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| *CometPark* |
| **Project Plan Document** |
| **SE 6387 Advanced Software Engineering Project**  **R.Z. Wenkstern**    ***02/18/2014*** |

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# Revision History

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| **Version** | **Date** | **Description** | **Authors** |
| 1.0 | 2/17/2014 | Completed initial draft | Hariprasad, Prasanna |

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# Overview

The University of Texas at Dallas is a growing university with a large number of parking lots to accommodate the increasing number of students on campus and off campus. There are various kinds of parking spaces available to the students, teaching, non-teaching staff and visitors. The different parking places available are Pay-by-space, On-Campus Apartment resident parking, Residence Hall parking, E-parking and Colored-Coded Parking Spots. There has been a general feedback that finding a parking space during peak hours close to the building they want to visit is quite difficult and time consuming. The CometPark system is aimed at providing a solution to this problem.

## 1.1 Purpose, Scope and Objectives

The purpose of this project is to help resolve the problem of finding vacant parking spaces on campus for the students and staff of the UTD Community. The CometPark system will be made available to the users as a mobile application accessible from their smart phones.

The scope of this project is for the parking lots of the UT Dallas campus. The CometPark system is meant to be used by the students and staff of the University who commute by car.

## 1.2 Assumptions and Constraints

Some assumptions and constraints upon which the CometPark system is based are as follows:

* The users should have a smart phone with data plan and GPS activated.
* In open parking lots where the wiring facility is not very extensive, the system must have as little or no wiring as possible.
* The Controllers used by the CometPark system should be able to connect to the University Wi-Fi (CometNet).
* The connection to CometNet wireless network from the controller should not have any timeout.
* The parking lots have access to a power source, preferably a renewable energy source.
* The cost and timelines described for this project are based on the estimates for a small number of parking spaces in a single parking lot. Our current projection for completing our project is May 12, 2014. The overall cost for implementing this project would be around $30 per parking space, excluding civil and installation costs. Implementing the system on a large scale will have a different budget and timeline.
* The sensor module in each parking space will be protected from physical damage.

## 1.3. Project Deliverables

The deliverable is a software system which will help the user to find the nearest vacant parking spot through a mobile application on his/her smart phone. The other deliverables are as follows:

* Source Code
* Software
* Hardware
* Documentation
  + Project Plan
  + Vision Document
  + System Requirement Specification Document
  + Requirement Analysis Document
  + System Architecture Document
  + Detailed Design Document
  + Software Requirement Specification Document
  + Test Plan
  + User guide and Release Notes

## 1.4 Schedule and Budget Summary

The estimated timeline for the project is from 1/23/2014 to 5/12/2014 within which all the deliverables must be completed and delivered. Each deliverable has a due date and every effort will be made to deliver it on time without any delay. A detailed list of the deliverables and their respective due dates is available in Section 3.2.2 of this document.

The total budget for the Comet Park system is $200. The estimated cost for implementing the system per parking space is:

Cost per parking space: $28.57

Cost per controller component: $69.97(which will be shared by multiple parking sources in a lot)

# 2. Project Organization

## 2.1 Roles and Responsibilities

The following are the roles and responsibilities along with the person who will be playing that role in our project.

Project Manager:

* Has overall responsibility for organizing and planning the project.
* Is a facilitator and generalist.
* In our team, Hariprasad along with Prasanna will be acting as the Project Manager, in addition to be being team members.

Functional Manager:

* Helps in identifying the best technology and processes.
* Helps in the overall management of work related to software architecture.
* In our team, Rekha, Hariprasad and Arun are the Functional Managers

Developers:

* Does all the development and implementation part of the project.
* Shall be adaptable, collaborative, committed in addition to being dependable and responsible.
* Arun, Hariprasad, Prasanna, Rekha

# 3. Managerial Process Plan

## 3.1 Start-Up Plan

### 3.1.1 Estimation Plan

The estimation of resources, cost and time to implement the CometPark system are as follows:

The number of human resources that will be dedicated to this project is four. Since this project includes many hardware components such as IR Sensor, Solar Panel - 6V, XBee Series 1, Raspberry Pi as Controller, Amazon Web Service as Server, Wi-Fi adapter and Battery Pack, the number of components is expected to change in the course of project development.

The estimated cost for the various hardware components is about $200 for the demo purpose. These estimates are made based on the cost of the individual components needed to implement the system.

The estimated time for the project design is 50% of the total time of the project. The estimated time for coding and testing is 30% and 20% respectively, of the total time of the project. The total time of the project is 3.5 months ending on May 12th, 2014.

