LONDON METROPOLITAN UNIVERSITY

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(इस्लिङ्टन कलेज)

Final Year Project

Proposal Draft

Face Recognition Based Attendance System

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Nepal

Submitted By

Supervisor By

I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a marks of zero will be awarded.

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1. Introduction

The method of identifying people and recognizing person's identity by using their facial structure is called Facial Recognition. Facial Recognition technology is one of the widely used categories of biometric security. People can be identified and recognized by images or pictures through Facial Recognition Technology. Attendance record of employees is one of most important records present in an organization. Generally, Attendance record of employees are maintained using two ways:

1. **Manual**

   In manual attendance system a person records the present/absent record of employees in a excel or a attendance register by manually checking if the employee is present or not.

2. **Automated**

   In automated attendance system the present or absent record of employees are automatically stored in the database by detecting the presence or absence of employees using technologies such as face recognition.

Considering all the disadvantages of manual attendance system I have decided to develop a Face Recognition based Attendance System for Eat Ziffy Pvt. Ltd. hence this proposal is written to address the development of a system that uses subject's facial structure to recognize the subject and mark him/her as present and absent in the system.

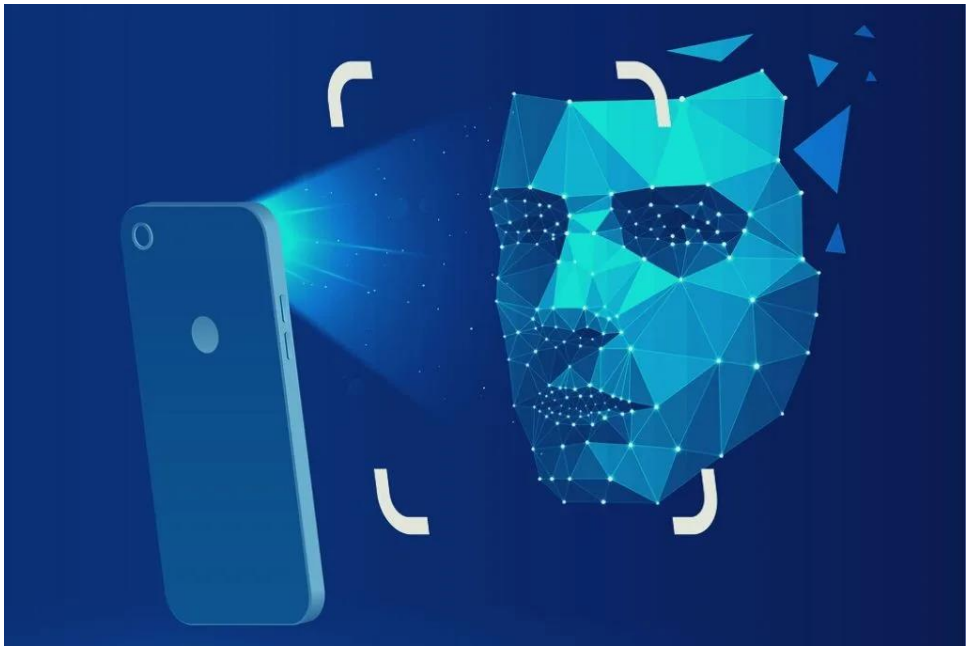

Figure 1 Image Depicting Facial Recognition (Faresse, 2020)

1.1. Problem Scenario

The attendance records of the employees at Eat Ziffy Pvt. Ltd. are recorded manually in the excel sheet by the HR department. Entering the data of presence or absence of employees manually takes a lot of time as number of employees will keep growing overtime in an organization. The HR department records the absence of employees through their application for leave sometimes the employees may not provide an application for leave and they are marked as present even when they are absent. There is risk of human error as HR department can record the attendance of employees incorrectly which can lead to incorrect information being used on employees payroll. There is risk of loss of valuable data of attendance by system crash as it is physically stored in a excel file in a hard drive. There is risk of records being changed if someone has access to the PC with the attendance records. There is no proper way to track the time the employees have entered the office.

