**CS/SE 6387 Advanced Software Engineering Project**

**(Spring 2013)**

**Smart Home Automation System**

**Project Management Plan**

Submitted to:

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|  |  |
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**Team Agreement**

By signing my name below, I hereby agree and possess no dispute regarding my contribution in the project, through my attendance in team meetings and the roles and responsibilities that I fulfilled, during the Preliminary Planning Phase of the project. I certify that the information present in this document is accurate to the best of my knowledge.

|  |  |  |
| --- | --- | --- |
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# 1.Project charter

## 1.1 Overview of the Project

SHAS (Smart Home Automation System) is an intelligent monitoring and control system that monitors and controls various “smart” appliances and devices throughout an enabled house. The main stakeholder is Professor Mark C. Paulk.

## 1.2 Purpose of the Project Charter

This Project Charter outlines the purpose, objectives, and scope of the SHAS project.

The purpose of a Project Charter is:

* to provide an understanding of the project, the reason it is being conducted and its justification
* to establish early on in the project the general scope
* To establish the project manager and his or her authority level

The Project Charter will be reviewed by the team members and approved. The final approval will be the principal of SHAS.

## 1.3 Project Objective

The objective of this project is to increase energy efficiency. SHAS will auto-regulate appliances and devices within the house in order to maintain an appropriate energy consumption level while providing the homeowner with a reasonable level of comfort.

# 2. Scope statement

The scope of the project includes the activities listed below.

* Establish real-time monitor and control of all kinds of devices and appliances in house.
* Save energy usage with minimal, sometimes even no interaction between user and system.
* The system would optimize energy consumption and provide usage pattern to increase energy efficiency
* Provide user a unified point of access to monitor and control the various appliances and devices
* User always can override the initial configuration of the system
* Determine which kind of devices should be controlled
* Establish safety system

# 3. Requirements change control process

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Date** | **Comments** | **Author** |
| 1.0 | 1/27/2013 | Initial Version. Includes team members, milestones, tools, project organization | Qiong, Manjit, Bocong |
| 1.1 | 2/6/2013 | Included WBS, Scope, Performance measures to be collected | Aarshi Sikka, Shivam Chhatwal |
| 1.2 |  |  |  |
| 1.3 |  |  |  |
| 1.4 |  |  |  |

# 4. WBS to the level of management control

## 4.1 Introduction

The Work Breakdown Structure presented here represents all the work required to complete this project.

## 4.2 Outline View

The outline view presents an easy to view and understand layout for the WBS.

1. Smart Home Automation System
   1. Initiation
      1. Develop Project Charter
      2. Deliverable*:* Submit Project Charter
      3. Project Customer Reviews and Negotiation
      4. Project Charter Signed/Approved
   2. Planning

1.2.1 Create Preliminary Scope Statement

1.2.2 Project Team Kickoff Meeting

1.2.3 Develop Project Plan

1.2.3.1 Architectural Design

1.2.3.2 System Design

1.2.3.3 Component Design

1.2.4 Submit Project Plan

1.2.5 Milestone: Project Plan Approval

* 1. Execution
     1. Project Kickoff Meeting
     2. Verify & Validate User Requirements
     3. Design System
     4. Procure Hardware/Software
     5. Install Development System
     6. Testing Phase

1.3.6.1 Integration Testing

1.3.6.2 Regression Testing

* + 1. Install Live System
    2. User Training
    3. Go Live
  1. Control
     1. Project Management
     2. Project Status Meetings
     3. Risk Management
     4. Update Project Management Plan

## 4.3 Hierarchical Structure

The hierarchal structure is similar to the outline view but without indentation.

|  |  |  |
| --- | --- | --- |
| Level | WBS Code | Element Name |
| 1 | 1 | Smart Home Automation System |
| 2 | 1.1 | Initiation |
| 3 | 1.1.1 | Develop Project Charter |
| 3 | 1.1.2 | Deliverable: Submit Project Charter |
| 3 | 1.1.3 | Project Customer Reviews Project Charter |
| 3 | 1.1.4 | Project Charter Signed/Approved |
| 2 | 1.2 | Planning |
| 3 | 1.2.1 | Create Preliminary Scope Statement |
| 3 | 1.2.2 | Determine Project Team |
| 3 | 1.2.3 | Project Team Kickoff Meeting |
| 3 | 1.2.4 | Develop Project Plan |
| 4 | 1.2.4.1 | Architectural Design |
| 4 | 1.2.4.2 | System Design |
| 4 | 1.2.4.3 | Component Design |
| 3 | 1.2.5 | Submit Project Plan |
| 3 | 1.2.6 | Milestone: Project Plan Approval |
| 2 | 1.3 | Execution |
| 3 | 1.3.1 | Project Kickoff Meeting |
| 3 | 1.3.2 | Verify & Validate User Requirements |
| 3 | 1.3.3 | Design System |
| 3 | 1.3.4 | Procure Hardware/Software |
| 3 | 1.3.5 | Install Development System |
| 3 | 1.3.6 | Testing Phase |
| 4 | 1.3.6.1 | Integration Test |
| 4 | 1.3.6.2 | Regression Test |
| 3 | 1.3.7 | Install Live System |
| 3 | 1.3.8 | User Training |
| 3 | 1.3.9 | Go Live |
| 2 | 1.4 | Control |
| 3 | 1.4.1 | Project Management |
| 3 | 1.4.2 | Project Status Meetings |
| 3 | 1.4.3 | Risk Management |
| 3 | 1.4.4 | Update Project Management Plan |