### 3.1.2 Staffing Plan

The team members will be given separate modules based on their area of expertise and the Project Manager will make sure that the workload is distributed evenly. All the team members will work on all the phases of the project.

### 3.1.3 Resource Acquisition Plan

The human resources for this project comprise of 4 members. This is a self-funded project. The hardware components are bought manually from Fry’s, and online through sites like amazon.com or sparkfun.com. The softwares are either free or on trial period or licensed to our university (UT Dallas). These shall be run on our personal laptops and/or on the lab PCs.

## 3.2 Work Plan

### 3.2.1 Work Activities

The start date for the project is 1/23/2014 and will last for duration of 3.5 months and must be completed by the May 12th, 2014.

The various work activities that will take place during the course of the project are:

1. Documentation
   1. Project Plan
   2. Vision Document
   3. System Requirement Specification Document
   4. Requirement Analysis Document
   5. System Architecture Document
   6. Detailed Design Document
   7. Software Requirement Specification Document
   8. Test Plan
   9. User guide and Release Notes
   10. Project Plan
2. Implementation
   1. Software
      1. Controller Programming
      2. Xbee Programming
      3. Mobile app development
      4. Back End Application Development
   2. Hardware Implementation
3. Testing Phase
   1. Manual Testing

### 3.2.2 Schedule/Resource/Budget Allocation

The following are the artifacts to be submitted along with the respective completion dates

|  |  |
| --- | --- |
| **Artifact Completed** | **Completion Date** |
| Vision Document | 2/18/2014 |
| Project Plan | 2/18/2014 |
| System Requirements Specification Document | 2/20/2014 |
| Requirement Analysis Document | 2/27/2014 |
| System Architecture Document | 3/4/2014 |
| Detailed Design Document | 3/6/2014 |
| Software Development Completion | 4/1/2014 |
| Software Testing Completion | 4/22/2014 |
| Software Deployment Completion and Demo | 5/8/2014 |
| User guide and Release Notes | 5/12/2014 |

Table 1 Delivery Schedule for the artifacts

The following are the important components that will needed to implement the system and their cost:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Model** | **Manufacturer** | **Price** |
| Passive Infrared Sensor | HC-SR501 | Amazon | $8.45 for 5 sensors |
| Xbee Module | Series 1 | RobotMesh | $20.23 |
| Controller | Model B | Raspberry Pi | $35.00 |
| Cloud Server | AWS | Amazon | Free for 750 hrs |
| Wifi Adapter | EW-7811Un | Edimax | $9.99 |
| Battery Pack | 6V - DiaMec | Apex Battery | $4.75 |
| Bread board | 400 tie-points | Amazon | $1.9 |

Table 2. Hardware components, manufacturer and costs.

The total budget for the Comet Park system is $200. The estimated cost for implementing the system per parking space is:

Cost per parking space: $28.57

Cost per controller component: $69.97(which will be shared by multiple parking sources in a lot)

The Softwares used were all free as we used free softwares, trial softwares and/or licensed software in the CS Graduate Labs. The human resources were all students working for free. The workstations were all free, since personal laptops or PCs in the UT Dallas CS Grad Labs.

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## 3.3 Risk Management Plan

If at any stage of the project, the number of people allocated to the project decreases, due to unforeseen circumstances, it must be immediately communicated to the manager who will assess the situation. The manager will plan for the remaining team will reorganize their tasks to complete the tasks on time. Since the analysis and design are all planned events, there would not be any deviation in the schedule.

# 4. Technical process plans

## 4.1 Process Model

The project will follow Harmony Process Model and following are the major milestones that are planned for each iteration:

Milestone 1: The system requirements will be gathered and the cost estimation for system engineering will be done in a span of 1 month. Acceptance is needed here from Professor, Teaching Assistant. Also the project vision, problem statement, Software Requirements Specification (SRS) document and project plan documents will be delivered with the gathered details.

Milestone 2: Once the requirement gathering is done and a plan is formulated, System Engineering will be taken care of. The various component interactions and integration of various modules will be done for a span of 14 days along with exploring Amazon Web Service (AWS) which will serve as the server for the software component. The deliverables for the period will be taken care of in parallel.

Milestone 3: After exploring the system components, actual tuning of the hardware will be done to meet the requirements of our project. The developer will work on creating the software modules along with hardware modules. Parallelism will go for 1.5 months until the entire system is developed. Frequent reviews of the code with the Professor and Teaching assistant will be done. In addition, the deliverables for the period will be taken care.

Milestone 4: Testing will start on the system once the development is finished. Testing is planned for a period of 2 weeks. Once the testing is complete, the system will be prepared for the demo in real world environment.