1.2. Project as a Solution

This project will help to overcome the above problem statements. With the help of this system the time taken to manually enter the attendance record in the system is saved. The attendance of the employees are automatically recorded in the database by recognizing their faces. The system will only allow the employees to view their own attendance records and the HR department to view attendance records of all the employees and modify them as per need which prevents the risk of records being changed. The system will record the employees attendance along with the time of their arrival which will help the HR department to keep track of employees who are always late. In case a employee is recorded as absent the HR department and the employee is notified through email. The HR department will be able to generate attendance report from the system. Unidentified users entering the office space are recorded by the system which can be used for security purposes.

2. Aims and Objectives

The main aim of this project is to mitigate the problems currently faced by Eat Ziffy Pvt. Ltd. through their manual attendance system by developing an attendance system which will automatically record the attendance of the employees using facial recognition. Following objectives have been set in order to achieve this aim:

Academic Objectives:

- To learn about image recognition, deep learning, convolutional neural networks (CNN), open-cv, haar-cascade classifier and others for accurate image recognition.
- To learn about database systems to record attendance data of employees.
- To understand and implement machine learning algorithms for facial recognition.
- To learn about deploying machine learning models in a server.
- To document the process of system development in a proper manner.
- Research about the current status of manual attendance system and its implications.

Project Objectives:

- To automate the attendance system.
- To use IOT devices to build a prototype of facial recognition system.
- To reduce the risk human errors present in manual attendance systems.

3. Expected Outcomes and Deliverables

After the successful development of this system, it will be able to perform the following tasks:

- To provide a system that will process the video using IOT devices and recognize the subjects in the video and record their attendance in the database.
- To notify absent employee and HR department through email.
- To record the time of arrival of employees.
- To provide a system through which employees can check their own attendance records.
- To provide a system through which HR department can check the attendance record of all employees and update the records as per requirement.
- To provide an RESTful API which will provide the attendance information of the employees to the system.
- To provide a system that generates a report from attendance record of employees.

The project is targeted to aid the Eat Ziffy Pvt. Ltd. so that they can easily and securely manage the attendance record of their employees and save time.

4. Project risks, threats and contingency plans

Not every project is completed smoothly. Every project has certain set of events associated with it which hinder in successful completion of the project which are known as the risks of the projects. Some of the risks that I might face during completion of my project along with measures to mitigate them are listed below:

SN	Risk Description	Probability	Impact	Contingency Plans
1	OS Crash	Low	High	Backup the data in the cloud
2	Natural Disaster	Low	High	Backup the data
3	Developing the system can be costly than expected.	Medium	Medium	Minimizing the cost by implementing certain strategies
4	Recognition Accuracy can be low	High	High	Experimenting various strategies to optimize the model
5	Employees might try to change the attendance records	High	High	Developing the system with proper authentication service and separating permissions on basis of roles
6	System can fail to recognize people due to insufficient lighting	High	High	Placing the devices that capture in a place with proper lighting.
7	Technical Failure	High	High	Properly using and implementing devices to overcome technical failure.

Table 1 Project Risks and Contingency Plans

5. Methodology

5.1.Selected Methodology

5.1.1. Scrum

In this project, I have decided to implement Scrum methodology which is based on Agile principle. Agile software development methodologies are popular for their flexibility and evolutionary nature. Scrum which is based on agile principle is usually used on projects where the plan is not detailed but the future tasks are clear. With Scrum methodology it can also be used on projects with incremental steps with each step creating a certain end product. Observation, adaptability, progressive elaboration, prioritizing and sizing tasks, and time-boxing are all used to boost personal productivity in Scrum methodology.

