

## Muster: Virtual Classroom for Students Using D-Jango

Mahesh K, Govinda Sai K\*, Suraj Hussain D

Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, India

\*Corresponding author: Govinda Sai K, Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, India, Tel: 9121938124, Email: sai691624@gmail.com

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### Abstract

In recent days, education has seen remarkable technological developments in computer aided learning that promise to significantly alter teaching and learning processes.

The lecturer delivers course materials in a specific location at a specific time in traditional classroom-based instruction. As a result, both the instructor and the learner are constrained by time and location. Muster, a virtual classroom application, is developed in this paper to improve online learning. Users can access course materials, submit/review assignments, participate in video chats, present lessons with white boards, and manage academic records all from the same digital platform under this paradigm. The program is built on the Django Framework, with Python and SQLite for the backend and HTML, CSS, and Java for the frontend. The application that is developed is extremely effective, user-friendly, and clear.

**Keywords:** Virtual classroom, online learning, Python, Django

## Introduction

Learning is the process of gaining new information or abilities through study, practice, or instruction. Education is the backbone of any country, and at least a minimum level of it is required to exist in society and to live. Standard schooling is primarily a one-on-one or face-to-face classroom procedure that lasts from kindergarten through graduation. Only the higher education system includes an online class system. It was how it was until the Covid-19 pandemic, a rare viral virus that spreads swiftly, especially from person to person. As it spreads around the globe, killing a lot of people, the World Health Organization declared it as a global medical emergency of international importance. Various financial, educational, and social engagements have been disrupted as a result of the preceding. As government measures like lockdown, isolation, social distance and others are enforced, the old classroom setup will never be the same. In the contemporary educational time, academic institutions in most nations throughout the world are introducing the Learning Management System as an alternative (LMS).

Since learning is a lifelong activity, students should be able to access information whenever they need it, regardless of whether they are in a classroom or a library. This learning management system, often known as an online classroom system, is now used in all levels of education, from elementary to university education. To make things simpler for system users, all worldwide educational schools are offering numerous e-learning approaches or creating user-friendly LMS. As a result, all educational service providers must now prioritize developing technology. All communication-related instruments, such as computers, smart phones, and mediums, such as software, are being modernized and made more user-friendly as a result of this. The current educational system's overall atmosphere has altered as a result of technical advancements and improved amenities. E-learning has become a popular way for people from all walks of life to share and update their knowledge.

E - Learning systems develop, delivers, manages, tracks, reports, and evaluates online learning resources. It's an unified software program that combines educational characteristics with virtual learning platforms' emerging innovations. Participants can browse courses, submit assignments, take exams, and communicate information with teachers and classmates using personal gadgets such as smartphones and tablets, resulting in a flexible educational environment. By enrolling participants, administer-

ing courses, capturing learner data, and handling reports, LMS software handles the learning process. Interactive whiteboards and electronic highlighters are two examples of internet-based educational gadgets. Similarly, digital scanners make learning easier by sending text to cell phones in a digital format. Students can communicate with professors, specialists, and classmates all over the world utilizing these gadgets from the comfort of their own homes. A number of studies have developed frameworks for transforming any location into a smart learning environment by employing internet services. This paper presents an innovative concept and development of Muster, an e-learning information management application for virtual classrooms based on Python.

## Literature Survey

In this work, Ikuomola (2018) created and deployed a reliable cloud mobile learning management scheme. The client model, mobile network, and cloud model are the three core parts of the system. Users like teachers and students can reach cloud services through a mobile network using the client model, which permits them to use a mobile application on their smart phones. The authentication server assists in the verification of each user's identification when they attempt to connect the system. The system was tested on an Android phone, and the results reveal that it provides students with instructional content and materials when and when they need them. It also allows the user to interact with the information more easily because of the many modes of audio, graphics, and video, as well as feedback functions [1].

Khaleel et al., (2018) shared his idea for a prospective learning management model that combines IoT apps and tools to improve learning and teaching. It also changes education into a highly dynamic and adaptable process, allowing students to direct and govern their personal learning encounters. There are eight applications in the LMS that will gain from IoT integration possibilities. Although some of these applications are currently included in a number of current LMSs, they do not make use of IoT functionality. Virtual reality and classroom surveillance, for example, are innovative applications that will offer significant value to forthcoming LMSs. A general overview and illustration of the application contents are given for each application. For every suggested application, a preliminary action plan is presented, which is independent on the existing IoT technologies. For college students, professors, and administrators, the planned IoT-enhanced LMS will deliver numerous extra services and opportunities [2].

