

Smart Classroom

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Abstract:- Smart classroom is representative of modern teaching. With the advent of modern technology it becomes easier for the students as well as teachers to perform their task more efficiently. The smart classroom is rectification to various problems that teachers as well as students face inside the classroom. This project aims to make use of modern technology for helping the teachers in utilizing more time for teaching and students to easily get access to the study material. In this project we are building a prototype of a smart classroom in which an application would be pivotal for carrying out various operations in the classroom. The setup makes use of rasp pi and rasp pi cam for recording the lectures of the faculties. The recorded lectures are later uploaded in a website which can be accessed with a given username and password provided for each student.

Keywords:- rasp pi, rasp pi cam

I. INTRODUCTION

The quality of education is a vital demand in today's competitive setting. Technology has affected us in each facet. Intuitive categories are a progressive approach of education within the education situation in India that offer quality teaching and learning opportunities to lecturers and students by serving them to longer devotion towards the teaching, better construct formation and educational action. New teaching ways are introduced that are called intelligent categories. It uses instructional material, 3D animated modules and videos. The idea of intelligent schoolroom has not solely created an interesting education however a chance for college kids to boost their performance.

The smart classroom is an enhanced classroom of technology that improves teaching and learning opportunities by group action learning technologies, like computers, special software, response technology audiences, help full listening devices, networking, and audio / visual capabilities. A smart learning setting not solely permits students to access digital resources and Engage in learning systems anyplace and anytime however additionally actively provides necessary student learning, suggestions and support tools, study suggestions within the right place, at the correct time and to the correct manner.

This paper is divided into 5 sections such that section 2 discusses the components used (both hardware and software), section 3 explains the implementation of the hardware component and the outputs obtained in the website are discussed in section 4. Section 5 concludes the paper.

II. COMPONENTS

A. Hardware:

➤ Raspberry Pi:

Raspberry Pi is a sequence of small single board computers developed in the United Kingdom by the Raspberry Pi Foundation. It was released to encourage basic computer education in schools and developing countries. There are several generations of raspberry that were released. All models have a Broadcom Chip (SoC) system with an ARM processor and integrated graphics processing unit[1].

➤ Raspberry pi cam:

It is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects. It is commonly used in surveillance drones since the payload of the camera is very less. Apart from these modules Pi can also use normal USB webcams that are used along with computers[2].

B. Software:

➤ Raspbian:

Raspbian is a Debian-based PC working framework for Raspberry Pi. It has been officially given by the Raspberry Pi Foundation as the vital working method for the group of Raspberry Pi single-board PCs. Raspbian utilizes PIXEL, Pi. Enhanced Xwindows Environment, lightweight as its fundamental work area condition as of the most recent refresh. a working framework is the arrangement of fundamental projects and utilities that influence your Raspberry Pi to run[3].

➤ Raspivid

Raspivid is the command line tool for capturing video with the camera module.

➤ Cron

The software utility cron also known as cron job is a time-based job scheduler in Unix-like computer operating systems. Users that set up and maintain software environments use cron to schedule jobs to run periodically at fixed times, dates, or intervals.

➤ PHP

It is an acronym for "PHP: Hypertext Preprocessor widely-used, open source scripting language. PHP scripts are executed on the server. It can generate dynamic page

content and can create, open, read, write, delete, and close files on the server. PHP can add, delete, modify data in your database and can be used to control user-access[4].

➤ **XAMPP**

It is an abbreviation where X stands for Cross-Platform, A stands for Apache, M stands for MYSQL, and the Ps stand for PHP and Perl, respectively. It is an open-source package of web solutions that includes Apache distribution for many servers and command-line executables along with modules such as Apache server, MariaDB, PHP, and Perl. It helps a local host or server to test its website[5].

III. IMPLEMENTATION

The hardware setup consists of Raspberry Pi and Raspberry pi cam module as shown in figure 2. The rasp pi cam module consists of a 5MP color camera module which is used for recording the lecture. With the help of Raspivid we can record the lecture and the commands for recording are:

```
#!/usr/bin/env bash
PATH=/usr/local/sbin:/usr/local/bin:/sbin:/bin:/usr/sbin:/usr/bin
SHELL=/bin/sh
NOW=$(date)
raspivid -t 10000 -w 640 -h 480 -fps 25 -b 1200000 -p 0,0,640,480 -o /DIRECTORY/pivideo.h264
MP4Box -add /DIRECTORY/pivideo.h264 "/DIRECTORY/Videos/Lecture-$NOW.mp4"
rm /DIRECTORY/pivideo.h264
```

After the video is recorded with the help of raspberry pi the recorded video can be uploaded using the Raspbian software which is a PC working framework for Raspberry pi[6].

