was easier to find items information and booking availability.		1	2	13	4
Overall I am satisfied with how easy it is to use this system			3	11	6
It is easy to learn how to use this system		1	2	7	10
The provided Information are easy to understand		1	1	9	9
The user interface is pleasant		3	5	11	1
This system has all the functions and capabilities I expect it to have.		1	4	11	4

Figure 4.16: Users overall feeling about this system

neutral, agree or strongly agree. As it can be seen from the user satisfaction table, participants were mostly satisfied with the new system(Figure 4.16). It was easy for them to find the information they were looking for. The displayed information for each item fulfill their requirements. 17 out of 20 of the participants found it really useful to have a calendar for each item. Most of them are willing to see works from the history of the item during its life time at school.The total of 9 are interested to have this feature while 5 found it interesting but not really important for them. It is clear from the results that, the participants found it easy to check the booking availability for each item and they agree that this system provides them with all functions and capabilities they expected it to have.

#### **4.4.2 Admin System Usability Testing Results**

There were a total of 5 participants in the Admin usability testing.

- What do you think about the user interface design? While navigating, was it easy to go back to the home page?

The answers for the first question were positive. Participants found this system easy and intuitive. They thought this system must be quiet helpful for the SAs because it provides them with the chance to control all equipments easily. It was easy for them to navigate back to the home page and they liked the navigation process in general.

- Do you think this web page is helpful for SAs to control school equipment?why?

All participants answered this question with yes, because this system provide them with a good overview and it make it easier to control and manage the equipments. They said that, currently they are using Google spread sheets for controlling school equipment which takes much time.

- Was there anything missing you were expecting to see?

Some of the participants would like to have a list of all available tools as well as the booked items. One of them is missing one function, he wanted to be able to click on the image of the tool to navigate to its information page so he could have clear view for each item.

- What do you like best? What do you like least?

The most liked features are many. The participants liked it because it allow them to edit the content and provides them with general overview about each item. They found it good management system to manage all booked items and check all reservations in one location. One of the preferred feature for most of them is the ability to check if the item was returned or not. Others liked the images attached for each item which could help them see how it looks like with out confusion with other items.

On the other hand, They didn't like the color scheme of the UI. One of the participants was not satisfied with the amount of details in the "view user comments" page. Others wanted to decrease the links and put all information in one page.

- In your opinion how can we improve this website?

According to the participants suggestions, this system could be improved by enhancing its appearance and making it more attractive. Another point is to have an overview list of all equipment. Some of the participants as explained before are interested to have clickable images for each item to navigate to its information page as well as decreasing the amount of information displayed in each page.

- How is it compared to the current booking systems at school? If you were to review this system what score would you give it out of 10?

Participants preferred this system more than the current booking systems and they thought this is better, quit useful for SAs.The can score it from 7 to 8 out of 10.

- How easy to use do you find this system?

This system was easy to use and easy to understand for all participants. They said it is not complicated and it is intuitive.

- If you could change one thing in this system, what would it be? and why? What is the main thing you would like to find in this system?

Some of the participants would like to change the background colors of the system as well as the order of the items within the left navigation bar. Others would like

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The home page was attractive		1	1	2	1
The site was easy to navigate				4	1
It was easy to find the information I needed			1	4	
I was satisfied with the information displayed in home page			2	3	
I was satisfied with the information displayed for each item		1	1	3	
The website is well organized		1	1	1	2
It was easier to check the equipments status		2		2	
overall I am satisfied with how easy it is to use this system			1	2	2
It is easy to learn how to use this system			2	2	1
The provided Information are easy to understand		1	2	1	1
This system has all the functions and capabilities I expect it to have.		2		2	1

Figure 4.17: Admin users overall feeling about this system

to connect email delivery through the website and make items images clickable. Mostly the participants focused on the reservation details and the reservation system in general. They would like to find all available items and some details about the booked items like from when to when an item is booked. They also wanted to check the history of each item and its category.

- Do you have any other comments? Suggestions ?