Yu Ding et al., (2020) article proposes and constructs a virtual environment for college physical education that incorporates the IoT, a cloud infrastructure, and a mobile user. This technology gathers essential data from the Internet of Things and reacts with the virtual reality environment, rendering the scene in the cloud and allowing users to explore virtual reality via a mobile node. The system's core functionalities and data warehouse, as well as software design and system validation, were completed following the standard analysis and system architecture design. It is demonstrated that the built virtual reality technology for college physical education has a great applicability and promotional impact through the study of particular trial cases and user experiences information from a college. It also serves as a scholarly resource for furthering college physical education reforms, as suggested [3].

Paramita et al., (2022) research examines the devastating consequences of a deadly virus pandemic, the ensuing lockdown, and the necessity to transform the offline school to an online class. Due to the closure of schools and universities as a result of the epidemic, the education industry relies primarily on "online learning." The rapidly growing cloud-centric aims among enterprises and institutions have emphasized the crucial need to progressively upgrade security within cloud architecture. The goal of this study is to investigate and characterize the various online educational portals, learning resources, strategies, and technologies available. It also outlines the infrastructure and techniques that can be used to conduct tests in a safe and non-cheating setting. It also considers if the concept of cloud-based learning administration is generally appropriate in the particular situation [4].

The goal of Elmasry et al., (2021) research was to recommend appropriate cloud infrastructure for institutions of higher learning in developing nations, as well as the kind of cloud computing deployment and operational approach. The study looks at how cloud computing is being used in higher education, as well as its design and possibilities for usage in a distance learning approach. It also presents a paradigm for incorporating cloud computing with learning management systems in order to create a cloud-based academic environment. In this research, it was suggested that higher learning institutions in developing nations with poor technology infrastructure operate learning management systems in the cloud, using a hybrid cloud model [5].

Shafiq et al., (2021) study focuses on learning methods and other technologies that have been used to help the educational process. In this paper, a methodological approach of

a cloud-based learning management scheme for educational institutions is described. In addition, the study will show how the suggested model produces the predicted results. The goal is to create a friendly environment for instructors, teaching staff, and managers. It also takes care of more important e-learning duties including seeking learning management system (LMS) navigations, textual and multimedia learning materials, and video learning materials [6].

The main goal of the study by Digvijay Pandey et al., (2021) is to analyze the impact of socio-demographic and associated factors on views for offering online classes amid India's COVID lockdown. A community-based, survey was used to gather core data. Only the information gathered directly from respondents at a specific point in time is used. A total of 150 people were used for this study, with judgment sampling being used. Descriptive statistics and binary logistic regression were utilised as a result. Binary logistic regression was determined to be the best model for fitting procedures to such a variable as the reliant. Backward stepwise logistic regression began with a prototype that included all variables and gradually eliminated factors with negligible coefficients till the system had the greatest predictive ability [7].

## Proposed Methodology

The introduction of several educational websites that offer academic materials makes life easier and more pleasant in this age of digital learning. Muster is a new digital or e-learning application that is being proposed and developed for resource sharing purposes. The Django Python Web Platform is used to create this virtual environment or service, which is utilized to deliver solutions via the Internet. It promotes speedy development and clear, realistic design created by skilled programmers. It eliminates a lot of the challenges associated with Web development, allowing to focus on building the application rather than reinventing the wheel.

The construction technique applied the Iterative Pattern of Software Development, which makes it easy to find and correct errors simultaneously. The concept is to add functionality prior to actually designing, testing, and implementing it. To develop the proposed system, several facts and features are evaluated, as listed below, in order to get the desired result.

1. To provide course materials to support various educational categories and its subcategories.

2. Each User has the ability to add Class Notes and Assignments to the app.
3. Present instructional resources via an open liveboard.
4. To make video conferencing between students and instructors more convenient.
5. To keep track of and evaluate the user's progress.

