

Learnify: E-LEARNING ENVIRONMENT

PROJECT PROPOSAL



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ABSTRACT

Learnify is an e-learning platform that aims to provide a dedicated online learning environment, improve the existing Virtual Learning Environments (VLE), and automate the process of online learning and assessment. It would reduce the human effort to minimum level as compared to other systems. In the midst of pandemic, educational institutions of all levels have shifted from classroom learning to online learning to minimize exposure to the Covid-19 virus. Because of this shift, the nature of training has diminished enormously. Our objective here is to lessen that loss in education quality while still following the Covid-19 SOPs, as the Covid is still present and may hit the world with new variants in the future. HomeTeacher makes e-learning efficient for students of all categories may it be children at school level, or college, or even higher level students. It benefits not exclusively to instructors at big institutions, but can facilitate a basic home tutor in conducting his/her teaching activities. Our matchless quality of recordings, automated attendance system, Smart Student Monitoring, and interactive interface will make the process of e-learning engaging and fruitful.

PROJECT PROPOSAL APPROVAL CERTIFICATE

It is certified that project proposal titled ‘**Learnify: e-Learning Environment**’ submitted by **Muhammad Ali, Waqar Ahmed** and **Eisha Rana** for the partial fulfilment of the requirement of “**Bachelor’s Degree in Software Engineering**” is approved.

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UNDERTAKING

We hereby undertake that we are marking this group for our final year project by our own choice. It is entirely our duty to complete this project in time. In case of failure or underperforming, neither the university nor the supervisor will be held responsible for unsatisfactory performance.

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1. Introduction

As we are facing a global pandemic nowadays, online teaching and learning has become a vital part of everyone's life. It means that the online learning has become more important today than in the past, and it is now the main source of learning.

We think about e-learning as something which would link students to teachers, but e-learning is not merely a video conference, but it is the name of a virtual environment that is as close to real classes as possible. To make the online classes very close to real, and to improve online education quality, we thought of our proposed "Learnify" e-learning system to help us deliver convenience to online learning by linking teachers and pupils in live environment where they could meet through video conference and fulfill the academic needs, with other supportive features at one central place.

The tools in the market are comparatively less e-learning driven, and are designed to function for multi-purpose. Some Apps are designed just for meetings, others are for business collaboration and even if there are some tools for e-learning, they lack versatility to aid a fruitful learning.

Our aim is to develop a system that is dedicated only for e-learning. The various tools we have now are not as well prepared for teaching students virtually. It is a big fact, that the online learning is here to stay with us in the future even without a pandemic. It is becoming more and more popular and people in the future might prefer to learn online rather than being physically present at an institute. Consequently, our definitive goal is to build a system that supports e-learning without drop in education quality as compared to physical learning.

2. Existing Systems

System #1

ZOOM

ZOOM is the famous online meeting App, but it is not a dedicated platform for e-learning;

Limitations

- Time Limited Meetings
- No in-built file management system
- No special features for teaching or learning

Proposed Solution

- Meetings are not Time Limited
- There is class dashboard where all related files can be stored and retrieved
- Whiteboard available for a teacher

System #2

Microsoft Teams

Microsoft Teams is a chat-based collaboration platform for document sharing, online meetings, and many more extremely useful features for business communications.

- No Automated Attendance System
- No special features for student monitoring

Proposed Solution

- Our attendance system is automated
- We take snapshots regularly for the verification purpose of real student

System #3

Moodle

Moodle is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalized learning environments.

Limitations

- Lack of Participation Measurement
- No Smart Student Monitoring

Proposed Solution

- Provides Student Participation Report
- Monitors the student while an exam
- Takes Snapshots of the student giving an exam

System #4

Vedamo

Moodle is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalized learning environments.

