# Project Plan

**PROJECT NAME: SMART VENDING MACHINE**

**COURSE NAME: INTEGRATED DESIGN PROJECT-02**
**COURSE CODE: CSE-460**

**GROUP NO: JULIETT (08)**

**SECTION: A**

**GROUP MEMBERS:**

**Pratyusha Kundu (201814014)**
**Anika Zaman (201814018)**
**Sabrina Afreen Haque (201814020)**
**Md. Arr Rafi Islam (201814050)**

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# 1 Introduction

## 1.1 Document Purpose

A project plan is a formal document designed to guide the control and execution of a project. A project plan is the key to a successful project and is the most significant document that needs to be created while starting a business project. The purpose of the Project Plan is to gather all information necessary to control the project. Project team members use it to understand what they need to do, when they need to do it, and what other activities they are dependent upon.

## 1.2 Associated Documents

Apart from project planning documents, Software Requirements Specification (SRS), Project proposal, Project Paper, Project Scheduling and Project Budget Analysis papers etc. are prepared and attached with along with the Project Plan.

## 1.3 Project Plan Maintenance

Project Plan depicts the complete structure of the project. Planning for the project might depend on the requirements of the clients. Besides, certain situation while developing the project might enhance the developers with permission from client to change the project plan. However, any changes in the project plan is brought and properly documented on consent of both client and project director.

# 2 Project Scope

Anyone who is interested to purchase from this smart vending machine will be able to use the system. A customer may install the android app from play store, register and log in to purchase from the machine.
An administrator will administer the system and keep the information accurate by using web portal. Furthermore, the system will need both Internet and Bluetooth connection to function accordingly. All system information will be maintained in a database.

## 2.1 Objectives

1. To detect if a product from a vending machine has been purchased or not.

2. Using Bluetooth and an app to connect with a vending machine to make shopping quicker.

3. To increase the use of online or mobile banking to reduce the use of cash with a view to lessening the spread of germs in any urgent situation i.e., pandemic, war etc.

4. To lessen crowds in markets and shops by setting up vending machines in local areas.

### 2.2 Success Criteria

1. The first step of success depends on the functioning of the prototype of the vending machine that is, if the prototype works correctly like the existing vending machines.
2. Then after the prototype works well, next success depends on the connection of Bluetooth with the prototype.
3. Then, the next step depends on controlling the Bluetooth using the android app.
4. The next step concerns about the correct functioning of sensors and mobile banking.
5. At the end, the UI of the system has to be easy for the users to use the system.

## 3 Deliverables

### 3.1 To client

The clients of the project are anyone who wants to use this Smart Vending Machine. It is required to find out objects that should be delivered to the client and list them and make documentation. Firstly, the developer team needs to collect information from the client to make prototype and deliver them for feedback. Then, temporary executable project is created for test analysis. For this project, the developers need to list appropriate sensors and hardware suitable for the project, most convenient user interface platform and payment process for users. Finally, the client is given an estimation time about project delivery date.

### 3.2 From client

To make project properly suitable for client, the developing team needs feedback from the client side. For their better understanding, documentation is essential. Documentation should contain nontechnical terms or technical terms with explanation. Documentation should be delivered frequently to the client for review. Test analysis need to be based on real time activities. After using the updated project and data can be collected from client and find out output accuracy. The users can recommend certain changes. Also, the developer team needs to give them support for further change in system.

# 4 Project Approach

Agile methodology has been adopted to carry out the proposed system from the beginning to end. Agile software development is an approach to software development under which requirements and solutions evolve through the collaborative effort of self-organizing and cross-functional teams and their end users. As the proposed system is divided into several segments consisting different functionality, it is necessary to check the outcome after completing each functionality. Each step in this methodology has a significant impact on the next step of the system. It supports adaptive planning, evolutionary development, early delivery, and continual improvement; it also encourages rapid and flexible response to change. Agile methodology has the highest possibilities to provide maximum efficiency of the system development. The steps of agile methodology which are adopted to carry out this project have been portrayed through the following image:

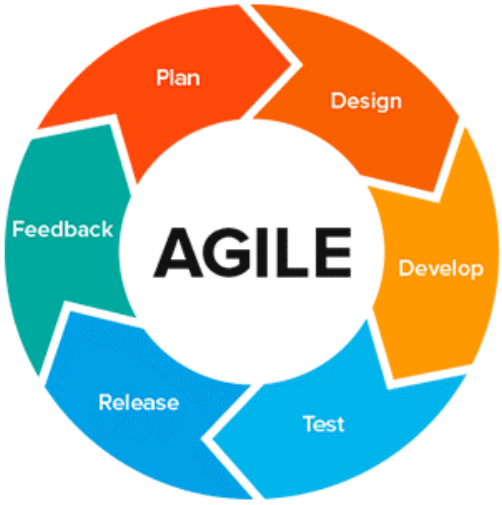


Fig: 1: Agile Methodology

## 4.1 Project Team Organization

We have divided our project into some parts and distributed the task among six group members as follows:

| Task Name | Resource Names |
|---|---|
| **Smart Vending Machine** | |
| Group Selection | |
| **Idea** | |
| Idea Generation | Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Idea Presentation | Pratyusha Kundu |
| Idea Selection | |

| | |
|---|---|
| Study Details of the Idea | Md Arr Rafi,Pratyusha Kundu,Sabrina Haque,Anika Zaman |
| First Draft Of the project | Pratyusha Kundu,Anika Zaman,Md Arr Rafi,Sabrina Haque |
| Presentation of first draft of the project | Pratyusha Kundu |
| Modification on the first draft of project | Pratyusha Kundu |
| Submission of the Final Project Proposal | Pratyusha Kundu |
| **Project Scheduling** | |
| Update 1 | Anika Zaman,Pratyusha Kundu |
| Update 2 | Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Update 3 | Anika Zaman,Pratyusha Kundu,Sabrina Haque |
| **Drafting SRS part-1** | |
| Determine project scope | |
| SRS Update 1 (Defining Scope, User Requirements & System Requirements) | Anika Zaman,Pratyusha Kundu |
| SRS Update 2 (Defining Relation Between User & System Requirements) | Anika Zaman,Pratyusha Kundu |
| SRS Update 3 (Defining System Models) | Anika Zaman,Pratyusha Kundu |
| SRS Update 4 (Defining System Architecture & System Evolution) | Anika Zaman,Pratyusha Kundu |
| Submission of Final SRS part-1 | Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| **Drafting SRS part-2** | |
| SRS update 5 (Defining Specific Requirements) | Anika Zaman,Pratyusha Kundu |
| SRS update 6 (Defining Design Constraints) | Anika Zaman,Sabrina Haque |
| **UI Design** | |
| Designing User Interface Mockups | Anika Zaman,Md Arr Rafi,Pratyusha Kundu |
| Preliminary Documentation Complete | Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Drafting UI Design Document | Pratyusha Kundu,Sabrina Haque |
| **Drafting Planning and Development Documents** | |
| Drafting System Development Documents | Md Arr Rafi,Sabrina Haque |
| Drafting Project Plan | Anika Zaman,Pratyusha Kundu |
| **Drafting Project Report** | |
| Drafting Project Article | Anika Zaman |