## 4.4 Tabular View

The Tabular View is a nicely organized table view of the WBS.

|  |  |  |  |
| --- | --- | --- | --- |
| Level 1 | Level 2 | Level 3 | Level 4 |
| 1 Smart Home Automation System | 1.1 Initiation | 1.1.1 Develop Project Charter  1.1.2 Deliverable: Submit Project Charter  1.1.3 Project Customer Reviews and Negotiation  1.1.4 Project Charter Signed/Approved |  |
| 1.2 Planning | 1.2.1 Create Preliminary Scope Statement  1.2.2 Project Team Kickoff Meeting  1.2.3 Develop Project Plan  1.2.4 Submit Project Plan  1.2.5 Milestone: Project Plan Approval | 1.2.3.1 Architectural Design  1.2.3.2 System Design  1.2.3.3 Component Design |
| 1.3 Execution | 1.3.1 Project Kickoff Meeting  1.3.2 Verify & Validate User Requirements  1.3.3 Design System  1.3.4 Procure Hardware/Software  1.3.5 Install Development System  1.3.6 Testing Phase  1.3.7 Install Live System  1.3.8 User Training  1.3.9 Go Live | 1.3.6.1 Integration Testing  1.3.6.2 Regression Testing |
| 1.4 Control | 1.4.1 Project Management  1.4.2 Project Status Meetings  1.4.3 Risk Management  1.4.4 Update Project Management Plan |  |

## 4.5 Tree Structure View

The Tree Structure View is the most popular format for the WBS. It presents an easy to understand view into the WBS.

Smart Home Automation System

Update Project Management Plan 1.4.4

Risk Management

1.4.3

Project Status

Meetings 1.4.2

Project

Management

1.4.1

Go Live 1.3.9

User Training

1.3.8

Install Live System 1.3.7

Procure

Testing Phase

1.3.6

Install

Development

System 1 3 5

Procure

Hardware/Software 1.3.4

Design System 1.3.3

Verify & Validate User Requirements

1.3.2

Project

Kickoff

Meeting 1.3.1

Milestone: Project

Plan Approved 1.2.6

Submit Project Plan

1.2.5

Develop Project Plan

1.2.4

Project Team

Kickoff Meeting 1.2.3

Determine Project

Team 1.2.2

Create Preliminary

Scope Statement 1.2.1

Customer Project Charter Approved 1.1.4

Customer Review Project Charter 1.1.3

Submit Project

Charter 1.1.2

Develop Project

Charter 1.1.1

Control

1.4

Execution

1.3

Planning

1.2

Initiation

1.1

Architectural Design

System

Design

Component Design

System

Design

Component Design

## 4.6 WBS Dictionary

The WBS Dictionary contains all the details of the WBS that are necessary to successfully complete the project.