Limitations

- Paid
- No Smart Monitoring & Attendance System

Proposed Solution

- Provides Student Participation Report
- Monitors the student while an exam

Table 1: Comparison between the proposed system and existing systems

| Features | ZOOM | MS Teams | Moodle | Vedamo | Proposed System |
|---|-------------|-----------------|---------------|---------------|------------------------|
| Automated Attendance | No | No | No | No | Yes |
| Smart Student Monitoring | No | No | No | No | Yes |
| File Storage Space | No | Yes | Yes | Yes | Yes |
| Snapshots of Meeting Participants for Reality Check | No | No | No | No | Yes |
| Student Class Participation Report (During Meeting) | No | No | No | No | Yes |
| Class Rooms | No | Yes | Yes | Yes | Yes |
| Automated Meeting Entrance | No | No | No | No | Yes |
| Facial Recognition to Enter Meeting | No | No | No | No | Yes |
| Integrated Chat outside Meetings | No | Yes | Yes | Yes | Yes |

3. Problem Description

During the past 2 years, covid-19 has shattered the system of the world and the education department is of no exception. All the education institutes, the teachers and students have suffered a loss of education quality due to sudden shift to online mode. As students ourselves, we have experienced a drop in quality of education due to the classes becoming online.

It is a fact that online education is not as good as learning in a real classroom environment. But due to these trying times, we have to take measures to make the online education system better, and better to an extent: so that it becomes as good as real classroom learning environment.

Many common platforms which are increasingly being made use of by almost every college, university and college are MS Teams, Zoom and Google Meet. These software systems were not developed solely to fill the purpose as dedicated platforms for virtual learning. They are lacking many features needed for a central platform for e-learning.

MS Teams was designed for company group meetings and does not have functions which would make it well suited for students, though it does come extremely close. Zoom having said that is most often used but one major drawback is that the conferences are time-limited and there's no other good platform to fairly share or chat, and many instructors need to make groups in WhatsApp or any other apps to share notes, announcements and take tests. Likewise, Google Meet is just a meeting place.

These problems have made us realize that we're in definite need of a system that comes with handy features to support e-learning. So, our proposed system will overcome all of these problems by providing a dedicated platform suitable for e-learning.

4. Project Objective

To develop a dedicated e-learning virtual environment which incorporates maximum learning features to support learning and teaching at one single place.

5. Proposed System

The Learnify provides an engaging and effective VLE for both the teachers as well as the students. According to our research, there is plenty of room for improvement in the VLE and one key weakness in the already existing platforms is lack of communication. Communication has become a drastic problem for the teachers during online sessions since little or no feedback is received from the students' side. However, by using technologies such as Computer vision and Automation, we can simulate a real class environment by bringing the students and the faculty closer to each other through better communication.

Some important and fascinating features such as class participation and Automated Attendance use computer vision algorithms to measure student's participation in class and generate overall class participation and attendance report respectively. It encourages the students to participate effectively during the class thus solving the lack of engagement problem during online classes. Similarly, automated attendance reduces time consumed during manual attendance by automating the entire attendance process by using face detection. All these requirements make e-learning effective.

The Smart Monitoring system monitors a student during exam, and his presence is also recorded by the use of frequent snapshots of his/her face. That will minimize the chance of cheating.

We save the teachers from the hassle of allowing the students into the meeting. And one enters into the meeting automatically after his/her face is detected on webcam. We also take screenshots of student upon entrance to the meeting, likewise at the end of the meeting, so the teacher can later verify the reality of student if needed.

Following are the main modules in our system:

5.1 User Account Management

This is the module where a user Student/Teacher can edit his account – change profile picture, change password, change personal information etc.

5.2 Classroom Management

A classroom is an important aspect of any educational environment may it be a real-world organization or a virtual one. Two important characteristics of a classroom are that it has a group of students and a teacher associated to each subject. Therefore, in an e-learning system the teacher is required to create a classroom for their particular subject and then the students can enroll in that certain class.

5.2.1 Create Class

Every teacher is required to create a classroom for their allocated subject. Once the teacher selects the create classroom option it asks for the subject name and then the classroom settings which can be modified later on.

5.2.2 Enroll Students in Class

A teacher can enroll students into the course by using student's email/username registered on our system.

5.2.3 Create or Schedule Meeting

The teacher can create meeting instantly or schedule one for later. Once he has scheduled a meeting. The enrolled students will be notified by the email that they have scheduled class on given time.

5.2.4 Join Meeting

Once the teacher has provided the link or the class code, the students can easily join in the class by entering the given code to join class or opening the link, or they can simply enter into the class from the 'Class Feed' Dashboard.

To save teacher from disturbance, he doesn't have to manually admit a student into the meeting. An enrolled student will be permitted to enter the meeting right after he opens the webcam and his face is recognized.