| | |
|---|---|
| Drafting Report | Anika Zaman |
| **Drafting User Manual and HelpDoc** | Anika Zaman,Pratyusha Kundu,Sabrina Haque |
| **Hardware Analysis Requirements** | |
| Conduct availability | Pratyusha Kundu,Sabrina Haque |
| Review specification | Anika Zaman,Pratyusha Kundu,Sabrina Haque |
| Develop primary budget | Md Arr Rafi,Sabrina Haque |
| Incorporate feedback | Md Arr Rafi,Sabrina Haque |
| Determine Delivery | Pratyusha Kundu |
| Obtain approval | Pratyusha Kundu,Anika Zaman |
| Secure Resources | Pratyusha Kundu |
| Hardware Analysis complete | Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| **Software Analysis Requirements** | |
| Conduct necessity study | Pratyusha Kundu |
| Draft Preliminary | Pratyusha Kundu |
| Review specification | Sabrina Haque |
| Develop primary budget | Anika Zaman |
| Incorporate feedback | Anika Zaman |
| Obtain approval | Md Arr Rafi |
| Secure Resources | Anika Zaman,Md Arr Rafi,Pratyusha Kundu |
| Software Analysis complete | |
| **Implementation** | |
| **Android App Development** | |
| Phase 1 (SignUp and Login) | Android Studio,Anika Zaman,Md Arr Rafi |
| Phase 2 (Remaking the app and Admin system) | Pratyusha Kundu,Android App Development Environment (MIT App Inventor) |
| Phase 3 (Recharge and designing Buy Now page) | Pratyusha Kundu,Sabrina Haque,Android App Development Environment (MIT App Inventor) |
| Phase 4 (Buy Now page) | Pratyusha Kundu,Android App Development Environment (MIT App Inventor) |
| **Hardware Integration** | |
| Phase 1 (Controlling Motors with switches) | Anika Zaman,Motors,Pratyusha Kundu,Switches |
| Phase 2 (Controlling motor with Bluetooth) | Anika Zaman,Bluetooth Module,Pratyusha |

| | |
|---|---|
| | Kundu,Android App Development Environment (MIT App Inventor),Arduino Mega,Motors |
| Phase 3 (Making the prototype structure) | Prototype of Vending Machine,Anika Zaman |
| Phase 4 (Detecting the product dropped or not) | Android App Development Environment (MIT App Inventor), Anika Zaman,Arduino Mega,Bluetooth Module,Motors,Pratyusha Kundu,Sonar Sensor |
| **Testing** | |
| Phase 1 (SignUp and Login) | Android Studio,Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Phase 2 (Remaking the app and Admin system) | Android App Development Environment (MIT App Inventor),Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Phase 3 (Recharge and designing Buy Now page) | Android App Development Environment (MIT App Inventor),Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Phase 4 (Buy Now page) | Android App Development Environment (MIT App Inventor),Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Drafting Software Testing Document | Anika Zaman,Pratyusha Kundu |
| **System Integration** | **Android App Development Environment (MIT App Inventor),Anika Zaman,Arduino Mega,Bluetooth Module,Coils,Motors,Pratyusha Kundu,Prototype of Vending Machine,Sonar Sensor,Products for display** |
| Phase 1 (Completing the prototype structure) | |
| Phase 2 (Installing the hardware components) | |
| Phase 3 (Integration with app) | |

| | |
|---|---|
| **System Testing** | Android App Development Environment (MIT App Inventor),Anika Zaman,Arduino Mega,Bluetooth Module,Coils,Md Arr Rafi,Motors,Pratyusha Kundu,Prototype of Vending Machine,Sabrina Haque,Sonar Sensor |
| **System Implementation Complete** | Android App Development Environment (MIT App Inventor),Anika Zaman,Arduino Mega,Bluetooth Module,Coils,Md Arr Rafi,Motors,Pratyusha Kundu,Prototype of Vending Machine,Sabrina Haque,Sonar Sensor |
| **Finalize Project Documents** | |
| Final SRS preparation | Pratyusha Kundu |
| Final UI Design Document | Sabrina Haque |
| Final Project Plan | Pratyusha Kundu |
| Final User Manual | Anika Zaman |
| Final Report | Anika Zaman |
| Final Software Testing Document | Pratyusha Kundu |
| Final System Development Report | Pratyusha Kundu,Sabrina Haque |
| Incorporate Feedback | Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |
| Documentation Complete | |
| **Post Implementation Review** | |
| Review With Team Members | |
| Document Lesson Learnt | |
| Create Maintenance Team | |
| Post Implementation Review Complete | |
| Project Closing | Anika Zaman,Md Arr Rafi,Pratyusha Kundu,Sabrina Haque |

Besides, a number of Project Directors have been continuously monitoring the overall progress.

# 5 Work Plan

## 5.1 Work Breakdown Structure

## 5.2 Resources

The resource distribution of the project is shown in the attached Gantt chart.