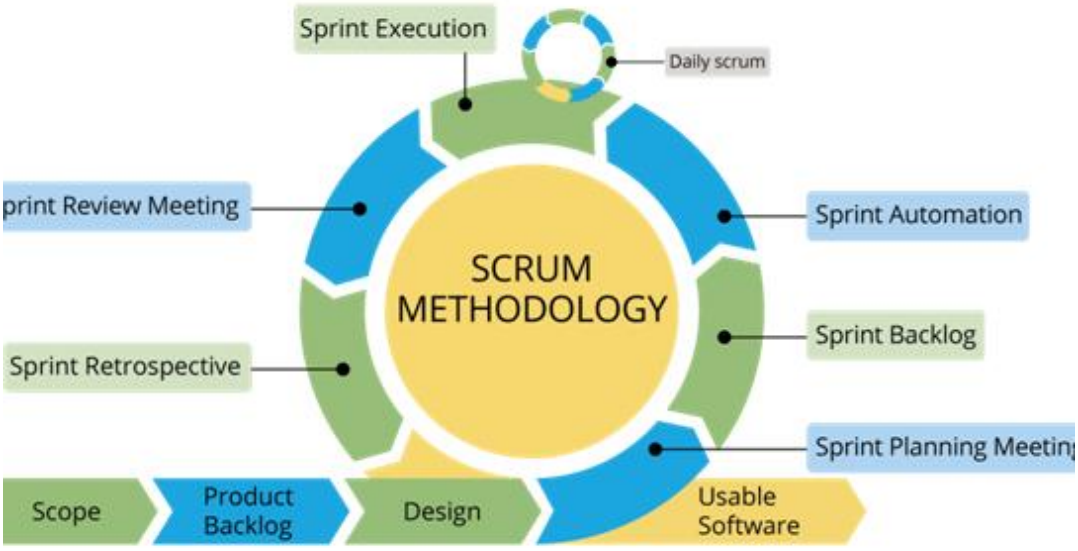

Figure 2 Scrum Methodology (Educba, n.d.)

Following are my reasons for choosing scrum methodology:

- The sprint goal will help me to focus on what should be achieved.
- It will help in updating and reviewing the system according to clients requirements.
- It will help in recovering defects in early stages.
- It will help me to manage the progress and track the status of the project.
- It is easy to learn and implement in my project.
- The attendance system can be continuously improved by using this methodology.
- It will help me to embrace the change in the system.

- It will help in dividing and developing my project into small chunks.
- It will help me gather feedback from my clients during the process of development which increases the quality of end product.

Additional Reading about considered methodologies here

6. Resource Requirements

The basic requirements which are required to complete this project are as follows:

6.1. Hardware Requirements:

- Computer with Internet Connection
- ESP32-CAM Module
- Jumper Wires
- FTDI Module

6.2. Software Requirements:

- Text Editor: VS-Code
- Programming Language: Python
- HTML, CSS or Bootstrap for website.
- Database: Postgres or SQL Lite
- Version Control: GitHub
- Draw.io or Microsoft Visio