The command for uploading:

```
#!/usr/bin/env bash
PATH=/usr/local/sbin:/usr/local/bin:/sbin:/bin:/usr/sbin:/usr/bin
SHELL=/bin/sh
rclone copy "/DIRECTORY/Videos/" "BalasGDrive:IoTClassroom/videos/"
echo Lastest Upload: $date
For maintaining the software environment cron is used,
*/1 * * * * ./DIRECTORY/Record.sh >> /home/pi/IoTProject/logfile 2>&1
*/2 * * * * ./DIRECTORY/Upload.sh >> /home/pi/IoTProject/logfile 1 2>&1
```

BLOCK DIAGRAM:

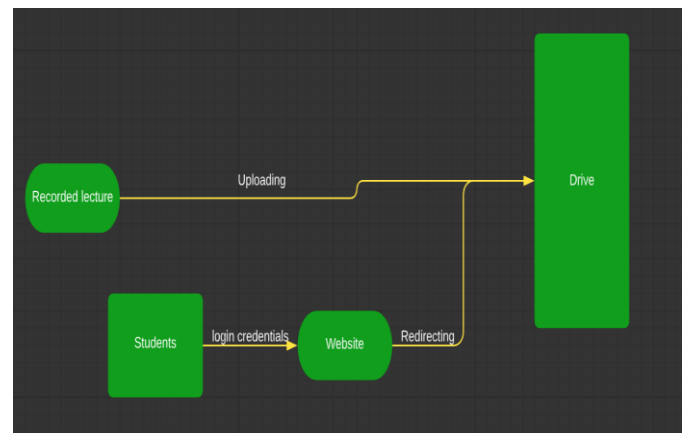


Fig 1: Block Diagram

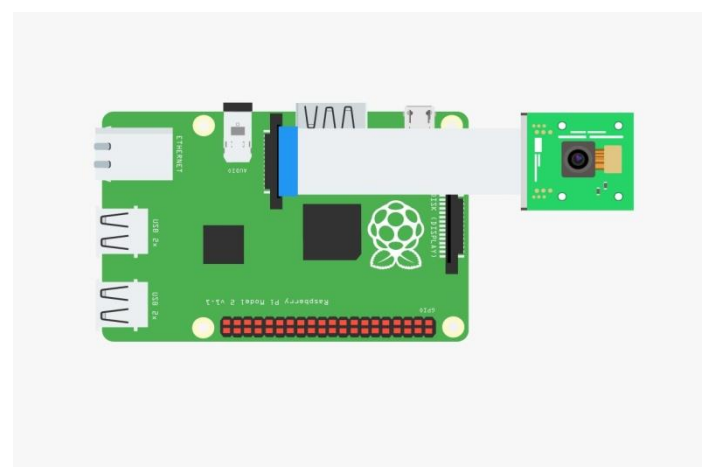


Fig 2: Circuit Diagram

➤ **Website:**

The recorded lectures will be uploaded in a google drive, and for accessing that drive folder every student is given a personal username and password. The students will only have access to view and download but not edit.

The website was designed with the help of XAMPP and PHP software. A database is created with the help of MySQL in XAMPP and the database host gets to enter the credentials and also has the ability to edit it as shown in figure 3.

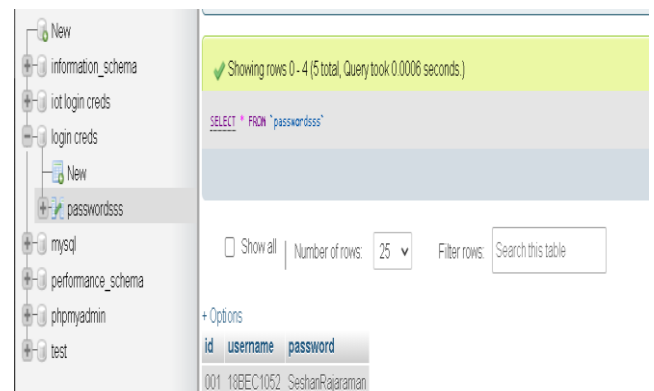


Fig 3: Database

The apache software in XAMPP can be used to generate the request and response for the website. The login credentials is the request and the output received is the response[8].

If the entered username and password (i.e.) fetched values is the same as that of the values stored in the db then the user is redirected to another link. Else, if the fetched values are not the same as the stored values then ‘Failed to login’ error message is displayed.

IV. RESULTS

Figure 4 shows the user interface of the website and with the help of login credentials in figure 3, the students can login and access the drive where the recording is uploaded.