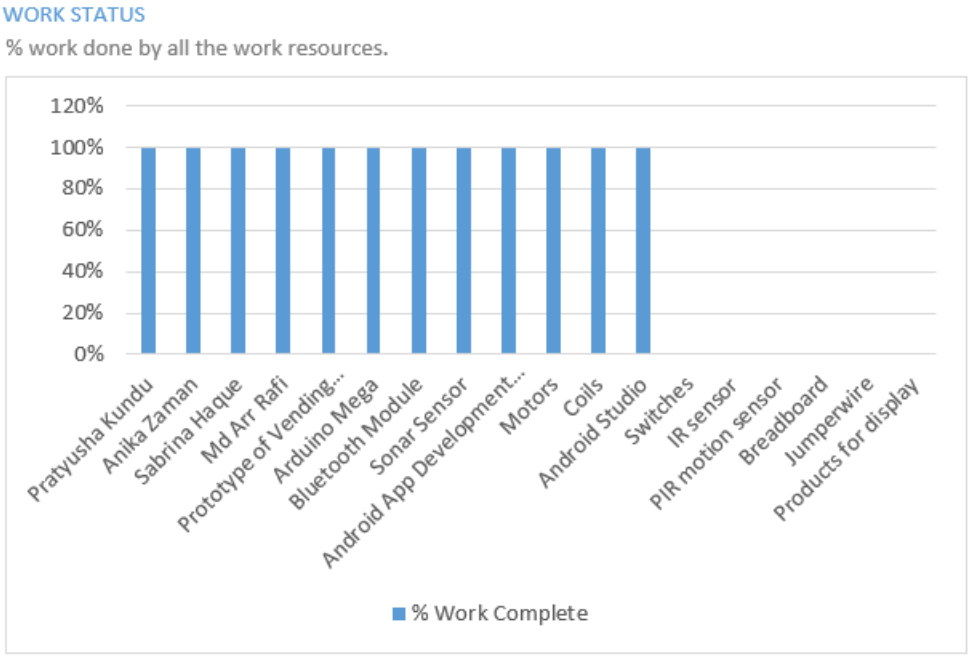


Fig: 2: Work Status of the Resources

| Name | Start | Finish | Remaining Work |
|---|---|---|---|
| Pratyusha Kundu | Thu 7/9/20 | Thu 7/1/21 | 0 hrs |
| Anika Zaman | Thu 7/9/20 | Thu 7/1/21 | 0 hrs |
| Sabrina Haque | Thu 7/9/20 | Thu 7/1/21 | 0 hrs |
| Md Arr Rafi | Thu 7/9/20 | Thu 7/1/21 | 0 hrs |
| Prototype of Vending Machine | Sun 5/16/21 | Sun 6/27/21 | 0 hrs |
| Arduino Mega | Sun 5/9/21 | Sun 6/27/21 | 0 hrs |
| Bluetooth Module | Sun 5/9/21 | Sun 6/27/21 | 0 hrs |
| Sonar Sensor | Sun 5/23/21 | Sun 6/27/21 | 0 hrs |
| Android App Development Environment (MIT App Inventor) | Sun 5/9/21 | Sun 6/27/21 | 0 hrs |
| Motors | Sun 5/2/21 | Sun 6/27/21 | 0 hrs |
| Coils | Tue 6/8/21 | Sun 6/27/21 | 0 hrs |
| Android Studio | Sun 4/11/21 | Thu 5/6/21 | 0 hrs |
| Switches | Sun 5/2/21 | Sun 5/2/21 | 0 hrs |
| IR sensor | NA | NA | 0 hrs |
| PIR motion sensor | NA | NA | 0 hrs |
| Breadboard | NA | NA | 0 hrs |
| Jumperwire | NA | NA | 0 hrs |
| Products for display | Tue 6/8/21 | Tue 6/8/21 | 0 hrs |

Fig: 3: Table for Resource Status of Remaining Work

## 6 Milestones

The completed milestones of the project have been shown in the following table:

COMPLETED MILESTONES

Milestones that are 100% complete.