Additional Reading on this requirements for this project

7. Work Breakdown Structure

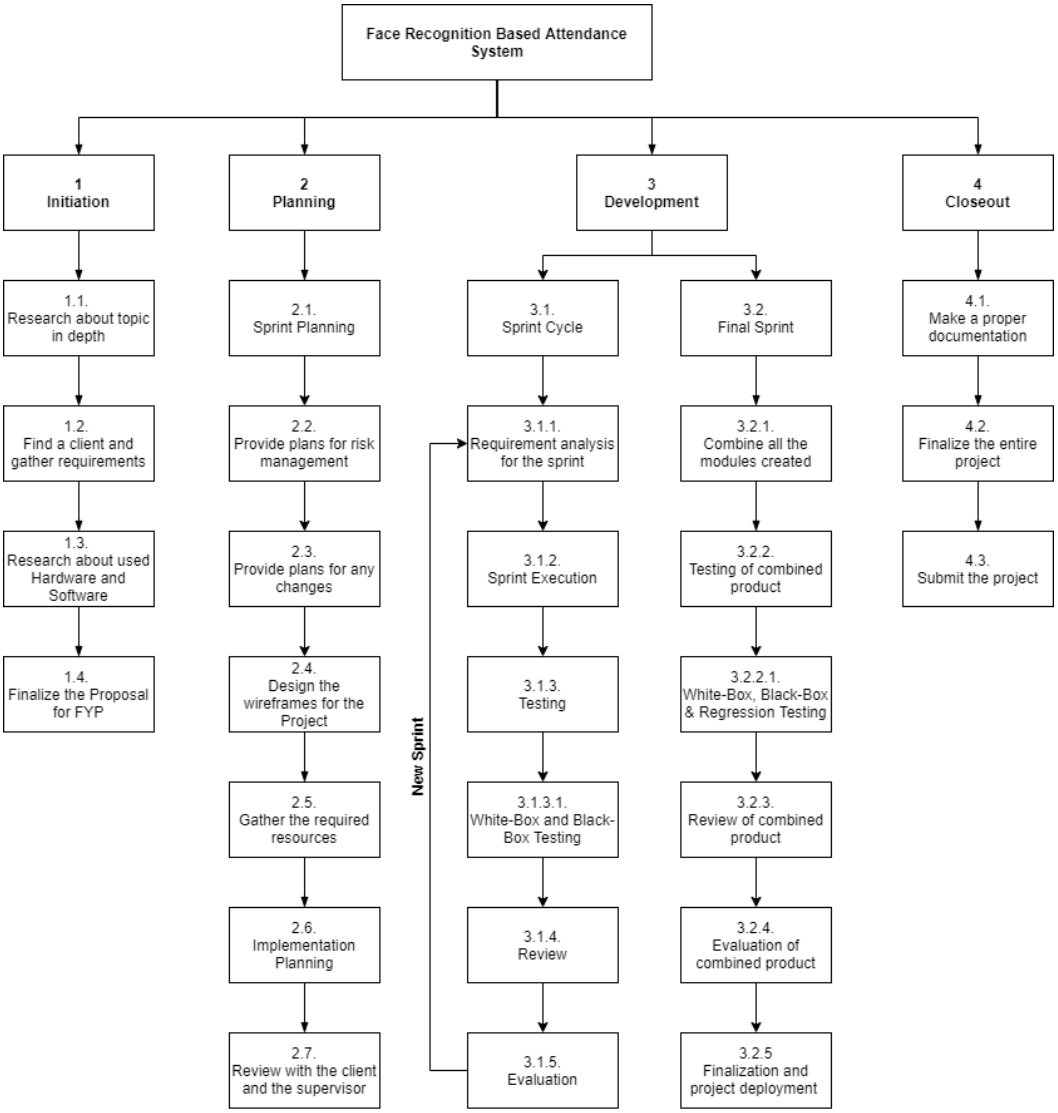

Figure 3 Work Breakdown Structure for Attendance System

8. Milestones

- ✓ **Milestone 1:** Topic Finalization (November 14, 2021)

  Topic finalization is the first milestone that was achieved. The milestone helps to focus on the project.

- ✓ **Milestone 2:** Client Finalization (November 15, 2021)

  The finalization of the client is the important milestone as the project is based on the requirement of the client. The changes are made based on the requirement of the client.

- ✓ **Milestone 3:** Proposal Submission (November 25, 2021)

  The final proposal submission will give the idea of how the entire project is going to be. This highlights the main aspects of the final projects. It also identifies the initial requirement of the project.

- ✓ **Milestone 4:** Completion of Interim Report (December 15, 2021)

  After the submission of the proposal the interim report is started. It is heavily based on the proposal and explains the topic in more detail. The interim report is major part of the report

- ✓ **Milestone 5:** Complete development related face recognition system (January 2022)

  This is the completion of development of the major portion of the project, this development automates the attendance system.

- ✓ **Milestone 6:** Complete development related to website and API (February 2022)

  The milestone helps to achieve the development of the dashboard for the project which helps the employees and the HR department to visualize the data.

- ✓ **Milestone 7:** Finalize Development (March 2022)

  All the development processes are finalized based on the review and requirement of the client. Every unit is tested and reviewed until this point.

- ✓ **Milestone 8:** Complete Testing (March 2022)

  The final testing of the developed unit is completed in this milestone. The development is completed from this point.

- ✓ **Milestone 9:** Complete the documentation (April 2022)

  The documentation of the project is completed which is the most important part of the project. The documentation is ready for submission.

- ✓ **Milestone 10:** Submit the project (April 13, 2022)

  The project is reviewed for the final time and submitted to the RTE.