They liked the direction of this project in general and they wanted to use it in real. Some of them suggested to add more pictures and visuals to make it more helpful and attractive.

- User Satisfaction: Admin users overall feeling about this system (Figure 4.17).



# Chapter 5

## Discussion

### 5.1. Discussion

As it has been explained before, There is a problem, and the author is trying to find a useful solution to solve it. The problem is “ Are School students able to understand history of things and equipment which they usually use during their school life?”. This problem was validated through the field works of problem validation process ( see chapter 3). In this chapter the results of the usability testing will be discussed to understand if it meets the requirements of the users. The main features of the proposed system will be stated along with results analysis. The proposed system consists of a couple of important features that might contribute in fulfilling the main objective of this project. At the meanwhile it could help users understand history of things and record these things history based on its usage. These features are, item description, item review and main features which build up the identity of the item and prove its existence. Item features could also enhance users understanding, therefore it could help them make a decision based on what they learn about any particular item. The other features are tools history, user comments and item reservation form.

It is clear from the field works in chapter 3 that, there is something missing in the current booking systems at school (KMD). Students complained about the lake of information about the equipment or how to use them. They are willing to find some details about the main features and some tips on how to use it. From the results of the same survey, students prove the need for tools features part because



currently they tend to search online or ask many different questions before using any tool at school. They want to have at least short review and information related to the available tools. Noteworthy, when participants were asked about how they tend to get information about school equipment, they said that they usually collect information from people within school community or search on the internet. Overall, it is clear enough that they tend to collect related information from different resources. Therefore, providing them with all information and tools features all in one place might make it easier for them. One of the things that might encourage the participants to use the proposed system in the future is the tools main features feature. They will return to use it to check school items main features and all related information. In addition, they would like to find more technical details as well. Participants suggested to have the main features presented in tables instead of text paragraphs.

When participants were asked about the information they would like to find in the school's equipment booking systems they suggested to be able to see some projects that were created using school equipment. Almost 90% of them are excited to know what projects were produced using any particular tool and most of them are willing to get the chance to see these projects in one way or another. Most significantly, when it comes to the age of the tool, it seems that, participants do not really care about how old the item is in the first place. Instead, they would prefer to check its productivity before anything else.

After experiencing the new system, most of them said that they will return to use this system from time to time to check what projects have been added to the history of each tool. Compared to the old booking systems, they preferred the new one because it gives them the chance to check equipment history. Participants suggested some additional details to be included to the tools history part where they can find a list of the best projects any item were used for during its life time at school. Another proposed feature to achieve the main objective is the commenting system. As it has been mentioned before, word of mouth is one important method in recording the world history. But could this feature work successfully within this system? And most importantly, is it something students are ready to do while using equipment booking system?

Almost 35 % of the participants tend to find information about school equipment

from their classmates, teachers, SAs or TAs. In addition, 54 % of them tend to ask for recommendations before using any tool. This could prove that there is a kind of exchanging word of mouth about school equipment within school community. When participants were asked if they trust people's comments or not, their answers were positive. They usually trust others comments and some times they even make decisions based on others opinions especially if they have experienced the same situation, as it has been mentioned in the literature review. Most significantly, they are willing to share their experiences with others as well. They thought, this might help others understand more and get a clear idea about any particular tool from the real world experience. During usability testing phase, participants feels encouraged to use the proposed system in the future to check users comments under each item. This is because, it allow them to learn from others and it provides them with the chance to share their own. This is one of the reasons of why they preferred the new system compared to the old ones.

Moving to the next point, the reservation part, which was proposed to be added to the new system because of its role in equipment history. The author wanted to record equipment history for future generations. The usage of any tool means something important in its lifetime. If it is used always, frequently ,rarely or remain unused for a very long time, these are regarded as significant moments during the tools life. Therefore, the reservation form, which has been designed to get the main details from the users could contribute in recording KMD equipment history accurately. One of the things that attracted the participants is the ability to make online reservations. This provides them with a great chance to check the available tools and make the reservation immediately.