| Name | Finish |
|---|---|
| Idea Selection | Wed 7/22/20 |
| Submission of the Final Project Proposal | Mon 8/31/20 |
| Hardware Analysis complete | Tue 4/13/21 |
| Software Analysis complete | Tue 4/6/21 |
| System Implementation Complete | Sun 6/27/21 |
| Documentation Complete | Tue 6/29/21 |
| Post Implementation Review Complete | Thu 7/1/21 |

Fig: 4: Completed Milestones

# 7 Risks, Constraints and Assumptions

This section will discuss initial Risks, Constraints and few Assumptions that were identified during initial project planning. Assessment attempts to identify, characterize, prioritize and document a mitigation approach relative to those risks which were identified prior to the start and during the project time-line. The Risk Assessment will be continuously monitored and updated throughout the life of the project, with further assessments which the Project Manager is allowed to amend. A constraint in project management is the restriction that limits project's desired outcome. Project constraint is one of the important factors that influences the project. It is a determinant factor to decide whether to continue the project or not. Basing on cumulative study, few constraints are identified for future references and address those once needed. To mitigate gaps within the risks and constraints and to allow the project move forward, few assumptions are made for supporting the decision of the stakeholders.

### 7.1 Risks

The risks of the project are discussed in the following table:

| **Risk Id.** | **Risk Description** | **Mitigation Plan (what to do to avoid the risk)** | **Contingency Plan (what to do if the risk occurs)** | **Impact (what the impact will be to the project if the risk occurs)** | **Likelihood of occurrence (e.g., high, medium, low)** |
|---|---|---|---|---|---|
| 1. | Malfunction of parts | Prior checking of equipment's | Check equipment's regularly | User will not be able to buy things from the vending machine | medium |
| 2. | Bluetooth Connection loss | Prior checking the wiring of Bluetooth module | The wiring to be fixed correctly | The vending machine will not connect with the user's smartphone | medium |

## 7.2 Constraints

### 7.2.1 Project Constraints

The project constraints are mentioned below:

1. Project funding sources are limited, with no contingency.

2. Due to the unavailability in this pandemic situation, a real mini vending machine could not be bought. It led to the project members to build a similar prototype which took much time.

3. Only certain type of online banking is associated with this project.

4. User will need Internet connection to buy products using this system.

### 7.2.2 Critical Project Barriers

Unlike risks, critical project barriers are impossible issues that can be destructive to a project's initiative. In this project, the following are possible critical barriers:

1. Removal of project funding

2. Unavailability of hardware resources

## 7.3 Assumptions

The following assumptions were made in preparing the Project Plan:

1. Management will ensure that project team members are available as needed to complete project tasks and objectives.

2. All necessary resources will be available and will be delivered in time.

3. All project participants will abide by the guidelines identified within this plan. The Project Plan may change as new information and issues are revealed.

## 8 Financial Plan

A Financial Plan identifies the Project Finance (i.e., funding) needed to meet specific objectives. The Financial Plan defines all of the various types of expenses that a project will incur (labor, equipment, materials and administration costs) along with an estimation of the value of each expense. A proposed financial plan for the project is tabulated here:

| Sr. | Category | Items | Qty | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1. | Cost of Materials | Bluetooth Module | 2 | 310/- | 620/- |
| | | Servo- full rotation | 4 | 1016/- | 4064/- |
| | | Servo Motor -SG90 | 2 | 160/- | 320/- |
| | | Arduino Mega R3 2560 | 1 | 850/- | 850/- |
| | | IR Sensor | 1 | 69/- | 69/- |
| | | PIR Motion Sensor | 1 | 88/- | 88/- |
| | | Ultrasonic Sensor | 1 | 70/- | 70/- |
| | | Breadboard | 1 | 65/- | 65/- |
| | | Jumper wire | 4 | 90/- | 360/- |
| | | Push Button | 5 | 5/- | 25/- |
| | | Wood Cost for Prototype | | 1800/- | 1800/- |
| | | Products for Display | | 50/- | 50/- |
| | | Delivery Cost | | 300/- | 300/- |
| | **Total Cost** | **8681/-** | | | |