

The proposed solution entails the development of a system that leverages the Internet of Things (IoT) to mitigate the risk of exam question paper leaks.

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Abstract

Exams might be the backbone of the entire educational system. We hear about an exam being postponed or canceled every year because of a paper leak. As a result, we devised the "Exam Paper Leak Security Framework," a heavily guarded framework predicated on the "exam suite." micro control, so as to produce a manageable and compact result. "complete" meaning "including modem, keyboard, electromagnetic lock, and Raspberry Pi module." At first, the school will ship a copy of the exams in a "sealed electronic box" (sometimes called a "electronic check box") to the establishment. The system will notify the appropriate university personnel by SMS (Short Message Service) sent through Twilio if the "electronic control box" is tampered with in any way, both before and after the moment the QR code is created by the Raspberry. As a result, it is clear that the queries have been shared with others.

Keywords: IoT – Internet of Things, SMS- Short Message Service, QR Code- Quick Response code, GPS- Global Positioning System, OTP- One Time Password

1. INTRODUCTION

The pursuit of knowledge will serve as a social catalyst. They are estimating the set of competencies by taking a test on paper, at exam centers, or on computers. The examination's principal objective is, of course, to choose competent individuals for a variety of positions. One of the biggest concerns of students is the "exam paper leakage" that occurs as a result of exam cancellation or postponement. Every year, there are reports of exam postponements and cancellations because to paper leaks. This meant that while some applicants put in the time and effort necessary to place highly, others were able to place highly with relatively little effort. The "a security framework against exam paper leakage" based on "Micro Controller" was therefore implemented as a portable and easily transportable solution. Exams will be shipped to universities in what is being called a "electronic sealed box."

The system sends "a SMS (Short Message Service)" over "Twilio" to the appropriate university authority if the box is tampered with before or after the time it takes for the Raspberry Pi to generate a QR code. with "the Electronic Control Box" experiencing a string of failures. The administration of the university will provide the head of the college a secret key 10 minutes before the exam begins. The university issues a formal "Fingerprint" to the college's top administrator. The head examiner will use a webcam provided by the university to reveal the hidden QR code. The electromagnetic lock turns and unlocks "the Electronic Control Box" whether or not the secret code is correct.

2. LITERATURE REVIEW

[1] C.Konda Reddy, B.Saijyothsna (2019)

This project prevents question papers from being leaked before the test and protects answer sheets until they are handed to the center for approval. The exam papers will be in an electronic control box that can only be unlocked at the exact moment of the exam after double checking the time. If someone tries to open the electronic box before the time, the buzzer will beep. RFID-connected electronic control boxes provide initial authentication. Face recognition and detection are used as secondary authentication to boost security. The project was developed to assure fair competition and exam paper preservation.

[2] AlfarHussain, V.Naganjaneyulu(2017)

The proposal describes a safe electronic exam paper leak protection technique. Exams are essential because they allow professors to evaluate students' writing, internet, and verbal skills. The university sends the college an ARM-processed embedded device with the question paper in a sealed packaging. The college administration will receive an RFID card and a password 10 minutes before the exam. Swiping an RFID card with the right password opens an electronic sealed box. If somebody opens the electronic sealed box before or after RFID swipe time, the university board will receive a GSM notification that test paper was leaked.

[3] Gaikwad, Kenjale, Bagade(2016)

This study describes a secure electronic exam paper leak solution. The educational system revolves around exams. We propose employing electronic means to find and stop exam paper leaks. Under the suggested approach, the electronically protected box question sheets will be delivered to testing locations. A chosen user will open the box at a predetermined time and date. The sub boxes hold exam papers. Password-protected boxes. The exam controller will send a message containing each sub box's password. Only if the date, time, and password match will the box's electromagnetic lock unlock. A buzzer alerts us to illegal intervention in this system.

3. EXISTING SYSTEM

Providing printed exam questions to testing locations has been a huge administrative and logistical task. The question bank is managed using papers, texts, notes, and spreadsheets. There is no single managing question bank for a subject. Question writers must visit universities to define questions. Everything is manual. Examiners must define questions according to exam format. Due to the lack of a standardized mechanism for managing question banks, defining the question paper may take longer than defining the questions. The moderator must verify paper setters' question sets. Manual procedures may cause errors. One question paper is picked for the final exam and provided to a safe area for printing. Each test location must get printed exam papers on exam day. The institution must regularly test each semester, stream, student batch, and course type. A last-minute preparation step is needed to finish the assignment on time. There is no centralized software or technology that could simplify things so each entity could collaborate for a better process. Manual engagement in each process increases the potential of question paper leaks.