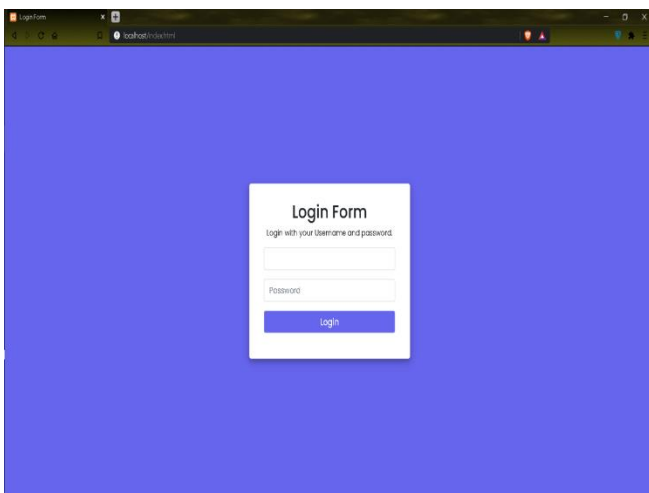


Fig 4: User Interface

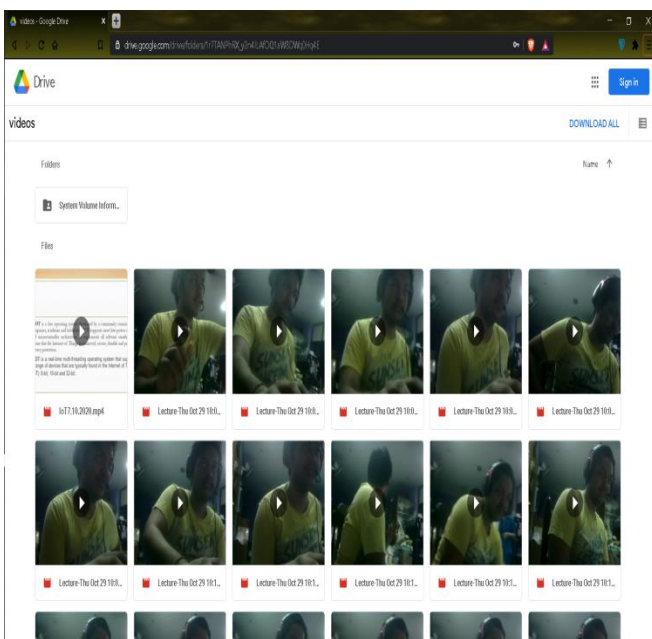
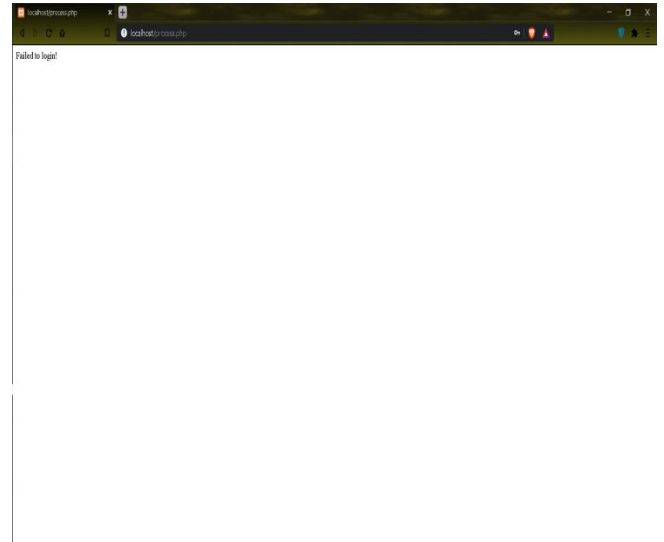


Fig 5: Drive

Figure 5 shows the lectures that were recorded with the help of Rasp pi cam module, all these recordings can be downloaded or viewed.

Figure 6 shows the result of entering incorrect login credentials.



V. CONCLUSION

These days everything is “smart” starting from vehicles and houses to tiny insects(nanobots). The concept of IOT has played an important role in our day to day life. Technology has immensely developed over the period of time and the real usage of this technology in academics is noticeable during the pandemic situation. When colleges and schools reopen this project can come in handy because the students could access the lectures even though they have missed them due to unavoidable reasons.

This project is an economical and an eco friendly project as its applications are vast and they do not cause any harm to nature. The rasp pi can be placed above the projector such that it covers the complete portion of the classroom without any disturbance and the students can access the lecture as soon as the class is completed and the recording has stopped.

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REFERENCES

- [1]. Explanation of Raspberry pi, <https://www.extremetech.com/computing/124317-what-is-raspberry-pi-2>
- [2]. Explanation of Raspberry pi cam, <https://makezine.com/projects/beginner-project-a-remote-viewing-camera-with-raspberry-pi/>
- [3]. Raspbian coding, Programming the Raspberry Pi, 2nd Edition: Getting Started with Python
- [4]. Explanation of php, <https://www.php.net/manual/en/intro-what-is.php>
- [5]. Explanation of XAMPP, <https://blog.templatetoaster.com/xampp-mysql/>
- [6]. Installation of Raspberry pi cam module, <https://thepihut.com/blogs/raspberry-pi-tutorials/16021420-how-to-install-use-the-raspberry-pi-camera>
- [7]. Installation of Raspberry pi OS, <https://www.raspberrypi.org/downloads/raspberry-pi-os/>
- [8]. Working with XAMPP, <https://www.phpknowhow.com/basics/working-with-xampp/>