| Level | WBS Code | Element Name | Definition |
| --- | --- | --- | --- |
| 1 | 1 | Smart Home Automation System | All work to implement Smart Home Automation system. |
| 2 | 1.1 | Initiation | The work to initiate the project. |
| 3 | 1.1.1 | Develop Project Charter | Project Manager to develop the Project Charter. |
| 3 | 1.1.2 | Deliverable: Submit Project Charter | Project Charter is delivered to the Customer. |
| 3 | 1.1.3 | Project Sponsor Reviews Project Charter | Customer reviews the Project Charter. |
| 3 | 1.1.4 | Project Charter Signed/Approved | The Customer signs the Project Charter, which authorizes the Project Manager to move to the Planning Process. |
| 2 | 1.2 | Planning | The work for the planning process for the project. |
| 3 | 1.2.1 | Create Preliminary Scope Statement | Project Manager creates a Preliminary Scope Statement. |
| 3 | 1.2.2 | Determine Project Team | The Project Manager determines the project team and requests the resources. |
| 3 | 1.2.3 | Project Team Kickoff Meeting | The planning process is officially started with a project kickoff meeting that includes the Project Manager, Project Team and Customer (optional). |
| 3 | 1.2.4 | Develop Project Plan | Under the direction of the Project Manager the team develops the project plan. |
| 3 | 1.2.5 | Submit Project Plan | Project Manager submits the project plan for approval. |
| 3 | 1.2.6 | Milestone: Project Plan Approval | The project plan is approved and the Project Manager has permission to proceed to execute the project according to the project plan. |
| 2 | 1.3 | Execution | Work involved to execute the project. |
| 3 | 1.3.1 | Project Kickoff Meeting | Project Manager conducts a formal kick off meeting with the project team, project stakeholders and customer. |
| 3 | 1.3.2 | Verify & Validate User Requirements | The original user requirements is reviewed by the project manager and team, then validated with the users/stakeholders. |
| 3 | 1.3.3 | Design System | The technical resources design the system. |
| 3 | 1.3.4 | Procure Hardware/Software | The procurement of all hardware, software and facility needs for the project. |
| 3 | 1.3.5 | Install Development System | Team installs a development system for testing and customizations of user interfaces. |
| 3 | 1.3.6 | Testing Phase | The system is tested using test cases. |
| 3 | 1.3.7 | Install Live System | The actual system is installed and configured. |
| 3 | 1.3.8 | User Training | All customers are provided with training class. |
| 3 | 1.3.9 | Go Live | System goes live with customer. |
| 2 | 1.4 | Control | The work involved for the control process of the project. |
| 3 | 1.4.1 | Project Management | Overall project management for the project. |
| 3 | 1.4.2 | Project Status Meetings | Weekly team status meetings. |
| 3 | 1.4.3 | Risk Management | Risk management efforts as defined in the Risk Management Plan. |
| 3 | 1.4.4 | Update Project Management Plan | Project Manager updates the Project Management Plan as the project progresses. |

## 4.7 Glossary of Terms

Level of Effort: Level of Effort (LOE) is how much work is required to complete a task.

Work Package: A Work Package is a deliverable or work component at the lowest level of its WBS branch.

WBS Component: A component of a WBS which is located at any level. It can be a Work Package or a WBS Element as there's no restriction on what a WBS Component is.

WBS Code: A unique identifier assigned to each element in a Work Breakdown Structure for the purpose of designating the elements hierarchical location within the WBS.

WBS Element: A WBS Element is a single WBS component and its associated attributes located anywhere within a WBS. A WBS Element can contain work, or it can contain other WBS Elements or Work Packages.

Reference:

[www.projectmanagementdcocs.com](http://www.projectmanagementdcocs.com)

# 5. Project management processes

There are five main processes of project management:

1. Project Initiation

2. Project Planning

3. Project Execution

4. Controls and Validation

5. Closeouts and Evaluation

# 6. Development / maintenance processes

## 6.1 corrective maintenance

Fixing bugs/ removing errors

## 6.2 Adaptive maintenance

Changes to the environment in which the software operates means necessary changes to the code. Could be updated operating system, or new hardware.

## 6.3 Perfective maintenance

Responding to user requests for changes in functionality or additional features.

# 7. Open issues & escalation process

The issue and action item management process consists of six steps.

* Identification
* Validation and Prioritization
* Analysis
* Tracking and Reporting
* Escalation (if needed)
* Resolution and Closure

 Figure 1. Issue and Escalation Process Flow Chart

# 8. Life cycle

We are going to use the incremental model that combines elements of the linear sequential model with the iterative philosophy of the prototyping. The project is designed, implemented, integrated and tested as a series of incremental builds. Iteration refers to the cyclic nature of a process in which activities are repeated in a structured manner. And increment refers to the quantifiable outcome of each iteration. Iterations can offer a development process two key things: iterative refinement, where the process improves what already exists and is being done, and incremental development, where the process results in progress against project objectives. Iterative and incremental development is a process that grows a system feature by feature during self-contained cycles of analysis, design, development and testing that end in the production of a stable, fully integrated and tested complete system**.**

# 9. Major milestones and schedule

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone/Deliverable Plan** | | | | |
| Milestone Deliverables (Description) | Who is Responsible | Start Date | Target Completion Date | Status |
| Questions to Professor regarding Requirements | Qiong | 1/23/2013 | 1/30/2013 | Completed |
| Bocong |  |  |  |
| Manjit |  |  |  |
| Shivam |  |  |  |
| Aarshi |
| Version 1 of SPMP | Bocong | 1/30/2013 | 2/6/2013 | Completed |
| Qiong |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Version 1 of SRS | Manjit | 1/30/2013 | 2/6/2013 | Completed |
| Qiong |  |  |  |
| Bocong |  |  |  |
|  |  |  |  |
| Version 2 of SPMP | Shivam | 2/7/2013 | 2/13/2013 | Completed |
| Aarshi |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Version 2 of SRS | Qiong | 2/7/2013 | 2/13/2013 | Completed |
| Bocong |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Proposal PPT | Manjit | 2/7/2013 | 2/13/2013 | Completed |
| QIong |  |  |  |
|  |  |  |  |
|  |  |  |  |

# 10. Cost estimates

The cost of this project should be the effort that every member in the team puts into the project. It will be measured in hours.

