K. J. Somaiya College of Engineering, Mumbai-77
(Autonomous College Affiliated to University of Mumbai)

Batch: A2 Roll No.: 1911027

Experiment / assignment / tutorial No. 3

TITLE: Project Plan document for Mini Project

AIM: To learn and understand the way of developing the software by classical methods of software Engineering., Planning and monitoring of the project using tools and prepare a document for the same by using the concept of software engineering **.**

Expected OUTCOME of Experiment:
CO: Analyze the software requirements and Model the defined problem with the help of UML diagram.

Books/ Journals/ Websites referred:

1. Roger Pressman, Software Engineering: A practitioners Approach, McGrawHill, 2010 ,6th edition
2. Ian Somerville , Software Engineering , Addison Wesley,2011,9th edition
3 http://en.wikipedia.org/wiki/Software_requirements_specification

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Software Project Management Plan

for

GPS based smart attendance system.

Sneha Kothi, Nayan Mandliya, Hussein Motiwala

14-09-2021

Version	Release Date	Responsible Party	Major Changes
1.0	14-07-2022	Sneha, Nayan, Hussein	Initial Document Release for Comment

Table of Contents:

1. Introduction

Over the years, several solutions have been developed to record the attendance of the students. The most popular of these is traditional manual attendance tracking systems. Each of these options has its disadvantages. In recent decades, schools have slowly begun to integrate software and modern clock terminals to better track the attendance of students along with the reduction in complexity and time consumption of the manual attendance system. Maintaining the attendance record with day-to-day activities is a challenging task. The conventional method of calling the name of each student is time-consuming and there is always a chance of proxy attendance. The following system is based on face recognition to maintain the attendance record of students.

1.1 Project Overview

This project aims to create an attendance system that allows students to record their attendance using their mobile device, with the help of face recognition technology and a GPS locator. Our proposed attendance system does not require any kind of peripheral device other than students' smartphones, thereby reducing computational time and avoiding the cost of placing physical devices in classes. The primary objective of the program is to be able to take attendance using students' mobile devices without inaccuracy. For the project to succeed, it must employ a location tracker and face recognition to deliver a reliable attendance system. Face recognition requires the student to have direct interaction with the device, while the GPS locator specifies the device's location. Since a student can use their mobile device, which they can bring anywhere, the system offers excellent mobility. Along with this we have other features-for teachers: They can login in this system and schedule lectures and after the completion of the lectures they can retrieve the attendance.

Major functions

- Student registration: Students have to register themselves so that their name and face features can be stored which then will be useful for attendance marking. This part must be done under the strict supervision of the professor so there will not be any discrepancy.
- Teacher registration: Teachers must register themselves to schedule lectures whose attendance will be taken by the system. This registration must be under

strict supervision to avoid discrepancies. Mail id of the teacher must be given so that all the attendance sheets will be mailed.

- Teacher login: Whenever a particular teacher wants to take attendance for a particular lecture that lecture must be scheduled in the system as well and for that teacher must be logged in to the system. The login credentials will be available to the teacher during registration.
- Lecture schedule: The teacher will be logging in with the help of login credentials and can schedule lectures. After scheduling the lecture a unique code will be provided to the teacher this code will be useful for students to mark attendance.
- Marking attendance: Whenever a teacher creates a lecture all the students will be able to see that lecture on the system. Students can mark themselves present by entering the code given by the teacher (code which is generated on lecture scheduling). Students' location will be tracked and if it is in the specified area then students just have to keep the camera of the phone in front of themselves and the system will do its job and student's attendance will be marked. This record will be stored in the database for that lecture.
- Attendance retrieval: When a lecture ends, the teacher will again log in. The teacher will now be able to get attendance. This attendance will be in the form of excel and this attendance sheet will be mailed to the teacher.