9. Project Gantt Chart

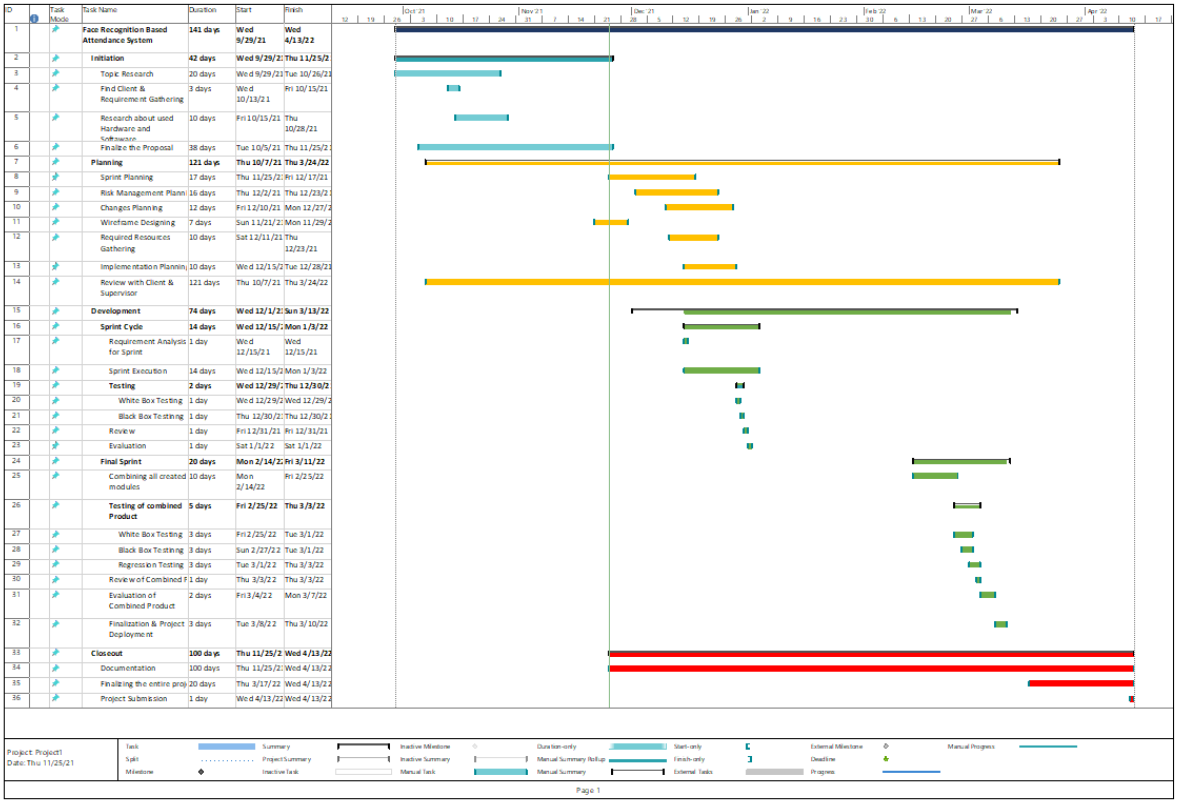

Figure 2 Gantt Chart

10. Conclusion

In a nutshell the face recognition based attendance system is aimed to mitigate the problems faced by Eat Ziffy Pvt. Ltd. in recording the attendance of their employees through their manual attendance system. This system will help the HR department to track the attendance of their employees more effectively. The employees will also be able to view their attendance records and incase the system makes a mistake employees can request the HR department for review. The system will provide secure authentication service and permissions to the users on basis of their roles so that the only HR department will be able to update or change the records. Lastly, to complete this project lots of hard work and research will be done. To complete this project lots of hard work and research will be done. Every task contributing to this project will be carried in steps with full effort. I am eagerly looking forward to work in this project, the knowledge and experience gained from this project will surely help my career advance in the field of Machine Learning and Computer Vision.