A feasibility analysis is performed to assess the practicality of a concept, such as verifying that a proposal is legally, technologically, and commercially feasible. The feasibility analysis for this work is carried out as follows:

**Project Requirements:** A Project Control List is a list that contains a succession of activities that must be included in a specific system. When we come across a new demand during the development process, it can be added to the list.

- User Registration and User Login
- Separate Account Page for each User.
- A whiteboard for inter-user conversation.
- A Search Bar

**Project Objectives:** The following objectives for the efficiency of the project to be developed should also be considered.

**Planned Approach:** The application's operation is meticulously planned and managed. The data will be correctly saved in data stores, which will aid in both retrieval and storage of information.

**Information retrieval in real time:** The suggested system's major goal is to enable speedy and efficient information retrieval.

**Easy to Use:** The system should be user-friendly and designed in such a way that it may be produced in a short amount of time while staying within the organization's financial constraints.

**Implementation:** In this digital age, there are a variety of front-end and back-end technologies to choose from. They exchange information over a network, the most common of which is the Internet. The portion of the application that the computer user, or client, sees is known as the front end. The system's back end is its "cloud" element.

**Front End Technologies:** The front end consists of the user device and the application that allows them to use the cloud computing system. With the use of HTML, CSS, and JavaScript, the program's frontend has been made more user-friendly. By installing the web application under HTTPS, the web application may safely transfer data with the webserver. JavaScript is a component of web applications that allows for interactive web sites. As the form provided by the user may contain incorrect information, it is critical to validate it. As a result, validation is required to verify the user's identity.

**Back End Technologies:** Python is used to create the back end. Django is a high-end Python Web platform that promotes fast expansion and a simple, practical design. The framework prioritizes component extensibility and "adaptly," as well as minimal code, less coupling, and quick development. SQLite is the best utilized database engine in the industry, and Django's default database is SQLite3.

## Results

Certain operational actions must be followed from the beginning to the end when using the virtual learning scheme. Here are a few screenshots from the app that demonstrate the project's primary functionality. The app logo, Home and Features Tab, and Contact Details are all on the Start-up page (Figure 1).

Every new user must register before receiving a login id and password. Users who have not registered will not be able to use any of the system's features. Figure 2 depicts this.

