Title	Intelligent Monitoring System- An IoT project built on a processor and microcontroller development board
Student name:	
Supervisor name:	Dr. Klaus-Peter Zauner

Aims/research question and Objectives

The main aim of this project is learning and building an internet of thing product on a processor and microcontroller development board. This main idea is inspired by the growth of IoT products in modern information society. The internet of things can be viewed as a global infrastructure for the information society, enabling advanced services by interconnecting things based on existing and evolving interoperable information and communication technologies. In general the project should have a general characterization as physical things can be communicated with the virtual things. For example, the monitoring system connected with the software in our phones.

The secondary aim of this project is to design a user friendly monitoring system for house security reasons. Monitoring system is a usual product in nowadays' live. However, some common monitoring systems are not friendly for family users. For example, the monitoring system only record images or videos but never give an alarm when thieves are trying to open the door. This project gives an idea of sending message and images to our users' phone while the sensor detected someone walking into the space to be monitored.

The third aim of this project is to design a low price project which can be accepted by IoTs' market. Sometimes, the price should even lower than ordinary monitoring system. Most of the IoT products with a remarkable functions could not be accepted by people cause the high price. So, a suitable low price processor and microcontroller development board should be chosen and also should have all the essential components to design this project.

According to these aims above, the objectives are summarized as follows:

- Familiarisation with processor and microcontroller development board topologies
- Familiarisation with the principles of design an IoT project
- Selection of suitable processor and microcontroller development board and study of any appropriate application notes
- Selection of suitable sensors and any other external devices for the board
- Initial paper design of the whole monitoring system
- Initial programming of the basic functions of the physical things
- Initial design of the communication system which can make a connection between the physical things and the virtual things
- Optimized programming and coding of the development board
- Fabricate the board with the external sensors and cameras
- Implement the physical things with the communication system
- Optimized the whole system to a mature IoT project
- Test the final design in an practical environment
- If time permits, add more functions to the system
- Write thesis and do a demonstration and a presentation

Summary of proposed research and analysis methodology

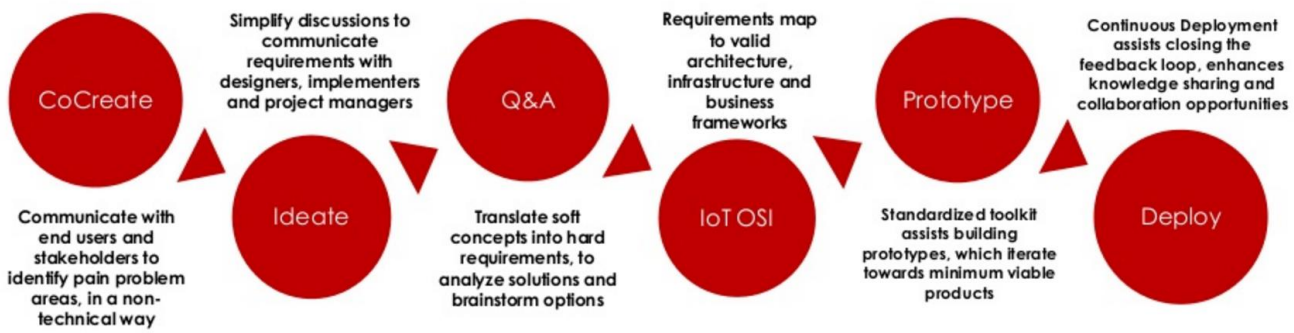
Qualitative research is important in the period of preparation of a project. From the perspective of leaning an internet of things project, it may be hard to know what and why people need from the IoT products. And the qualitative research which has an advantage of letting researchers have an in-depth understanding of the research context will be a great idea of leaning the IoT project. Besides, there are several methods of making a qualitative research methodology. This project will use mixed methodologies to gain the objectives listed above.

The first methodology used is called case studies. It is defined as a methodology that focus on one instance of a particular phenomenon with a view to providing an in-depth account of event, experiences or processes occurring in that particular instance. It is important for an IoT project at the beginning period. For a complex IoT project, case study research will help the researchers to make sense of established patterns. Case studies also can be revised and adapted as the researcher gathers more data. It helps the researcher learn a specific IoT project in a first time.