11. References

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12. Appendix

12.1. Methodology Continued

.1.1. Considered Methodologies

- **Waterfall Methodology**

According to (Bassil, 2012) the waterfall software development life cycle model is a incremental software development process in which the progress is regarded as flowing increasingly downwards (similar to a waterfall) through a list of phases that must be executed in order to successfully bind a computer software. Originally Waterfall model was proposed by Winston W. Royce in 1970 to describe possible software engineering practice (Royce, 1970).

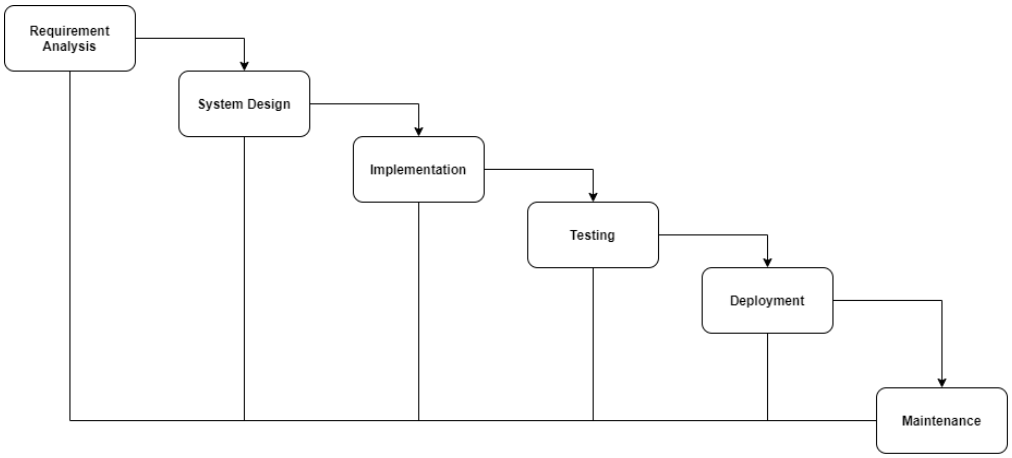

Figure 4 Steps of Waterfall Methodology

Reasons for not choosing Waterfall Methodology for this project are:

- This risk of the project would increase if this methodology was selected because it doesn't include feedback of the customer in early phases of the project.
- In this methodology testing is performed at the end which makes harder to fix problems if implemented in this project.
- Because of its rigid nature choosing this methodology would give no room for changes if required in the project.

- **Prototype Methodology**

According to (Arnowitz, et al., 2007) prototyping is essential to creating successful software and successful user experiences because of its clear depiction of software requirements which instead of describing requirements it visualizes them. In this methodology developer creates the prototype of the solution to showcase its functionality to the clients.

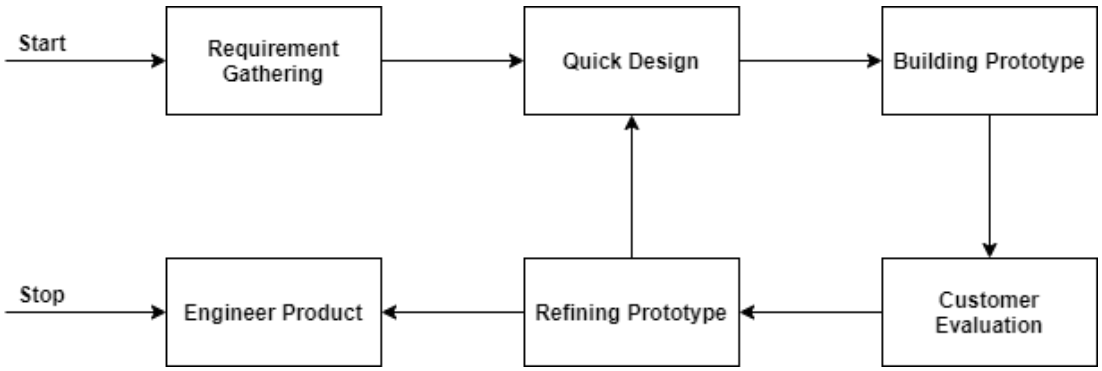

Figure 5 Prototype Model

Reasons for not choosing Prototype Methodology for this project are:

- If this methodology was chose there would be risks of increasing the cost of the project as in this method the cost of prototype is usually paid by the developer.
- There would be risk of not matching the client's requirements and expectation of the system from the prototype.

