"A requirements analysis with feasibility study for an abstract design of a pervasive kitchen designed for a student demographic"

MODULE NUMBER: CM3203

MODULE TITLE: Large One Term Individual Project

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My project

With the introduction of IPv6, smart devices and an increase in embedded systems it is inevitable that an 'Internet of things' is booming and ubiquitous computing is becoming the norm and is ever creeping into everyday life and the home. It is only a matter of time before homes are completely pervasive.

The project I am undertaking is a *requirements analysis with feasibility study for an abstract design of a pervasive kitchen designed for a student demographic*. To do this I will investigate all kinds of embedded technologies to combat problems faced by students by exploring the use of a range existing, new and emerging technologies usable in the kitchen.

I will be looking at is the problems students face in the kitchen, whether it is sharing appliances, food theft, compiling shopping lists, washing up etc, and looking at ways to solve these problems, and increase efficiency of processes through the use of technology.

I will also look at ways to increase the efficiency of a kitchen. For example, students often live in houses with upwards of 6 people having to share one oven, or 4 hobs, one fridge etc; I will explore ways, with the use of technology and embedded systems how the efficiency of processes (outlined by students) in the kitchen can be improved.

In order to do this I will be undergoing extensive research on relevant current pervasive technologies and emerging pervasive technologies to be used in a kitchen to improve these processes and provide a basic outline of an abstract design of a pervasive kitchen. Once this is completed I can then list my requirements.

The requirements will involve establishing each component's processing needs and their respective interactions, investigating the requirements of processes with the new technologies in place whilst not losing any functionality of a standard kitchen.

To perform a requirements analysis on this I will be comparing my requirements with results of primary research with other students, by distributing a survey and interviewing certain students to gain a more qualitative perspective, to assess how effective technology can be in improving processes and counteracting problems. The level of successfulness determined by the analysis will be based on the extent of problems solved and an improved process by the technology, i.e. the less of a compromise a user has to make, the more successful the system.

Because I will be looking at this project from the early stages of the project design lifecycle I will mainly focus on requirements of the system. However once I have developed detailed requirements with an analysis, I will then perform a feasibility study taking into account the 'TELOS' Factors (Technical, Economic, Legal, Operational, Scheduling) to provide the basis of a top-down design of a pervasive kitchen, that in theory can be continued to develop the idea further. As I am concentrating solely on the early stages of the development lifecycle e.g. the first stages of the 'Waterfall Method': Research and Requirements primarily, touching upon Design. To show my 'design' or outline of the system I will also model it using an SSM (Soft Systems Methodology) model and detailed use cases of processes.

To perform the feasibility study I will look at current attempts to design a pervasive kitchen, how successful they have been and attempt to make comparisons with my system designed for a student demographic. I will also look at companies taking steps in order to develop themselves more into smart embedded systems. For example, Google recently purchased 'Nest' for $3.2 billion - a company that designs smart thermostats and smoke detectors.

Deliverables (In Brief)

- Relevant technologies overview
- Results of research undertaken
- SSM model of system
- In depth, complete requirements list
- Requirements analysis
- Feasibility analysis
- Considerations for continuing design

Project Aims and Objectives

- Keep in mind the design is for a student demographic
- Identify every problem in a student kitchen
- Identify all improvements technologically possible with the efficiency of kitchen use
- Model these processes and problems
- Outline an array of technologies that can help problems identified
- Explore how these technologies can be applied in a real world scenario
- Describe the design of a pervasive kitchen, detailing every process
- Abstract the 'pervasive kitchen' into an array of overlapping subsystems
- Develop detailed requirements of a pervasive kitchen without omitting any requirement.
- Perform a requirements analysis against the data collected and my documented requirements
- Perform a feasibility analysis on outlined requirements looking at 'TELOS' factors (Technical, Economic, Legal, Operational, Scheduling)

Work plan

Next to each week is the work I expect to complete by that week's end. I have given myself the Easter recess as a buffer time to allow some leeway on the deadlines I have set myself although the competition time of the tasks should not be extended by more than 2 days with unforeseen circumstances. Some extra time may have to be allocated as a result of other work assigned in Week 3, although the work plan will not alter too drastically.

Bold Text = milestone

Week 2 (03/02/'14)

- Preliminary research of relevant technologies
- Document research
- **Design questionnaire**
- **Distribute questionnaire**

Week 3 (10/02/'14)

- Continue to distribute questionnaires
- Start to collate results

- Look at preliminary results and compare how they correlate with existing technologies
- Arrange interviews with 10 students
- Progress meeting with tutor

Week 4 (17/02/''14)

- Continue/finish collating results
- Interview students
- **Write up results**
  - **Outline main issues highlighted in results**

Week 5 (24/02/''14)

- **Model the processes**
- Progress meeting with tutor

Week 6 (03/03/''14)

- Further research and outline technologies that counteract problems highlighted
- Document technologies

Week 7 (10/03/''14)

- **Design the kitchen based on research results and technologies documented**
- Progress meeting with tutor

Weeks 8 & 9 (17/03/''14)

- Design requirements for kitchen
  - Use Case-based requirements
- Progress meeting with tutor

Week 10 (31/03/''14)

- **Finish designing requirements for kitchen**
- **Evaluate requirements against research data (requirements analysis)**
- Progress meeting with tutor

Week 11 (07/04/''14)

- **Feasibility analysis**
- Considerations for carrying on development
- Meet with tutor to go over work done

Week 12 & Easter Recess (12/04/''14) – (06/05/2014)

- Collate work
- Proof read
- **Submit final report**