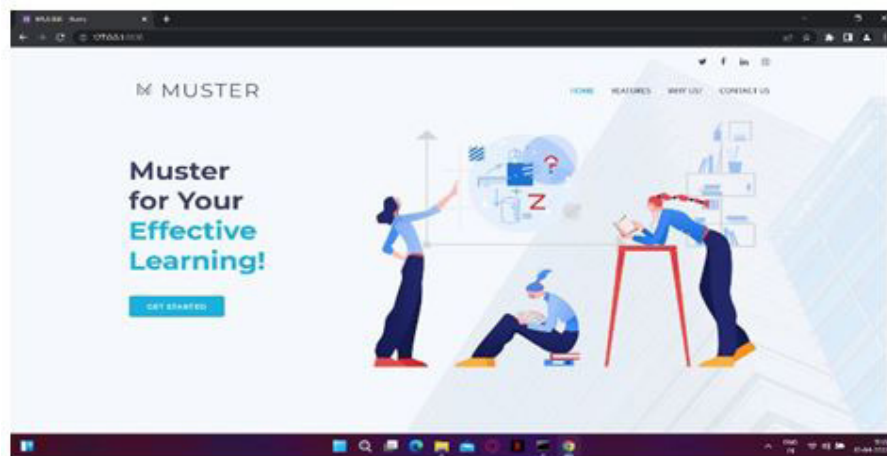


Figure 1: Startup Page

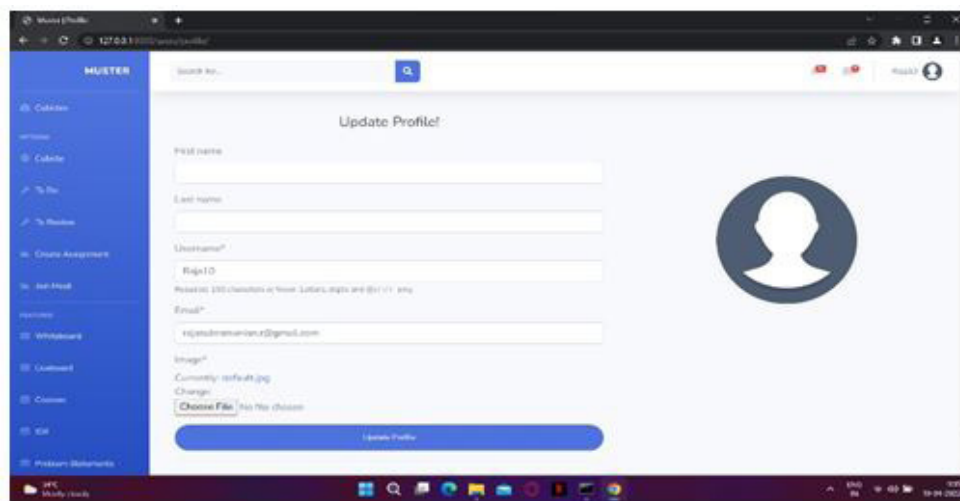


Figure 2: Registration Page

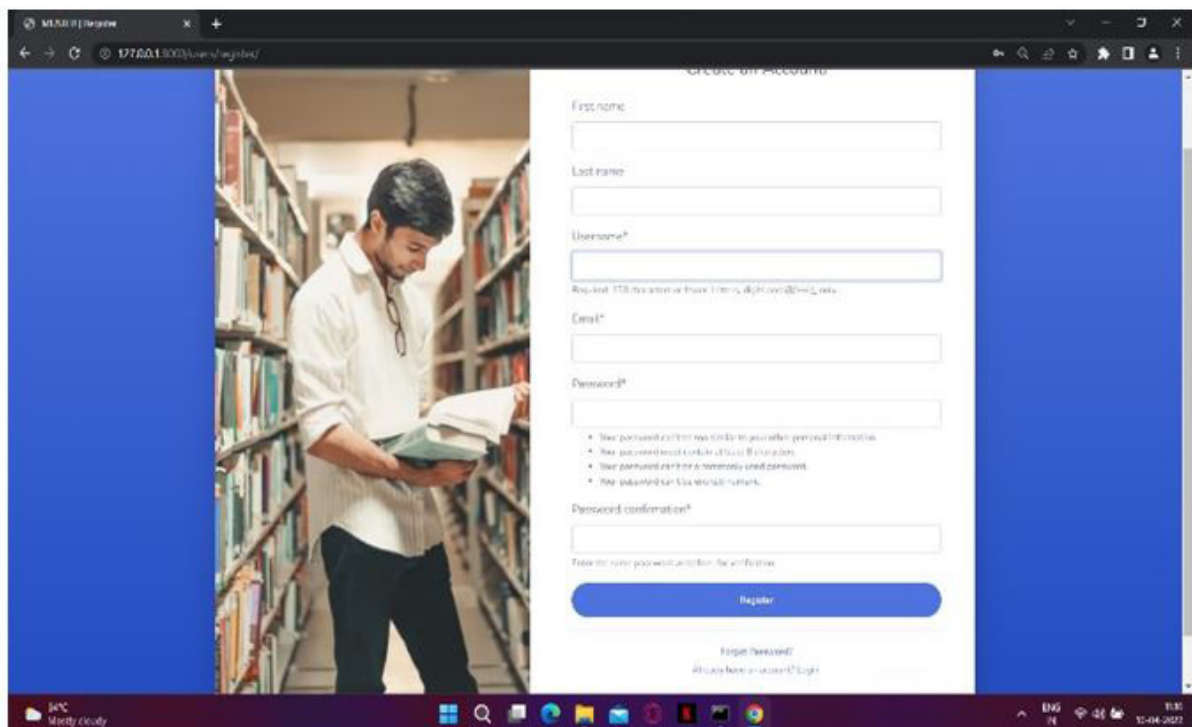


Figure 3: Login Page



Each user has their own login and profile page to update. The user's id will be used to verify the user, preventing unauthorized access. Figures 3 and 4 depict the login and profile update pages, respectively.

This is the login page where the users can use their respective credentials to login to our web app.