5.3 Video Conferencing

Video Conferencing is the core functionality that is necessary for any online system. Our main aim is to make our online classroom environment as realistic as possible. Many interesting features are added to normal video conferencing which makes online class similar to a real-time classroom. This part basically starts off by the teacher setting the time for the class session and then the students can join the class.

5.3.1 Automated Attendance

We have automated the process of attendance so that the teacher would not have to take it manually, hence, saving more time for the teacher. For this process, the students are required to keep their webcams on throughout the class so that the face detection algorithm can make sure the student is present.

5.3.2 Student Face Recognition

A student is only permitted to join the video conference once he opens the webcam and his/her face is recognized. As soon as his face is recognized, he will be permitted to the meeting.

5.3.3 Class Participation Timeline

This feature tracks the communication time between each student with the teacher and displays these records in a chart showing the participation percentage of each student.

The Timeline shows for how much time the student was present in front of camera, how many questions has he asked, for how much time he has opened the mic. Then a participation report is generated for each student and sent to the teacher.

5.3.4 Screen Share

The screen sharing feature allows the students to see the screen of the presenter. The students can also share their screens if asked to show something. Through this, the teachers find it easy to keep the students on track by going through each topic they are teaching.

5.3.5 Whiteboard & Annotation

Whiteboards are the essential way of teaching in a class so any teacher who needs to solve mathematical equations, provide some derivations or even explain something by plotting can feel free to use the whiteboard feature which contains a white screen, a bunch of colorful markers along with a duster. The annotation allows to point something on presenter's screen to ask a question etc.

5.3.6 Raise Hand

The raise hand option reduces the disturbance issue by avoiding several students speaking at the same time. A student can simply raise his/her hand in case of any query or to answer a question.

5.4 Class Feed

This module consists of a file-storage space for all the members to see. This is basically where the teacher can upload all the material for the particular class in sections such as the notes section, videos, assignments and quizzes. The students can easily access all the notes and videos and can also download them.

5.4.1 Assignments

Teacher can make a storage space here where all the students will have to submit their assignments.

5.4.2 Quiz

Teacher can add up quizzes and students can upload their solutions. The quiz can be of MCQs type, teacher can add questions and their MCQs, along with answers and the students can simply upload their solutions.

5.4.2.1 MCQs Shuffler

MCQs shuffler will shuffle the MCQs for each student created by the instructor. For example, if he creates 20 MCQs and then wants to make a 10 MCQs paper, the random 10 will be picked for each student.

5.4.3 Lectures & Notes

Here the teacher can upload the lectures notes, share the books or study material and also, he can post the recorded sessions here. The students can download that from here.

5.4.4 Student Progress Report

The student progress report can both be seen by student himself and the teacher. It will include the student's total attendance percentage, grades against submitted assignments and quizzes along with the total sum of these all at the end, and the missing tasks or assignments will be listed here as well.

5.4.5 Class Discussion Board

Here the participants of the class can discuss about the topics studied.

5.5 Student Dashboard

This is the main dashboard for the student which contains:

- List of Enrolled Classes
- An Activity Calendar
- Buttons to navigate to user profile
- Chat Option

5.6 Teacher Dashboard

This is main dashboard where he can access:

- Created Classes
- Account
- Tasks to be Graded
- Chat Option
- Meeting Calendar

5.7 Class Environment Dashboard

Class environment dashboard contains:

- Overall progress report of the class
- Displays the percentage of students is actively participating in the class
- Particular student's Performance (Grades, Total Attendance etc.)

5.8 Evaluation

The main purpose of this module is to provide tools that could help the invigilator during an online examination. Some of the main sub modules would be:

5.8.1 Smart Monitoring

This sub module would set up a timer which would make sure the student does leave their seat for too long in the case of a break. The computer vision model built inside will make sure the timer only starts if the student leaves and not in any other case.

If student leaves the seat, the invigilator will be notified. Moreover, it will also be included in student participation timeline that for how much time, he was active and for how much time he has left the seat.

5.8.2 Student Snapshots

Our snapshot taker will take the snapshot of student every 10 minutes after the exam has been started until the end. The snapshots will be stored alongside with the submitted exam solution and the evaluator can go through these snapshots to verify the identity of person giving the exam.

Moreover, our face recognition will also contribute in this.