**4.2 Methods, Tools and Techniques**

4.2.1 Development Environment

The product will be developed on Windows 7 at University of Texas at Dallas campus. The development servers will have Intel I5 processors and Eclipse/Net beans IDE.

4.2.2 Target Environment

The product will run on Amazon Web Service (AWS) cloud environment. The AWS free tier offers 750 free hours. It hosts both Linux and Windows environment and has MySQL database.

4.2.3 Development and Documentation Standard

All the documentation will be done based on the templates of IEEE standards with minor modifications to suit the needs of the Project.

4.2.4 Testing Standard

All modules will be tested for both functionality and performance testing and the application.

4.2.5 Team Structure

The method the group plans to go about completing this project is through equal distribution of the workload. The team structure shall consist of a project manager and developers. The project manager will be the main point of contact. It is the duty of each member in the team to take responsibility and ownership of the deliverables and the milestones to be completed in each sprint. All the workload will be distributed evenly to all the team members. Team members are advised to keep team’s interest above individual interest.

4.2.6 Programming languages

The major development of the software, mobile application and the hardware to software interactions will be written in Java. VERSIONONE should be used for Project Planning Management. IBM Rhapsody for designing the UML diagrams. IBM Rational Doors for documenting the requirements using IEEE STD 830. And GitHub shall be used for Version Control.

**4.3 Infrastructure Plan**

4.3.1 Hardware Component

The following table shows the list of hardware components that will be used.

|  |  |
| --- | --- |
| **Component Name** | **Model/Type** |
| Passive Infrared Sensor | HC-SR501 |
| Xbee Module | Series 1 |
| Controller | Model B |
| Cloud Server | AWS |
| Wifi Adapter | EW-7811Un |
| Battery Pack | 6V - DiaMec |
| Bread board | 400 tie-points |

Table 3. List of hardware components used

4.3.2 Software Development Infrastructure

Workstation Details are provided in the following table.

|  |  |
| --- | --- |
| **Component** | **Model** |
| Development Platform OS | Windows 7 |
| RAM | 8 GB |
| Processor | Intel I5/I7 processor |
| Hard drives | 750GB |
| Network | Wi-Fi(Comet net) |

Table 4. Workstation Configuration

All the project activities will comply with the policies and standards of University of Texas at Dallas.

Facilities: 4 Workstations. Each team member with each workstation. Server will be located in cloud (Amazon Web Service).

## 4.4 Product Acceptance Plan

The deliverables will be completed before the deadlines and reviewed thoroughly. Demo the will be done for every milestone that is listed in process model section.

# 5. Supporting Process Plans

## 5.1 Configuration Management Plan

The Configuration Management tool that we are planning to use for version control of source code and documents is github. To track the workload assignment and progress, we are using VERSIONONE project planning tool. VERSIONONE is agile project planning management tool.

## 5.2 Test Plan

The time allocated for the Testing is 20% of the total project time. The test coverage involves the testing of the code and hardware components used. The testing used here would be Manual, Functional and Integration Testing. The peer testing is performed by the project team members with their allocated modules.

## 5.3 Documentation Plan

The documents for this project will be submitted online and a hardcopy will be given. The printed documents follow the A4 sheet dimensions with no consideration of colors.

## 5.4 Quality Assurance Plan

The quality assurance plan starts by setting the goal. The functional and non-functional testing ensures the quality of the project. The critical areas are identified and given special attention. The goals are checked in regular intervals and assured they are met, if not the changes are made as per to reach the milestone.

## 5.5 Problem Resolution Plan

The project team follows a proper procedure of error reporting and tracking of the bugs. The problems encountered in the project are updated in the Issue Tracker document and tracked by their status. The functional manager will be responsible for the Issues tracking in the project.

# Appendix A: Glossary

|  |  |
| --- | --- |
| **Term** | **Definition** |
| Controller | Model B Raspberry Pi |
| CometNet | The Wi-Fi connection provided at University of Texas at Dallas |
| UTD, UT Dallas | Refers to University of Texas at Dallas |
| AWS | Refers to Amazon Web Service which is the cloud service provider for our project |

# Appendix B: References

1. IEEE 1058-1998
2. <http://www.tbs-sct.gc.ca/emf-cag/project-projet/ppto-pssp/templates-gabarits/project-projet/project-projet05-eng.asp>
3. <http://pic.dhe.ibm.com/infocenter/clmhelp/v4r0/index.jsp?topic=%2Fcom.ibm.rational.rrm.help.doc%2Ftopics%2Fr_vision_doc.html>