Definitely, documentary research is essential procedure for a long term project. The study of a side variety of documents available enables researcher to gain understanding of making processes. It is an important method for prepare the initial paper design of the whole system. It has a benefit of giving the research an entry point to begin the design. However, this method have a drawback of a low reliability and validity used if the documentary resources are from the website.

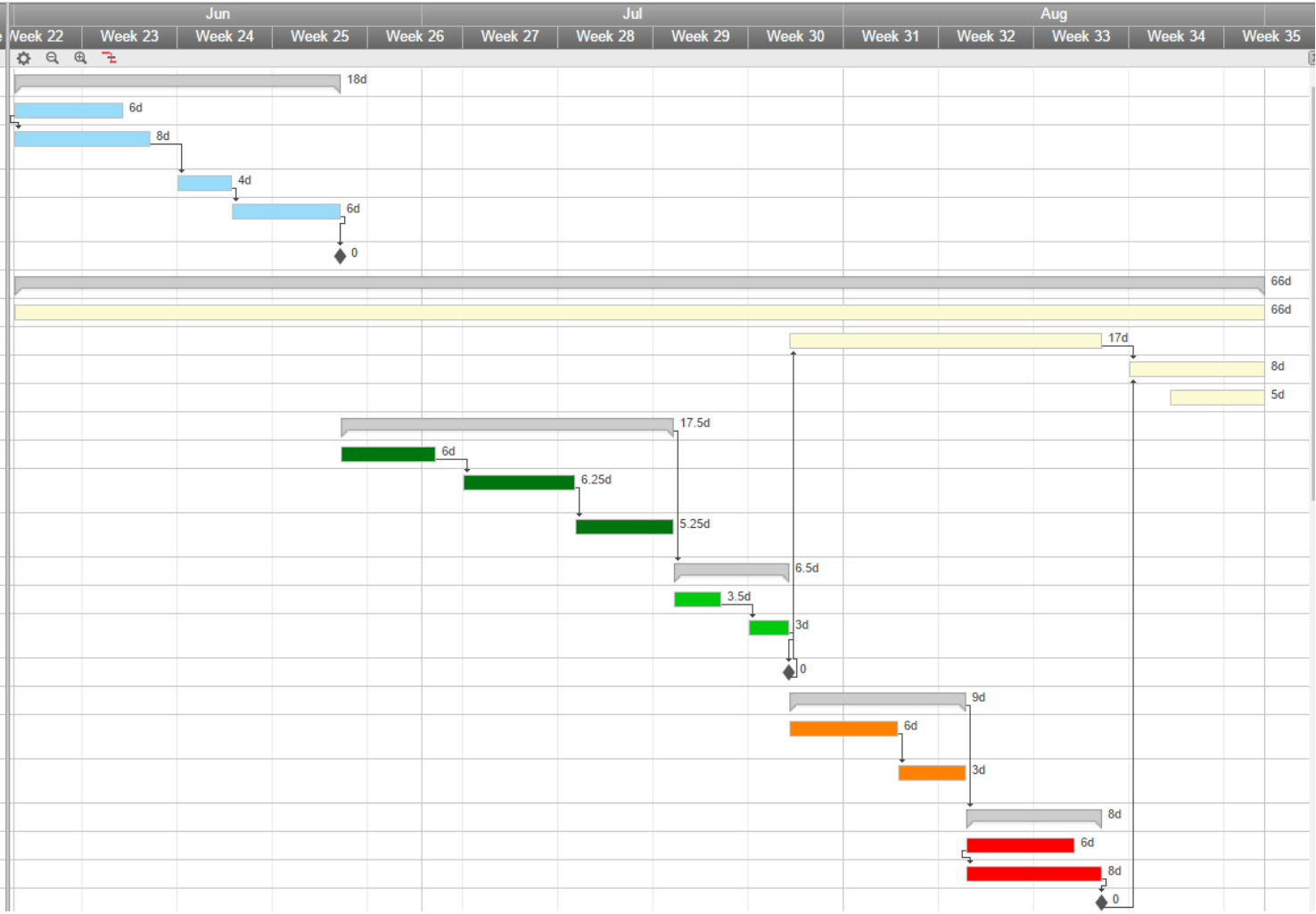
For a project which finally gives a delivery or product, it is important to have a group interviews to know the true feeling from customers. For example, this project finally will deliver an intelligent monitoring system which need a user friendly experience. It is important to know the feeling from customers such as whether the price of the product can be afford or is it convenient to use the app to communicate with the monitoring system. Interviews, surveys and focus groups methodology are all good choices.