This project does not have a budget. All of the team members are students working for free. Also, the licenses for the development tools and computational resources are provided by UTD.

# 11. Responsibility assignments

Every Phase of project will have a project manager. And he/she will be in charge of the project. Every member in the team has responsibility.

Responsibility Assignment Matrix Template

|  |  |  |  |
| --- | --- | --- | --- |
| **Task** | Responsible | Accountable | Consult |
| Requirement | Bocong, Qiong, Manjit | Bocong, Shivam | Manjit |
| Design |  |  |  |
| Implementation |  |  |  |
| Testing |  |  |  |
|  |  |  |  |

| **Code:** | **Stands For:** | **This Person Is:** |
| --- | --- | --- |
| R | Responsible | Responsible for performing the task or creating the document |
| A | Accountable | Accountable and has sign-off authority for the task, such as the project manager, sponsor, technical lead |
| C | Consult | Providing expertise, advice and support to the person responsible for the task or document and others |
| I | Inform | Informed of task progress or results, usually by the person responsible |

# 12. Performance measures to be collected

We are going to justify the performance as the following six categories:

* Effectiveness: A process characteristic indicating the degree to which the process output (work product) conforms to requirements.(Are we doing the right things?)
* Efficiency: A process characteristic indicating the degree to which the process produces the required output at minimum resource cost. (Are we doing things right?)
* Quality: The degree to which a product or service meets customer requirements and expectations.
* Timeliness: Measures whether a unit of work was done correctly and on time. Criteria must be established to define what constitutes timeliness for a given unit of work. The criterion is usually based on customer requirements.
* Productivity: The value added by the process divided by the value of the labor and capital consumed.
* Safety: Measures the overall health of the organization and the working environment of its employees.

The following reflect the attributes of an ideal unit of measure:

* Reflects the customer’s needs as well as our own
* Provides an agreed upon basis for decision making
* Is understandable
* Applies broadly
* May be interpreted uniformly
* Is compatible with existing sensors (a way to measure it exists)
* Is precise in interpreting the results
* Is economical to apply

# 13. Plans

• **Communications**

To communicate with the customer, we use emails and in person meetings.

Customer Contact Details: Mark C. Paulk, Ph.D., [Mark.Paulk@utdallas.edu](mailto:Mark.Paulk@utdallas.edu)

To communicate between the team, we use emails and in person meetings.

Aarshi Sikka: [axs104621@utdallas,.edu](mailto:axs104621@utdallas,.edu)

Bacong Zhao: [bxz121430@utdallas.edu](mailto:bxz121430@utdallas.edu)

Manjit Singh Thakurratan: [mxt103420@utdallas.edu](mailto:mxt103420@utdallas.edu)

Shivam Chhatwal: [sxc104820@utdallas.edu](mailto:sxc104820@utdallas.edu)

Qiong Wang: [qiongwang2010@gmail.com](mailto:qiongwang2010@gmail.com)

• **Configuration management**

* + Microsoft Word/Open Office Writer is used for documentation.
  + SRS for requirements elicitation.
  + Rational Rose is used for design modeling.
  + Eclipse IDE is used for development.
  + JUnit is used for white-box testing

• **Risk management**

The risk management has the following steps:

* Risk Identification
  + Brainstorming is a basic method to identify risks
  + Use checklists of known risk factors and recording which ones apply to our project.
  + Based on the WBS to methodically discuss each section and bring out what risk would affect it.
  + Analyze designs for potential flaws
* Risk Analysis
  + Categorize all kinds of risks that have been identified
  + Rank the impact severity level of each risk
  + Assign event occurring probability rating to each risk
* Risk process
  + Decide responsive action to each risk
  + Allocate the resources to the risk that must be handled

# 14. Design Techniques

We would be following UML to create the design of the software using Rhapsody Rose software. The design will include use case diagrams, sequence diagrams.

# 15. Testing Techniques

1. Unit testing – Verify the functionality of a specific section of code. We will conduct unit testing on the class level.
2. Integration testing – We will conduct integration testing to verify interface between components against the software design.
3. System testing – We will conduct system testing on a completely integrated system to verify that it meets its functional and nonfunctional requirements. Equivalence partitioning and boundary value analysis will be used to develop the test cases.
4. Regression testing – We will conduct regression testing to verify fixed bugs and the entire system.

# 16. Software Tools

1. GIT – Used for documents/source code version control
2. Rational architect – Used for design
3. Eclipse – Used for developing software and its modules
4. JUnit – Used for unit testing
5. Bugzilla – Used for bug tracking and management