Objective:

In every higher education setting, there are concerns about student attendance, as the current process of manual attendance taking is not only time-consuming but is also inaccurate. Inconsistent attendance in class may significantly affect students' overall academic performance. Thus, having a consistent attendance system is important. Attendance of the student is marked using face recognition and retrieved by the student's location using GPS services. This project has a high potential to replace the current attendance system, as it is designed for speed and accuracy and is more convenient than the current approach. The objective of this project is to record the real-time attendance of students for a particular lecture by verifying their location. If the location corresponds to the set value for the college then the face of the student will be captured and after being verified from the database the student will be identified and attendance will be recorded.

Benefits:

- It saves time for manual attendance
- A contactless attendance solution is provided.
- Saves the hardware and software requirements of smart attendance system wherein webcams would have been required for each classroom.
- Saves time required to capture the face of every student by and recognize them followed by marking the attendance.
- Ensures that no student can mark the attendance of any classmate and that attendance isn't marked from any location.
- No biometric machines are required as attendance will be marked by mobile phone only.
- This system can be implemented with low investment as a bunch of good developers can easily build the system.

1.2 Project Deliverables

Sprint 1: 11-1-2022 to 7-3-2022

Designing the frontend(UI/UX) of the application for easy and hassle free experience for the user.

Sprint 2: 8-3-2022 to 2-5-2022

Constructing the base of the flutter app and providing a concrete structure to it thereby ensuring that all the functionalities pertaining to the application for efficiently.

Sprint 3: 3-5-2022 to 27-6-2022

Providing the complete flutter based application with all the functionalities as stated in SRS.

Sprint 4: 28-6-2022 to 22-8-202

Integrating the smart attendance system based on OpenCV and deep learning which will enable the application to recognize the facial features of a student thereby marking there attendance.

Connecting the flutter app with the database of college or university so that attendance can be stored in the database on a daily basis for different subjects categorized by the stream and year.

Testing the product after completing the development of the entire application and checking for its accuracy, working status and improvements.

Final Product:

The application will be provided to the client as a mobile application available on mostly Android and iOS devices.

Sr. No.	Deliverable	Date
1.	Mobile Application	August 2022
2.	Video Reference Manual	August 2022

1.3 Evolution of the SPMP

The Agile - Scrum software development methodology will be followed for this project. Hence, the various functionalities of the project have been divided into sprints and each sprint has a definite schedule. If a sprint isn't completed on time, then the unfinished product backlog item will be rolled forward for completion in the next agile sprint which is known as overflow.
In agile, being able to pivot and make changes to big organizational changes on the fly is key to long-term success, but so is the ability to do so with a consistent underlying purpose. Change management is concerned with controlling and tracking changes to project and product scope and ensuring conformance to customer expectations. Agile change management is concerned with increasing the ability of the project to be responsive to requests for change and to quickly implement the accepted change requests. Any changes that need to be made, will be incorporated in the upcoming sprints. Carrying out scheduled updates will not be a difficult task since its schedule and the corresponding sprint (wherein the update will be implemented) will be decided beforehand. Moving on to unscheduled updates, an employee might come up with an alternative and a better solution for any sub-problem. This idea will be pitched to the whole team and if the majority of the members approve of this idea, then the project manager will verify and integrate this to the system. In case of a tie, the project manager's say is final. The sprint wherein this unscheduled update will be incorporated, will be dependent on the type and purpose of the update.

1.4 Reference Materials

- *https://unolo.com/?gclid=Cj0KCQjwg7KJBhDyARIsAHrAXaFP26Wk3KknA96tK6zkQ4r7yRzQpYLFbUBc83fQmkyv7WnnqVUF_s8aAgmfEALw_wcB*

- *https://truein.com/face-attendance-demo/?utm_source=google&utm_medium=ppc&utm_campaign=Ad31_3-3-2_face_recognition_attendance_app&gclid=Cj0KCQjwg7KJBhDyARIsAHrAXaE2KI29ge9bc6ZNjtn6yQXh-eNFZn1iIHp9fOLA97aEjp_YWdmbyeMaAkNvEALw_wcB*

Title	Author	Publishing org
Unolo	unolo	Smartsense technologies Pvt. Ltd
truein	truein	Yugstart Technologies Pvt. Ltd.