There are some suggestions to make it possible for them to reserve several items using the same reservation form without the need to repeat the whole process for each item. Participants are willing to have an easy and clear booking system where they could check the booked and available items clearly. Some of them suggested to have calendars like the ones used for meeting rooms reservation ( KMD, 3rd floor) but online version. Noteworthy, availability indicator and the pop-up calendar are a brand new features that were proposed to enhance the functionality of the proposed system, which therefore enhance the history of the tools. During the problem validation phase, participants complained about not

being able to know the current status of the equipment while using the current booking systems at school. Almost 85% of them wanted to check the availability of each item and the exact time they could use it in so they could manage their time based on that. The author proposed the availability indicator that works as a blinking words, “Available” or “Booked” under each items picture as explained in previous chapter.

After experiencing the new system, during the usability testing, users liked these new features because it allow them to check the availability of each item. This could encourage them to use this system in the future as well. Participants are so interested to have the pop-up calendar which could save their time and help them make good decisions based on the status of the desired tool. Overall, they were thankful to get these new features which is clear from the user satisfaction table were 17 out of 20 of the participants think it is a very useful function.

Unfortunately, the author thought it might be useful for students to check the history timeline of each item. This was proposed to present the tools timeline on which the equipment under each category are classified by the year it were added to school equipment.( Check chapters 3 and 4). It is clear from the results of the field work survey and the usability testing that, students do not really care about the history timeline itself. Instead they focus on the productivity of the item.

Participants were asked if they tend to check the age of the tools, almost 73% of them said they are not interested at all to know its age. In addition, the age does not make any differences in their choices if the desired tool still functioning perfectly. If participants are to choose between old productive camera and a low quality brand new camera, they will go for the productive one even if it is older. They might make some comparisons but at the end they will use the productive one either if it is the new or the old available camera.

In order for the history of things to be recorded, there must be a well designed environment. It is clear enough from the problem validation field works, that, the current systems that are dealing with the school equipment needs some improvements to help in achieving the desired objective. SAs thought that, the current booking systems are complicated and it must be easier and more user-friendly.

As the main function of the booking systems is to link students with the equipment so they could use them for their projects. SAs are willing to have a list of

all available equipment in each department. In some departments, students have to go to the equipment location and look for the available options with the help of the SAs which is time consuming for both parties. Students Assistants currently facing some difficulties in managing the equipment rental process. They would like to be able to check all rented tools as well as the reservation details. SAs current method for tracking the reservation process and the delayed tools seems to be very traditional. All reservation details are written in a sticky notes along with the due date and they keep checking it from time to time. There are several problems in their method. First off, they might miss the deadline , they might lose the notes and forget what tool is missing or with whom it might be. In addition, they through these sticky notes as soon as they get the tools back, which means a huge miss in the items history. Overall, they wanted to be able to track the rented tools, check all reservations, get the chance to contact the users and send an alarming notification to remind them about the due date.

Talking about the main things users usually ask for before using any tool, SAs said that, users mainly ask for explanations on how to use the equipment, because most of them are new in the field of media design. Users also ask for the main features of the equipment and they request some comparisons information to be able to make a decision. SAs were also asked if the users usually check the age of the tools. It is clear that, KMD students mostly use the tools that fits with their requirements without checking its age. Some times they might go for the new tools if it is easier than the older ones like cameras. (professional cameras and GoPro cameras for instance).

The usability testing reveals positive results that makes this prototype seemed successful. The participants found it a good management system that allows them to control the equipment reservation process from A to Z. It even allows them to check all reservations in one location. The ability to track the status of each tool, either returned or delayed, makes this system unique and helpful. All participants were satisfied with the provided features in this system. They thought this could make their job easier and it could help students find the desired tools in a very short time. They agree that, by using the proposed system they can have a detailed overview about KMD equipment status and its condition, unlike the traditional method they are currently using. SAs are willing to access the tools

information page by clicking on its image in the admin panel which could help them recall how it looks like. Finally, they suggested to add one more feature that could give them some details about the history of each tool.