After logging in, both students and instructors can view/download class content and assignments, submit assignments, give feedback, and interact with other students and teachers. Figures 5 and 6 depict the assignment submission and course uploading pages, respectively.

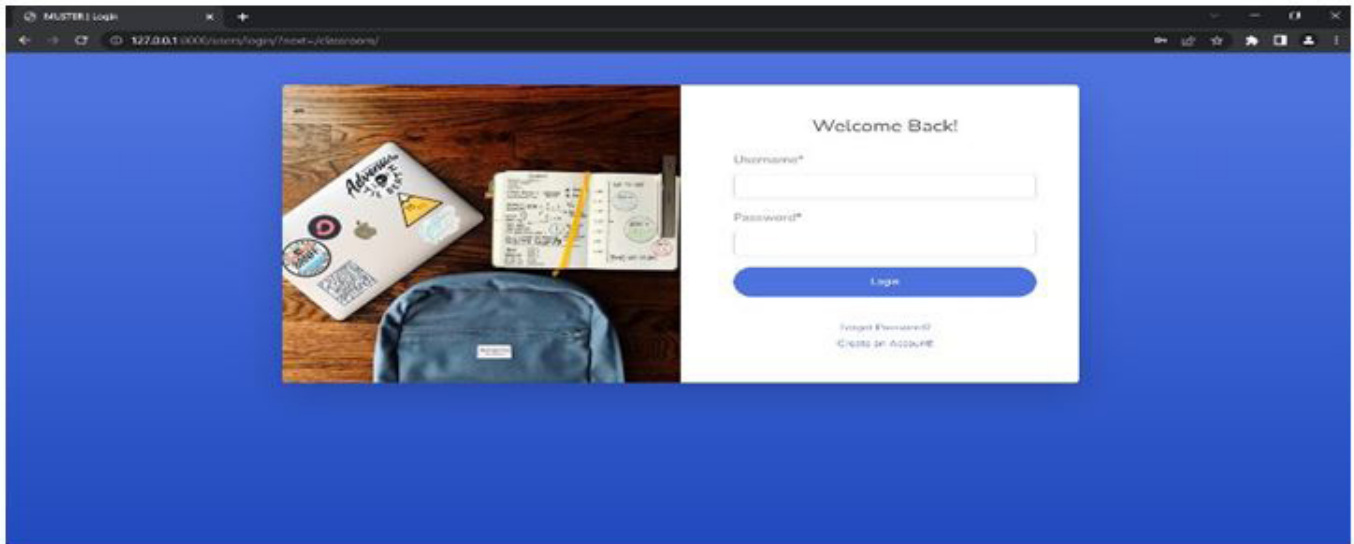


Figure 4: Profile Update Page

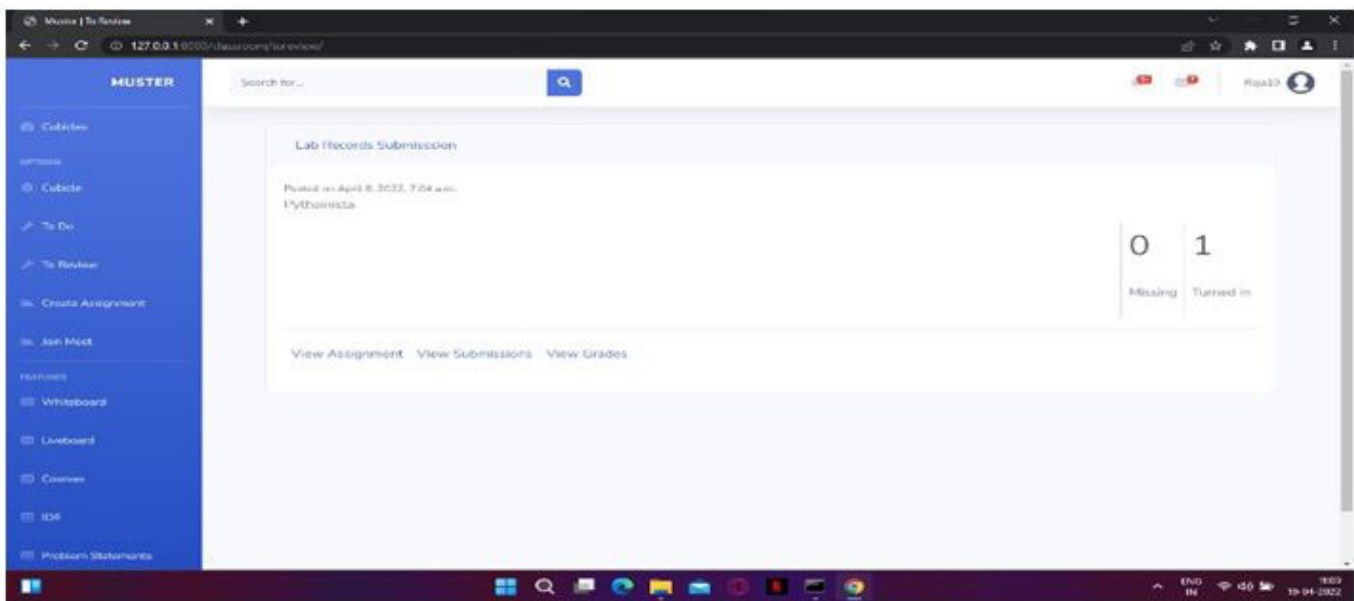


Figure 5: Assignment Review Page

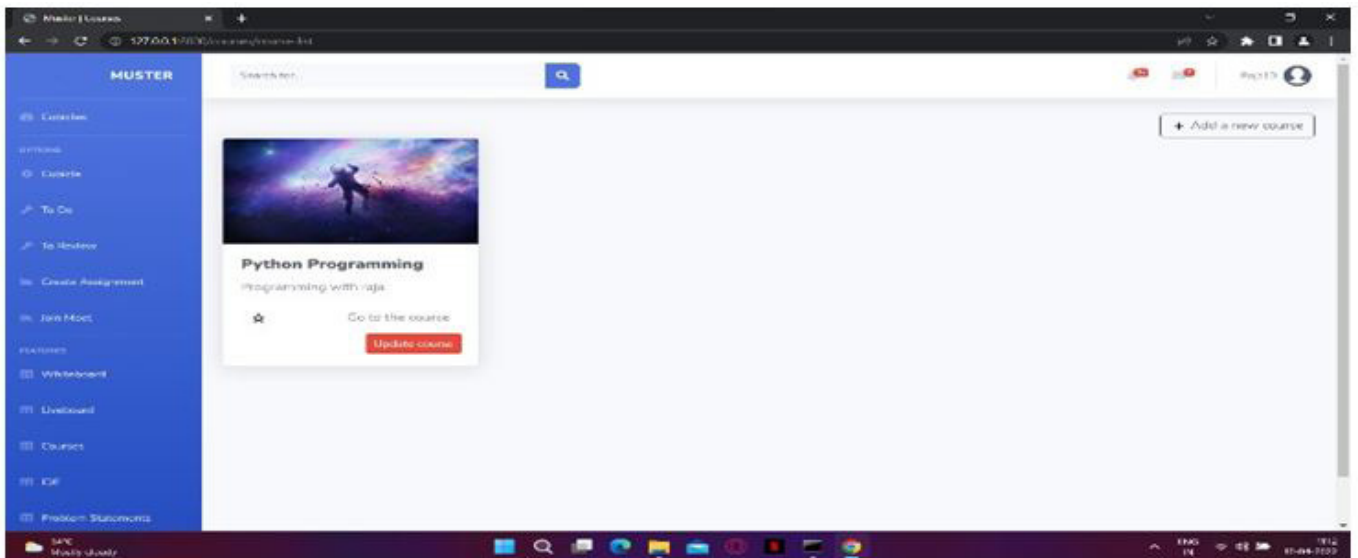


Figure 6: Course Upload Page

The video conferencing page and Live open board pages are given as Fig. 7 and Fig. 8