5.9 Chatting

The main purpose of chat feature is to accommodate in the teachers outside the educational environment such as simple home tutors. A student can keep in contact with his home tutor through simple chat and there would be no need of making an entire classroom for this purpose. The chat also allows you to go on video call which contains all the features of the video conferencing module. Other than this one can share links, notes, images, audio and video calls through a simple chat. Chat can be both one to one or one to many. In one to many the students can also make a chat group where they can share notes and chat.

5.10 Admin Panel

The admin can perform administration tasks like

- Manage users
- Add Announcements
- Manage Web Application

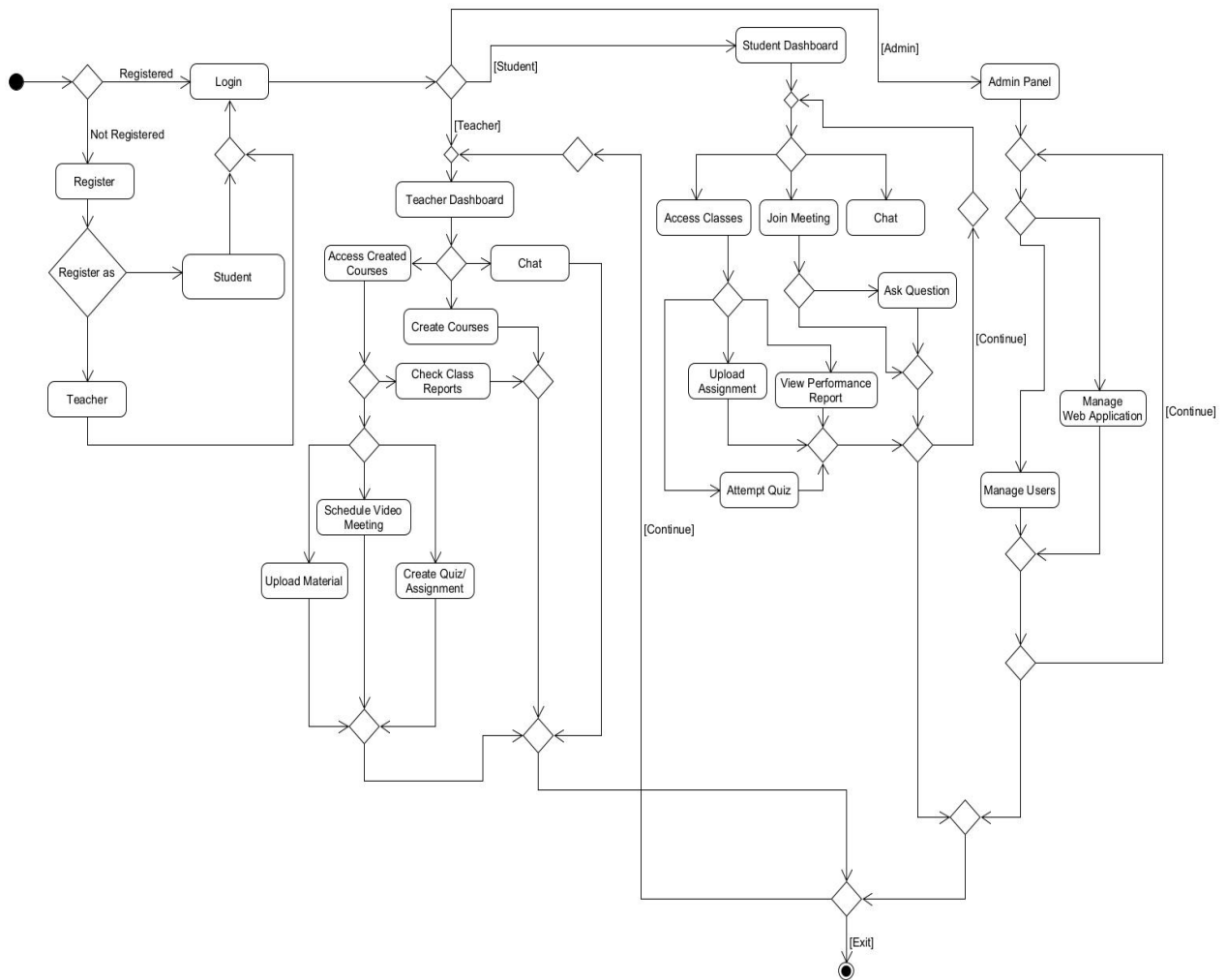


Figure 1: Flow diagram for the proposed system

6. Methodology

We will be using the **Incremental Model** in our development process. As we are clear with our requirements in the first phase, we can break down parts of requirements in modules and then we'll develop individual modules and test them. If a requirement change arises, that can be covered in next build