## **5.2. The HoT Design**

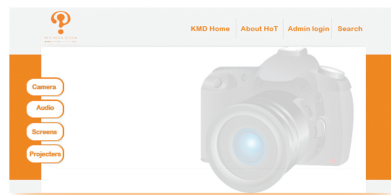
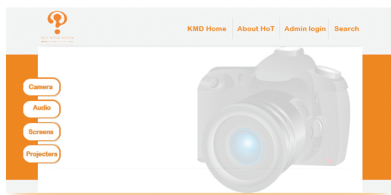
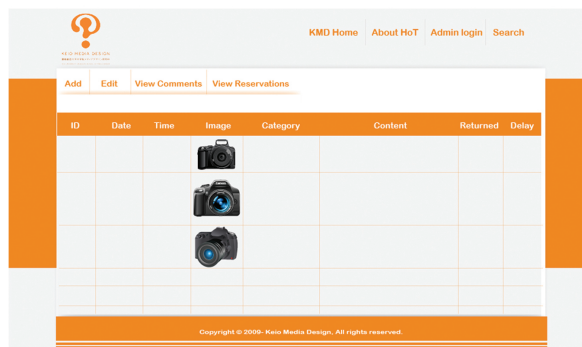
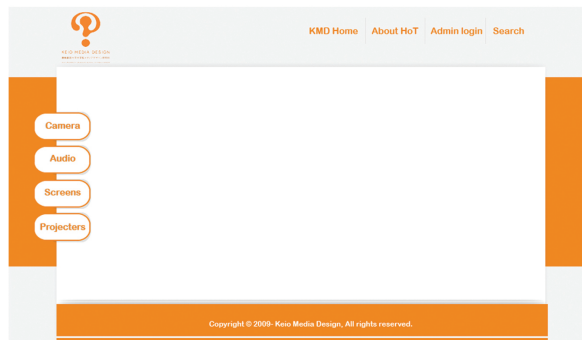
Based on the results of the usability testing for both, the HoT web-page and the Admin Panel, the proposed system seemed to be quiet successful. This means that, the system could function properly to fulfill the main objective of the project. The participants liked the way it works, they found it user friendly, easy to use and it provides them with all details they might need while searching for equipment at school. In addition, the system could work successfully in recording equipment history as well. All required details that build up the history of the equipment can be stored inside each tool's history. Reservation details, equipment main features, projects conducted using each tool and the real world user experiences, could build an accurate history for the available equipment "Physical Things". On the other hand, almost all of the participants are not satisfied with the User Interface colors. They liked the system structure but they suggested some improvements on its appearance and the color combination to make it more attractive. Therefore, the new proposed UI will be explained in the coming sections within this chapter.

## **5.3. HoT Future Improvements**

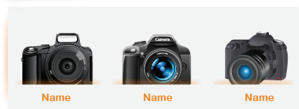
As it has been mentioned before, The proposed system seemed to be successful. Users are satisfied with its functionality. The only thing to be improved is the User Interface design and color combinations. As this system was proposed to be used as a reservation system for KMD equipments, the author decided to use the theme of KMD. The colors will be used based on the KMD's visual identity (Figure 5.1) shows HoT future design, Web-page & Admin panel . HoT home page is designed for both, students and admin users on which, admin users could login to the admin panel. Admin users will be able to control the equipment in one location. As it can be seen from (Figure 5.1) admin users can navigate easily using the new UI. They could add new posts, edit the content,

view all reservations and view all comments. Each link will direct them to the desired page immediately.

On the other hand, students will have all functions that were explained before. They could access each category where the tools will be displayed based on the year like before. Users could select the year and the view will expand so they can see all tools, select the desired tool, the pop-up calendar will appear if they hover the mouse on top of the item's image and the availability indicator will be there for each item. Noteworthy, all of the main features will be displayed in one page. The user could choose any feature inside the item's profile, and the view will expand to show the related details. The item's main features and descriptions will be summarized in one table (Figure 5.1). Both of the history and the comments features will be the same as before, while the reservation form was moved to be displayed within the same page, unlike the old design, where the reservation form placed in different place.