- **Rational Unified Process (RUP)**

In their book Rational Unified Process made easy (Kroll & Kruchten, 2003) explained that RUP is a well-defined and well-structured software development approach that is iterative, architecture-centric, use-case driven and it provides a disciplined approach to assigning and managing tasks and responsibilities in a software development organization through which software development teams can produce high-quality software which meets the needs of its end users and do so within a predictable schedule and budget.

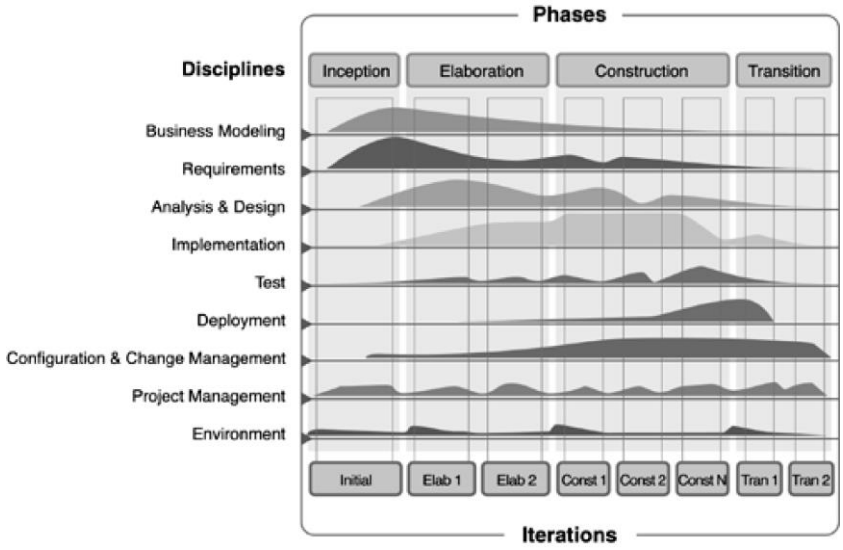

Figure 6 Two Dimensions of RUP (Kroll & Kruchten, 2003)

Reasons for not choosing Rational Unified Process for this project are:

- The RUP methodology is not as flexible as Agile.
- The RUP methodology relies too much on the customers or stakeholders feedback.
- It can be slow for this project.

12.2. Resource Requirements Continued

The basic requirements which are required to complete this project are as follows:

12.1.1. Hardware Requirements:

- Computer with Internet Connection

  A laptop or desktop computer with proper internet connection is required to program the system and document the necessary information about the project. It is also required to build the database and carry out the research work for the project.

- ESP32-CAM Module

  A small low powered camera module based on ESP 32 is required to capture the footage of the employees. The module will be programmed to recognize the employees through the footage captured through its camera.

- Jumper Wires

  While placing the ESP-32 Camera Module on a breadboard the reset button will be placed at bottom so we will use jumper wires to connect the FTDI module with the board so that the reset button is easily accessible.

- FTDI Module

  FTDI Module is required to connect the camera module to the computer so that it can be programmed for facial recognition.

12.2. Software Requirements:

- Text Editor: VS-Code

  Vs-Code will be used as the code editor to write the code for the system because it is an excellent code editor which is easy to work with, errors are easy to debug in it.

- Programming Language: Python

  Python is the programming language that will be used to program the system.

- HTML, CSS or Bootstrap for website.

  HTML along with CSS or Bootstrap will be used to develop the frontend of the system that will be used by the employees and HR to view the attendance data which will be provided through an API.

- Database: Postgres or SQL Lite

  Postgres or SQL Lite Database will be used to store the data of the users and attendance data of the employees.

- Version Control: GitHub

  GitHub will be used to manage and track different versions of the system.

- Draw.io or Microsoft Visio

  Tools like Draw.io or Microsoft Visio will be used to for the process of documentation of the system.