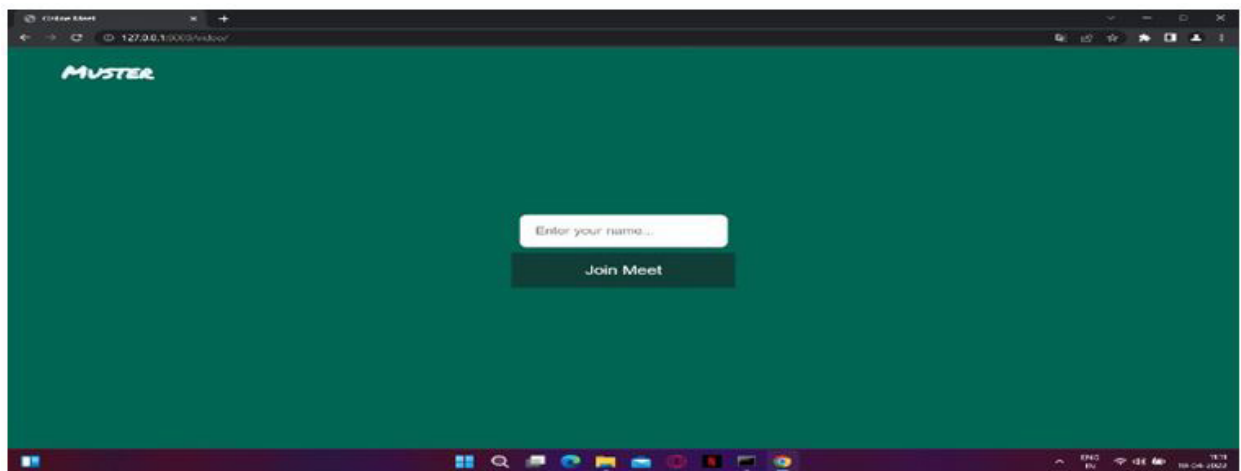


Figure 7: Video meeting Page

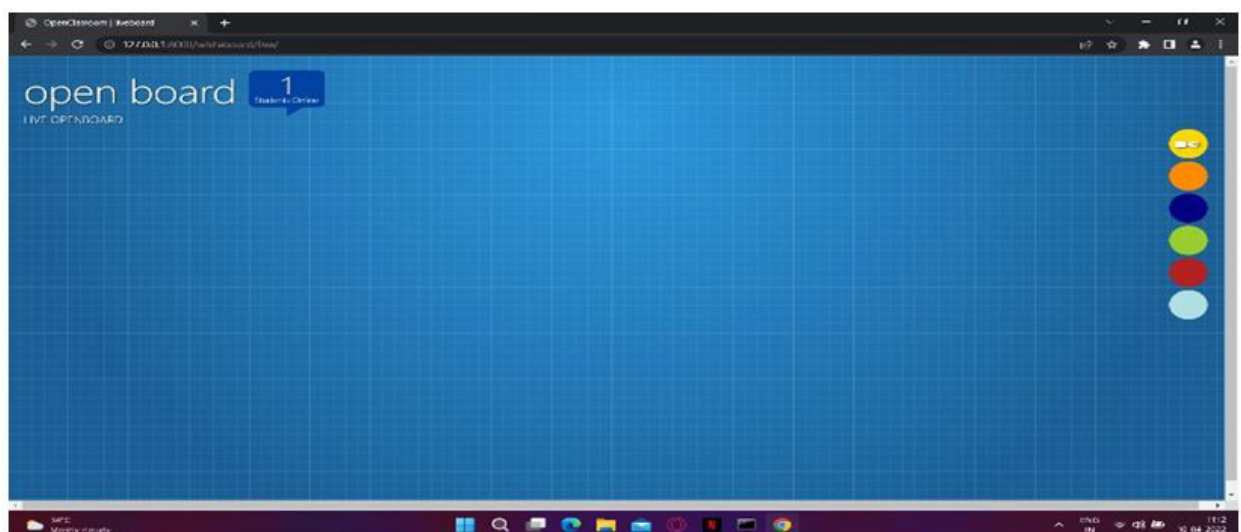


Figure 8: Live Open Board Page

## Conclusion

Muster, a virtual classroom learning tool, has been developed in this study. The new system is expected to address the existing system's flaws and difficulties. It will integrate open learning methodologies based on new technology with online education, with the goal of making learning more flexible, exciting, and accessible at any time and from any location with Internet access. Students will be able to freely navigate inside the virtual classroom environment, enhancing the knowledge resources available to them.

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