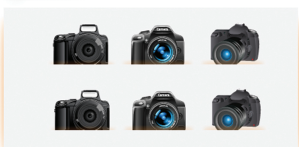
»» 2016



»» 2015

»» 2014

»» 2013



»» Features



»» History

»» Reservation

»» Comments

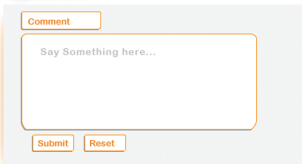


Figure 5.1: HoT future design, Web-page & Admin panel

# Chapter 6

## Conclusion

This research proposed a new system that could help in enhancing people's understanding of Everyday objects in life. The proposed system consist of two parts, the HoT web-page that works a reservation system which provide users with all related information to the available equipment at school. While the second part was designed for administration purposes.This part helps admin users to control school tools and have an overview of the tools status and its conditions as explained in previous chapters.

### 6.1. Prove of Concept

Based on the results of the usability testing for participants while experiencing both systems (The web-page and the admin panel), it can be said that, the proposed system meets the requirements of its users. The problem validation field works reveals some serious issues that proves the existence of the problem. Students used to search for the equipment and its related information either online or from people around them, which proves that, they need to have a clear understanding of the objects in their environments.This expectation, "Through this new system, the awareness of objects identity will increase", this is true because students were interested to have the objects main features and related information all presented in one system.

Noteworthy, most of them used to ask for recommendations to be able to find the right tool for their projects. They want to be able to see some samples of what



could be done with the available tools at school. In addition, they want to get the chance to share their experiences with other students within the school community as well as they have a desire to learn from others experiences. The results seemed to approve this expectation; “Through this new system, the interest in sharing experiences can be raised”, as the implementation of the commenting system seemed to be successful because it helped the students to share their thoughts with others and learn from them at the same time. The ability to see what kind of projects were created with the available equipment in the history part was also considered as a great addition to the proposed system.

The admin panel seemed to be successfully implemented. It is clear from the user-testing that, participants were 100% satisfied with the proposed system. It allowed them to control the equipments and manage the reservation process in an advanced way. Using this system they could check the conditions and the status of each tool as well as viewing all reservations, user comments and objects related features all in one system.

The real realization of the proposed system will help in collecting objects related information based on its usage within school community. It will build a great data inside the database which will be reflected in the history of each item. Finally this process will enhance people’s understanding of Everyday tools in their school life, which could be applied in different fields with some modifications based on the real requirements of each field.

## **6.2. Limitations**

Although the results of the usability testing proves the success of the proposed system, the author still consider this project as unsatisfactory experience. There were some limitations during the implementation process. The lack of skills is one main issue, the developer of the system start with no experience in programming or web-development. The author spent some time learning some programming basics through online tutorials. Dealing with databases is also one of the new fields the author has not experienced before. The DB tables were created in phpMyadmin and MySQL. While connecting DB with HoT web-Page and the Admin Panel many problems appeared from time to time on which some parts

were connected successfully with the DB while others were not. This led to creating a prototype which is not functioning perfectly as it should be, but it was enough for the participants to experience the main concept of the project.

## **6.3. Extension of Concept**

As it has been mentioned earlier, HoT is only one example to test the visibility of the main concept. There are a variety of fields where this concept could be applied. Everything in our life has stories and history but we can't access most of them unless it is written in books or explained in one way or another. In the next part, the author will explain some possible implementations of the History of Things concept.

### **6.3.1 Location Based Applications**

Historical sites all around the world have their unique history. Their history reveals some of its past events which were recorded by historians. History is not just the past events that refer to a very long time ago. Some archaeological sites were destroyed recently and this also must be recorded in their history. Therefore, history exists and is updated according to the status of the archaeological site. There are tons of books that explain the history of the archaeological sites in detail, but do people access these books whenever and wherever they want? How if it happened for them to be in one of the geographical locations of the historical sites as tourists? Reading about things is interesting, but being at their real location is a totally different experience. Mostly, people became interested to learn more about the hidden stories behind the structure and the ornaments they see in front of them in the real world.