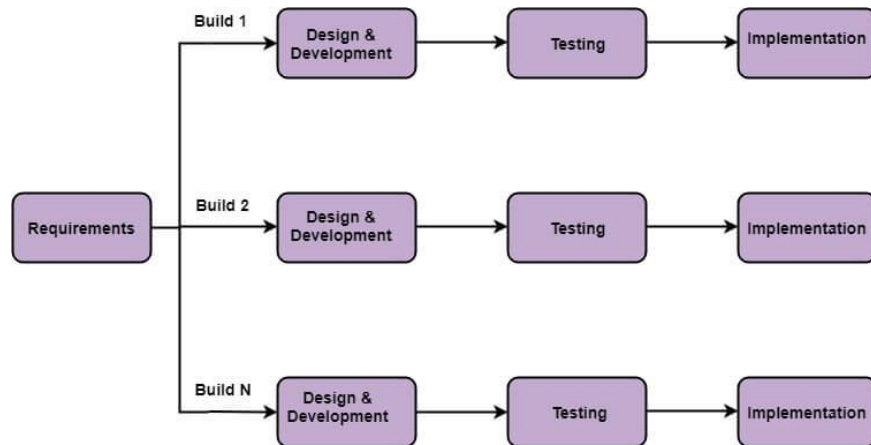


Figure 2 : Incremental Model

7. Project Scope

We describe our project as a video conferencing and e-learning web application platform where students can communicate with their teachers in real-time and chat with each other. It also provides facility to create classrooms and upload the material.

The platform aims to make e-learning as much closer to real classroom environment as possible. It reduces human effort by automating the attendance of students by face detection using latest technologies of Computer Vision. It will also measure class participation of students and generate the reports at the end. It supports the safe examination through great features like Smart Monitoring and Student Face Capture. These measures will minimize the risk of cheating during online exam. The teachers can upload lectures and supportive material inside class feed and they can create assignments, quizzes too and the students will be able to download and submit the solutions.

Our platform is free to use for high education institutes like universities, colleges to small institutes like schools or even a simple home tutor can benefit from that. It solves the major problem of learning online, with no loss of education quality at all.

8. Feasibility Study

The project is feasible as it requires just a computer with good internet connection to run the web application.

8.0.1 Technical feasibility

Our project will be developed in latest tools and technology like Computer Vision and Artificial Intelligence, using OpenCV, Python etc. Our project is technically feasible, as all these tools are being used in the industry and none of them is out dated.

8.0.2 Economic Feasibility

Our project will cost just for having a computer and internet connection. No other major cost is involved in this like installing specific machines or devices to run the system. No sophisticated hardware is required. Hence, our project is economically feasible.

8.0.3 Operational Feasibility

Any user with basic knowledge about computer and internet can easily use it.

8.1 Risks Involved

The risks are:

- Only those students will be marked as present automatically, who show their face in front of the camera.

8.2 Resource Requirement:

Table 2: Hardware required for the proposed system

| Hardware | Requirement |
|----------|-------------------------|
| CPU | Intel core i3 or higher |
| WebCam | |

9. Solution Application Areas

Our application is a major problem solver in the field of education and distant learning. It serves a great contribution in e-learning field.

10. Tools/Technology

Table 3: Tools and technologies to be used for the proposed system

| Tools and Technology | Version | Rationale |
|----------------------|--------------------|--------------------------------|
| VS Code | 1.5 | Text Editor to write code |
| Git/GitHub | 2.34.1 | To manage and control versions |
| MERN Stack | | To create full web application |
| WebRTC | 1.0 Stable Version | To create video conferencing |
| Python | 3.10 | To code for Computer Vision |

| | | |
|---------------------------------------|---------------|----------------------------------|
| Anaconda | 2021.11 | For Python Coding |
| OpenCV | 3.4.16 | To use computer vision libraries |
| AWS | | To use as cloud server |
| HTML5/CSS/JavaScript Bootstrap 5.0 | | For web Frontend |
| Xampp | 8.0 and above | For PHP Processing |
| PHP | 7.0 and above | For web backend |

11. Expertise of the Team Members

All team members have good knowledge of all tools listed for development. As the Software Engineering students, we have grip on tools and basic to moderate level knowledge on the tools. We can develop the project skillfully using the above mentioned tools.