1.5 Definitions and Acronyms

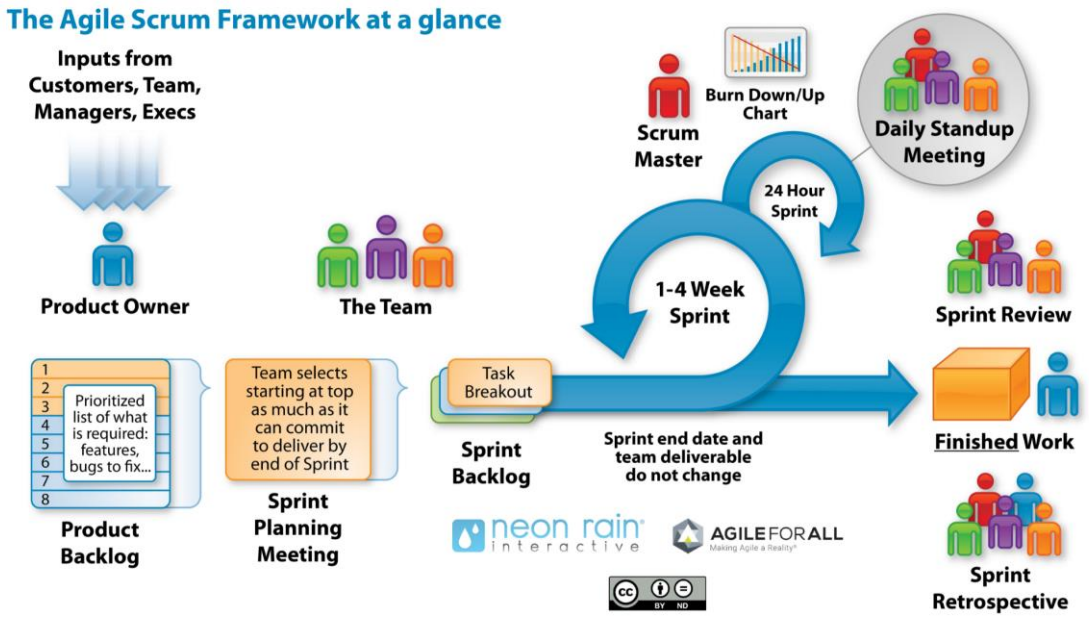
- **Scrum master:** Scrum Master is responsible for promoting and supporting Scrum. Scrum Masters do this by helping everyone understand Scrum theory, practices, rules, and values.

- **Product Owner:** The Product Owner (PO) is a member of the Agile Team responsible for defining Stories and prioritizing the Team Backlog to streamline the execution of program priorities while maintaining the conceptual and technical integrity of the Features or components for the team.

- **Scrum Development Team:** Scrum Development Team consists of professionals who do the work of delivering a potentially releasable Increment of “Done” product at the end of each Sprint. A "Done" increment is required at the Sprint Review. Only members of the Development Team create the Increment.

2. Project Organization

This section specifies the process model for the project and its organizational structure.



2.1 Process Model

Agile scrum methodology is sprint-based project management system whose goal is to deliver the highest value to stakeholders.

- Scrum is a framework that allows for more effective collaborations among teams working on complex projects.
- Agile and scrum are two similar project management systems with a few key differences.
- Agile is more flexible and promotes leadership teams, while scrum is more rigid and promotes cross-functional teams.

Agile scrum methodology is a project management system that relies on incremental development. Each iteration consists of two- to four-week sprints, where each sprint's goal is to build the most important features first and come out with a potentially deliverable product. More features are built into the product in subsequent sprints and are adjusted based on stakeholder and customer feedback between sprints.

Whereas other project management methods emphasize building an entire product in one iteration from start to finish, agile scrum methodology focuses on delivering

several iterations of a product to provide stakeholders with the highest business value in the least amount of time.