One of the possible implementations of HoT is the location based applications. The author proposed a mobile application that could work with iBeacon devices. Initially, the idea is to make it possible for people to understand the history of the historical and archaeological sites around them. If you could imagine yourself walking in Tokyo beside Tokyo Station for example. All you can see is the current building but not how it looks like when it existed for the first time in Tokyo. Using the proposed app, people might receive notifications on their smart devices. The

notifications consists of some pictures and well presented information about Tokyo Station. They could learn about the architect designer of the station, when it was built, changed or not, collapsed etc. These notifications will be programmed and connected with the iBeacon devices that are distributed in different locations inside the station and therefore sent to people's devices if the Bluetooth is ON. This could be applied in different ways and different locations. The main objective is to make it possible for people to access the hidden history and enrich their minds and their knowledge.

### **6.3.2 Souvenirs AR Application**

Cultural heritage with Augmented Reality is another possible implementation of HoT concept. The author introduced this idea in 2015. The main concept was about linking cultural heritage with technology. The author proposed to add technological value to the cultural souvenirs. The idea is to create cultural souvenirs with AR promotional Application that could be used as Smart phones application. This could be achieved through creating 3D souvenirs and print them using 3D printers. Then Some images or animations that explains some facts about the real cultural representation of the souvenir will be attached to the 3D printed souvenir through Augmented reality. The explanation could be on how that cultural piece is used as well. Users could access these information by scanning the small image which are attached to the 3D object. The (Figure 6.1) bellow explained how this app works.

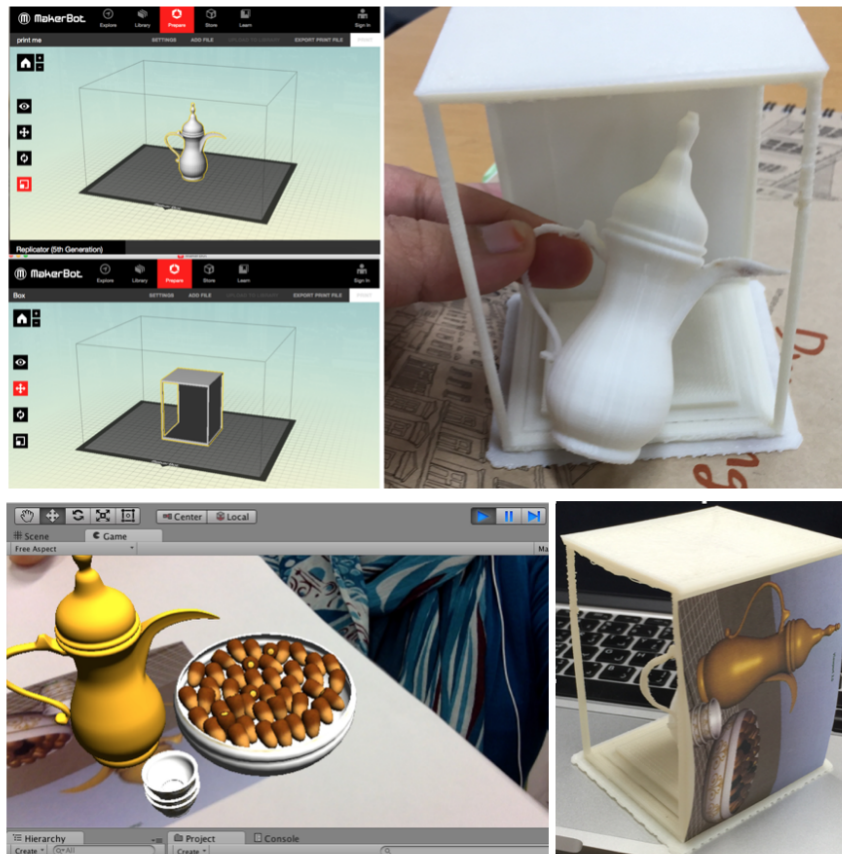


Figure 6.1: Cultural heritage with Augmented Reality

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