12. Milestones

We have scheduled our milestones as follows:

Table 4 Division of Milestones

| Sr. No | Task Name | Start Date | End Date | Days to Complete |
|--------|---------------------------------|------------|-----------|------------------|
| 1 | Problem Identification | 30-Sep-21 | 19-Dec-21 | 80 |
| 2 | Proposal Writing & Presentation | 1-Nov-21 | 26-Dec-21 | 55 |
| 3 | Requirement Gathering | 15-Oct-21 | 15-Aug-22 | 304 |
| 4 | System Modelling | 15-Jan-22 | 15-Aug-22 | 212 |
| 5 | Coding | 1-Feb-22 | 30-Sep-22 | 241 |
| 6 | System Testing | 15-Feb-22 | 15-Oct-22 | 242 |
| 7 | Report Writing | 1-Mar-22 | 15-Nov-22 | 259 |

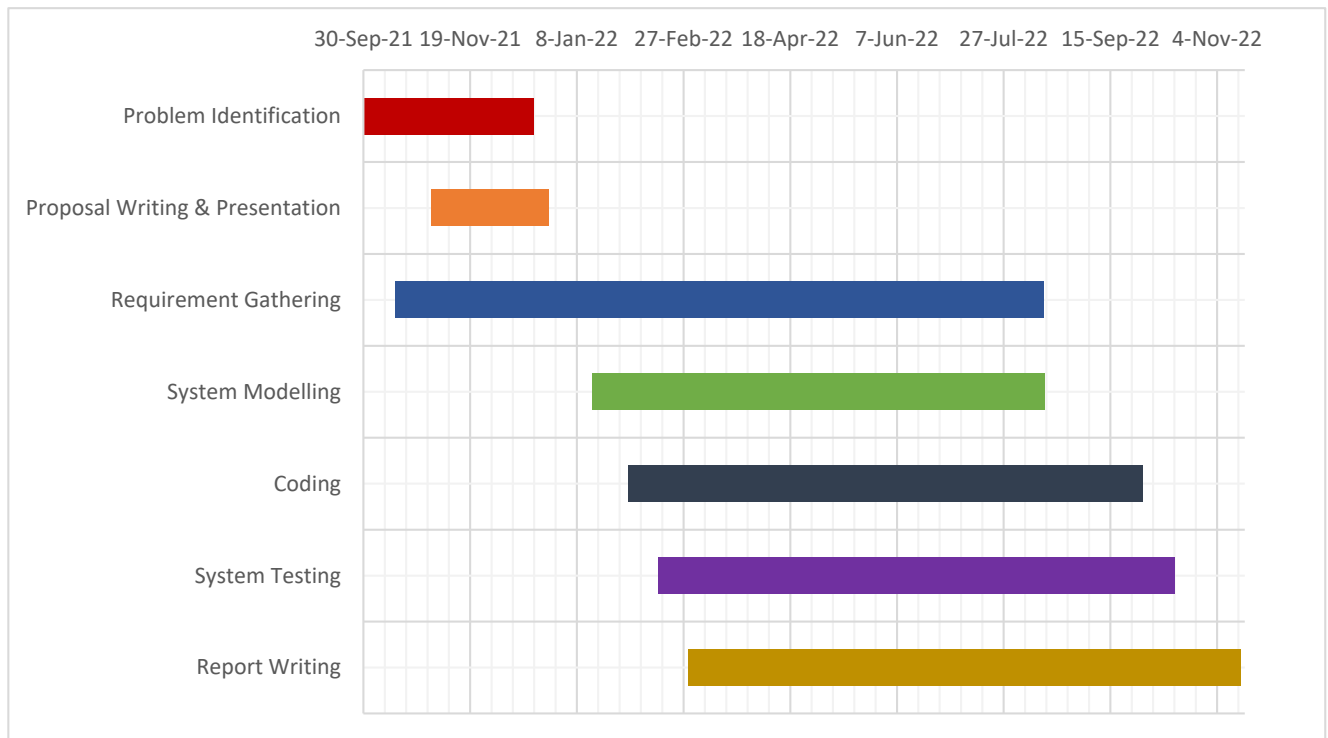


Figure 3: Gantt chart

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