A general methodology of building an Internet of Things project is called IoT methodology which aims to provide a loosely structured ecosystem which is made up of tools, design patterns, architecture references and guidelines to build IoT solutions. The figure below demonstrates the basic concepts of building an IoT project. The first two steps may not be considered for a student's project. What should be considered is the IoT OSI which simplifies the components of the IoT and makes it easy to digest the scale of Internet of things. For example, most of the IOT will have an architecture models contain 5 blocks as APPs, IoT services, middleware, connectivity and end points.



Research plan – Gantt chart

	Task Name	Start	Finish	% Complete
1	**Literature reading & Preparation**	16-06-01	16-06-24	
2	Review of the principles of design an IoT project	16-06-01	16-06-08	
3	Familiarisation of the topologies of design a processor development board	16-06-01	16-06-10	
4	Selection of Suitable board	16-06-13	16-06-16	
5	Study the board's notebook and leaning the programming method	16-06-17	16-06-24	
6	milestone 1	16-06-24	16-06-24	
7	**Regular activities & Assessment**	16-06-01	16-08-31	
8	Weekly meeting with supervisor	16-06-01	16-08-31	
9	Write a draft thesis	16-07-28	16-08-19	
10	Write a final thesis	16-08-22	16-08-31	
11	Meeting with moderator	16-08-25	16-08-31	
12	**Initial design**	16-06-25	16-07-19	
13	Initial paper of the whole system	16-06-25	16-07-01	
14	Initial programming of the basic functions of the physical things	16-07-04	16-07-12	
15	Design of the communication system between the physical things and virtual things	16-07-12	16-07-19	
16	**Optimizing level**	16-07-19	16-07-27	
17	Optimize the programming of the development board	16-07-19	16-07-22	
18	Optimize the programming of the communication sysstem	16-07-25	16-07-27	
19	milestone 2	16-07-27	16-07-27	
20	**Fabrication of the system**	16-07-28	16-08-09	
21	Fabricate the board with the external sensors and cameras	16-07-28	16-08-04	
22	Implement the physical things with the communication system	16-08-05	16-08-09	
23	**Test & Implementation**	16-08-10	16-08-19	
24	Test the system in a practical environment	16-08-10	16-08-17	
25	Discuss the further work and make an improment	16-08-10	16-08-19	
26	milestone 3	16-08-19	16-08-19	



Ethical statement

For this project, the only ethical concern is the invasion of privacy. The testing of monitoring system should not be processed at public places or other private properties. As a professional engineering student, I promise that I will never have an action of the invasion of privacy at the whole duration of this project. The testing implementation only will only be taken place at my own private property.

Legal and commercial aspects

The commercial potential of this project is evaluated by some factors. This statement only listed the good points of this project:

a. Good technological viability - an IoT project can be realistically be commercialized through the development of a prototype.
b. Big market size – Monitoring system for family uses will have a big market if the price is as low as the ordinary ones because it has an additional function of an alarm system connected to customers' smart phones.
c. A good property – this project can be patented with a strong and defended protection.
d. A not bad novelty- A few of the companies have developed parallel technology.

Definitely, the delivery of this project will be a mature product which can be sold in the IoT market. So, firstly it should have a copyright which gives a protection for this project of original source code and documentation for 70 years after death of author. And also for license / patents use. Finally, to protect the product, trade-marks also needed for stopping bogus or counterfeit goods.

Besides, a health and safety policy is needed for risk assessment, record and procedures. If this product goes to industries, it should observe the manufacturing regulations.