Agile scrum methodology has several benefits. First, it encourages products to be built faster, since each set of goals must be completed within each sprint's time frame. It also requires frequent planning and goal setting, which helps the scrum team focus on the current sprint's objectives and increase productivity.

There are 3 main roles:

Project Manager : Sneha Kothi

Technical Team Head : Nayan Mandliya

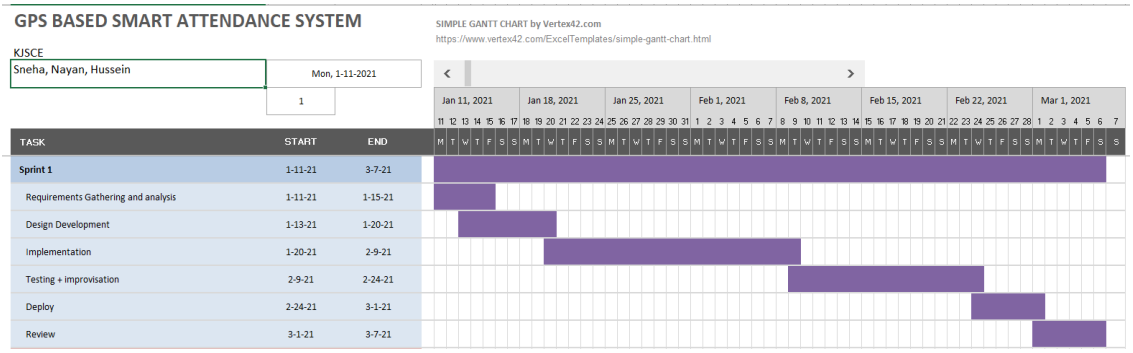
UI/UX Head : Hussein Motiwala

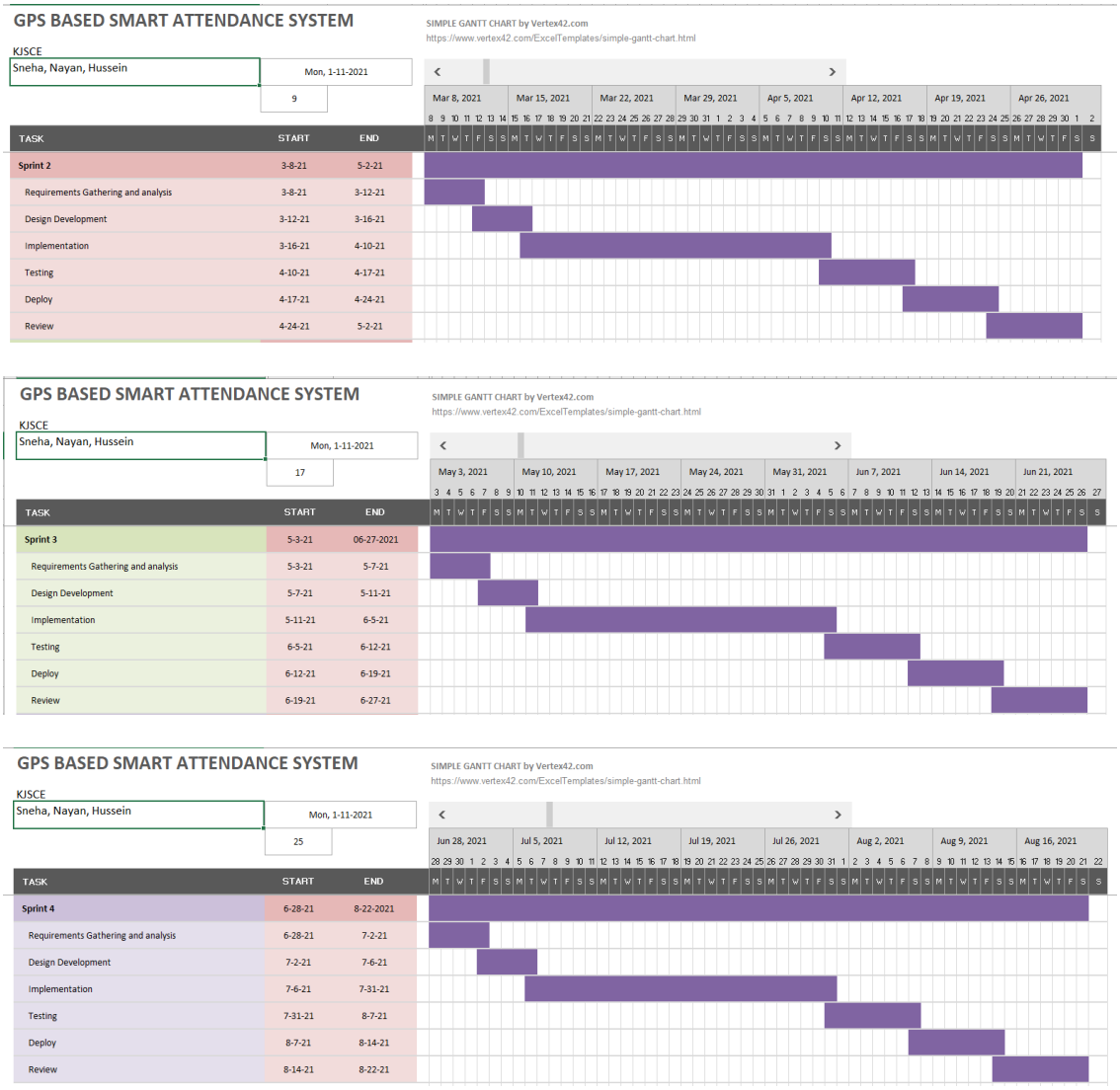
Our entry criteria for the project is a list of all people who are going to use this system with their photos which will be taken while creation of database and the precise latitude and longitude coordinates of KJ Somaiya College of Engineering.

Exit criteria are delivery of product that customer can assess, maintenance and addition of new features in future sprints

2.2 Organizational Structure

Schedule:





2.3 Organizational Interfaces

All data provided is not correct. Some of it is made up.

Organization	**Liaison**	**Contact Information**
Customer: KJ Somaiya	Mr. Jackson	jks338@outlook.com
Subcontractor: KJ Somaiya	Mr. Jackson	jks338@outlook.com

Software Quality Assurance	Sneha Kothi Nayan Mandliya Hussein Motiwala	sneha.kothi@somaiya.edu n.mandliya@somaiya.edu hussein.m@somaiya.edu
Software Configuration Management	Sneha Kothi Nayan Mandliya Hussein Motiwala	sneha.kothi@somaiya.edu n.mandliya@somaiya.edu hussein.m@somaiya.edu

2.4 Project Responsibilities

Role	**Description**	Person
Project Manager	leads project team; responsible for project deliverables	Sneha Kothi
Technical Team Head	Responsible for building the product and meeting the needs of the organization for which the product is made	Nayan Mandliya
UI/UX Head	Responsible for designing a user -friendly and easy to navigate user interface for people to use the app	Hussein Motiwala

3. Managerial Process

3.1 Management Objectives and Priorities

We believe that in this era of ever growing technology, we should adopt ways that give us better results and reduce manual effort.

We aim to build a product that eases the hassles and difficulties that come with manual attendance systems. Our goal is to not only make an easy-to-use app for students but also for teachers as they wouldn't need to download and preserve attendance on their devices on a daily basis.

Our main priority is having an efficient and accurate smart attendance system that recognizes a student from his/her face and marks his attendance only if they are within a certain range that is set by default and with a code that is randomly generated and shared by the faculty once lecture starts. Once the lecture ends the attendance is saved in the database and the faculty can request a copy of the same mailed to themselves.

Project Dimension	**Fixed**	**Constrained**	**Flexible**
Cost	X		
Schedule			X
Scope (functionality)	X		

3.2 Assumptions, Dependencies, and Constraints

Assumptions:

- Students and teachers have a stable internet connection.
- Students are under strict supervision while marking their attendance.
- User has any of the following Operating Systems listed above.
- The unique code provided by the teacher is only accessible to students sitting in the classroom.

Dependencies:

Cloud computing service

- For storing student's confidential data.
- For storing attendance of the students temporarily.

3.3 Risk Management

As our system is a potential replacement for the traditional attendance system it should be very reliable with no loose ends at all.

So the risk which we have estimated is that the user data which we are storing which includes the users image and credentials could be compromised due to some issue in the database or some code fault. to avoid this on the database side we are planning to use firebase/MongoDB as backend which are secure databases.

Another risk is if some two students look alike and our system is not able to distinguish between them, then there might be issues in the final attendance records. To avoid this we might have to train the model with sufficient data so this error might not pop up.

3.4 Monitoring and Controlling Mechanisms

Information Communicated	**From**	**To**	Time Period
Status report	Development Team	KJSCE	Monthly

Project Review	Development Team	KJSCE Testing Team	Once in 2 Months
Testing report	KJSCE Testing Team	Development Team	Once in 2 Months
Suggestions	KJSCE	Development Team	Anytime.

3.5 Staffing Approach.

The skills required for the project would be:

- Knowledge about Databases
- Flutter framework and Dart programming language
- UI/UX designing skills
- Good Communication skills

The team members will be recruited based on which part of the project they would like to work in along with what knowledge they have and how willing they are to learn more not only what's in scope but what's outside the scope as well.

They will also be selected on how well they can communicate with people in their team as well as with people from different teams and organizations

They will be provided with resources like YouTube playlists ,documentations etc to expand their knowledge further.

4. Technical Process

4.1 Methods, Tools, and Techniques

Technologies required for mobile application:

- Android: Flutter
- IOS : Flutter

Database:

- MongoDB
- Firebase

Application and data:

- Python
- Dart

Techniques:

- **ConV Net**
- **FaceNet** is considered to be a state-of-the-art model for face detection and recognition with deep learning
- A **Flutter geolocation** plugin which provides easy access to platform specific location services

Business tools:

- GSuite

4.2 Software Documentation

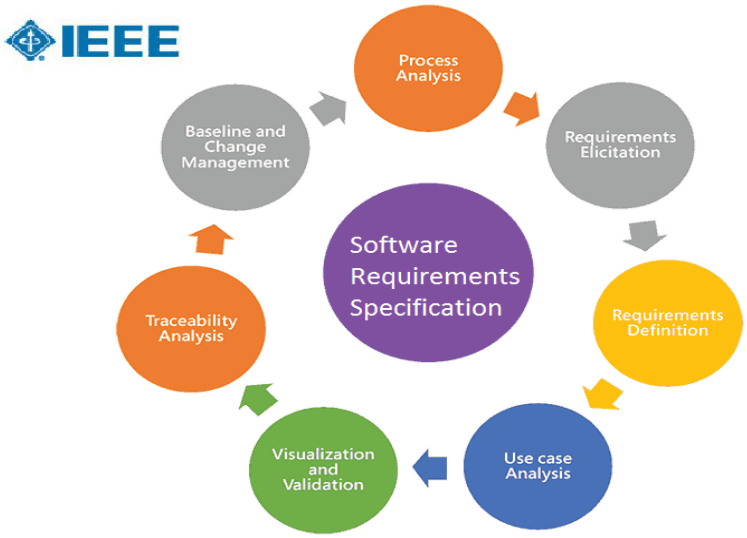
Software documentation is a part of any software. Good documentation practices are important for the success of the software. Documentation must comprise an interactive User Experience, Information Architecture, and good understanding of your audience.

It needs to serve the purpose of resolving the issues, when encountered by the developer, end user or while during customer facing the knowledge Base. Appropriate details and description need to be in the documented to achieve the following goals:

- Resolve issue encountered by the developer during the development process

- Help end-user to understand the product
- Assist customers and the support team to find the information.

4.2.1 Software Requirements Specification (SRS)



EXP1_SRS_GPS_based_attendance.docx

4.3 User Documentation

The User Documentation will be in the form of a video tutorial so it is easy for students to become familiar with the application.

A paper documentation of the same will be available if someone wishes to delve deeper and understand more about the application

4.4 Project Support Functions

The project follows standard procedures which are updated as and when new modules are added. The transactions for the database are carried out as per ACID properties, that is atomicity, consistency, isolation and durability.

5. Work Packages, Schedule, and Budget

5.1 Work Packages

The Mobile application will have 4 packages:

- Backend: Flutter
- Frontend: Dart
- Database: Mongo/Firebase
- Processing: Python

5.2 Dependencies

Cloud computing service

- For storing student's confidential data.
- For storing attendance of the students temporarily.

Mobile

- Active Internet Connection.
- Modern Mobile with GPS functionality available for precise location fetches.

5.3 Resource Requirements

Roles:

- UI/UX Head
- Technical Team Head
- Project Manager

Hardware and software requirements:

- Laptops/PCs with working webcam.
- Adobe XD
- Text editors like VsCode, Android Studio, Google Colab, Firebase console.
- Private GitHub account
- Documentation : Word, Powerpoint and Google Docs.

Time requirements: Approximately 8 months

5.4 Budget and Resource Allocation

- For boosting the backend of the application i.e The smart attendance system a laptop with higher RAM and GPU will be required.
- For clear pictures of students for the database collection a good quality webcam will be required.
- For saving the credentials to attendance of numerous lectures for various years students on a daily basis a large Database with strong security protocols will be required.
- Around 30% of the budget will be spent for backend development which is one of the integral part of the system.

The complete budget information is provided in the doc given below. Budget is calculated using COCOMO II model by considering all the required parameters.

1911031 EXP 2 Project Estimation.docx

5.5 Schedule

Schedule: 11 January 2022- 22 August 2022

- Designing the UI/UX for the product: 18 February 2022
- Building the flutter application: second week of June 2022
- Integrate the smart attendance system with the application: last week of July 2022
- Database Connectivity: Second week of August 2022
- Final product testing: Third week of August 2022

6. Additional Components.

6.1 Appendices

- (PDF) Smart Attendance Monitoring System (SAMS): A Face Recognition Based Attendance System for Classroom Environment
- Mobile Application for Student Attendance and Mark Management System
- Mobile Attendance System App

Conclusion: By performing this experiment understood how the project must be planned and how to prepare documentation of the same. By understanding this concept prepared a software project management plan for our groups project. Also understood how a project is scheduled in Microsoft excel.

Post Lab Descriptive Questions

1. State various Scheduling principles and explain them in detail.

ANS)

Page No.
Date

Ans Like all other areas of software engineering a number of basic principles guide software project scheduling.

1) Compartmentalization :- The project must be compartmentalized into a number of manageable activities and tasks. To accomplish compartmentalization both the product and the process are refined.

2) Interdependency :- The interdependency of each compartmentalized activity or task must be determined. Some tasks must occur in sequence, while other can occur in parallel. Some activities cannot commence until the work product produced by another is available.

3) Time allocation :- Each task to be scheduled must be allocated some number of work units (e.g. person-days of effort). In addition, each task must be assigned a start date and a completion date that are a function of the interdependencies and whether work will be conducted on a full-time or part-time basis.

4) Effort Validation :- Every project has a defined number of people on the software team. As time allocation occurs, you must ensure that no more than the allocated number of people has been scheduled at any given time.

5) Defined responsibilities :- Every task that is scheduled should be assigned to a specific member.

6) Defined outcomes :- Every task that is scheduled should have a defined outcome.

for software projects, the outcome is normally a work product or a part of a work product.

7) Defined milestones:- Every task or group of tasks should be associated with a project milestone. A milestone is accomplished when one or more work products has been reviewed for quality and has been approved.