4. PROPOSED SYSTEM

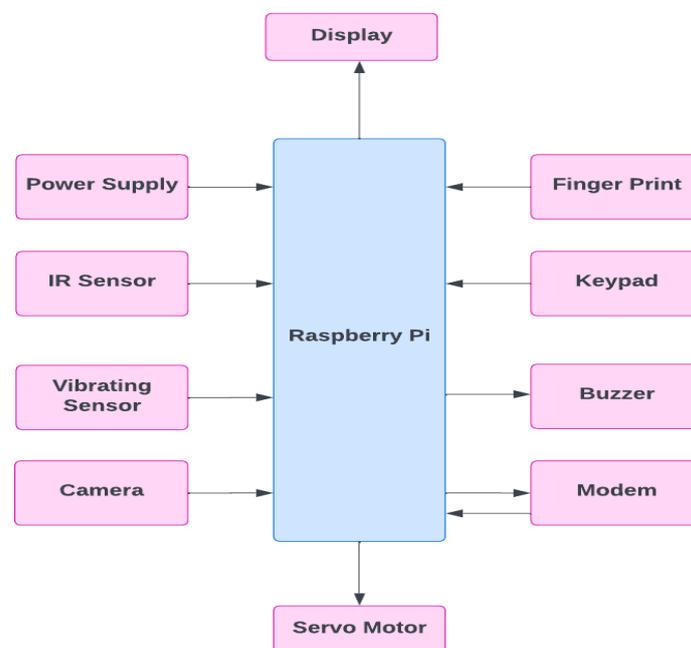


Fig.1. Block Diagram of Proposed System

The proposed system is shown by a block diagram with Raspberry Pi, modem, IR sensor, vibrating sensor, camera, and fingerprint components connected to it is as seen in Figure 1.

4.1 SYSTEM SPECIFICATIONS

4.1.1. HARDWARE REQUIREMENT:

- Raspberry Pi
- Finger Print Module
- IR Sensor
- Vibration Sensor
- Moto driver circuit
- Servomotor
- Camera
- Keypad
- Buzzer
- Display(LCD)

4.1.2. SOFTWARE REQUIREMENT:

- Python
- Thinkspeak Cloud
- Twilio

4.1.3. POWER SUPPLY CIRCUIT

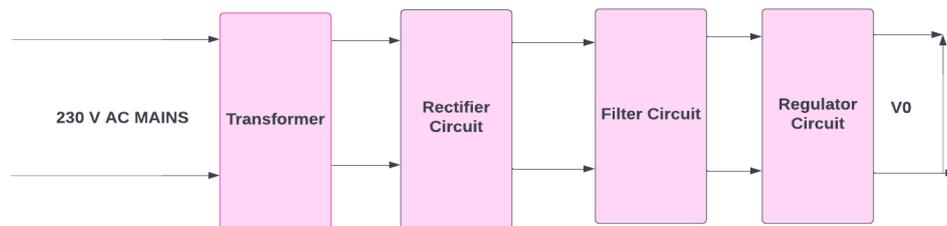


Fig.2. Block Diagram of Power Supply Circuit

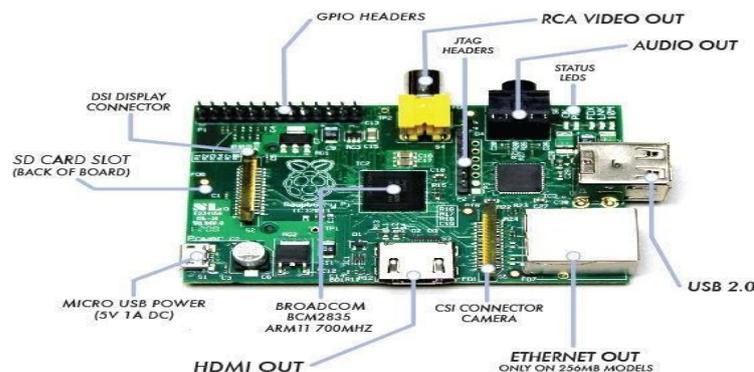


Fig.3. Raspberry Pi circuit connection

4.1.4. Raspberry Pi Configuration

Processor: The Broadcom BCM2837B0 is a System-on-Chip (SoC) that features a 64-bit Cortex-A53 processor running at a clock speed of 1.4GHz.

The memory capacity of the system is 1 gigabyte of low-power double data rate

2 synchronous dynamic random-access memory (LPDDR2 SDRAM).

Connectivity : 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2

Video & sound: 1 × full size HDMI MIPI DSI display port MIPI CSI camera port4

Multimedia : H.264, MPEG-4 decode

SD card: Micro SD format

Input power: 5V/2.5A Direct current (DC) can be transmitted using a micro USB connector at a voltage of 5 volts (V).

5. Working Principle

Infrared sensors, vibration sensors, and cameras are used to keep an eye on the exam papers used by universities and colleges, as well as government agencies. Raspberry Pi is used to send the signal to the microcontroller. The 230v ac is reduced to 12v ac by a step-down transformer in the power supply block. The voltage regulator, filter, and rectifier come next. A 5v dc supply was generated and fed to its outputs as a result.

- Raspberry Pi
- Motor Driver Circuit
- Display

There are three distinct approaches to this undertaking. They are Competitive Exams, University Exams and Security System.

Prior to the commencement of the examination on a given day, the question paper box cannot be opened by anybody in addition to exam superintendent until 10 minutes Prior to the commencement of the examination. Fingerprint recognition was first implemented by an examination supervisor. A secure QR code will be generated and sent to the Exam Superintendent if the fingerprints match. The verification process for the camera on the Raspberry Pi just takes a few seconds once the organizer receives the QRCode on their mobile device. The electronic question paper box will be available after verification is complete. Please notify the Exam Zone Office if the criteria do not match. Mode 2(University Exam) is also same as that regarding mode 1 (competitive Exam).

Mode 3 is a Security System. While in Transit from the Zonal Office to the designated testing facility. The electronic question paper box is equipped with infrared (IR) and vibration sensors to detect any tampering and send an alert to the Raspberry Pi, the zonal officer, and the exam superintendent via SMS and GPS coordinates.

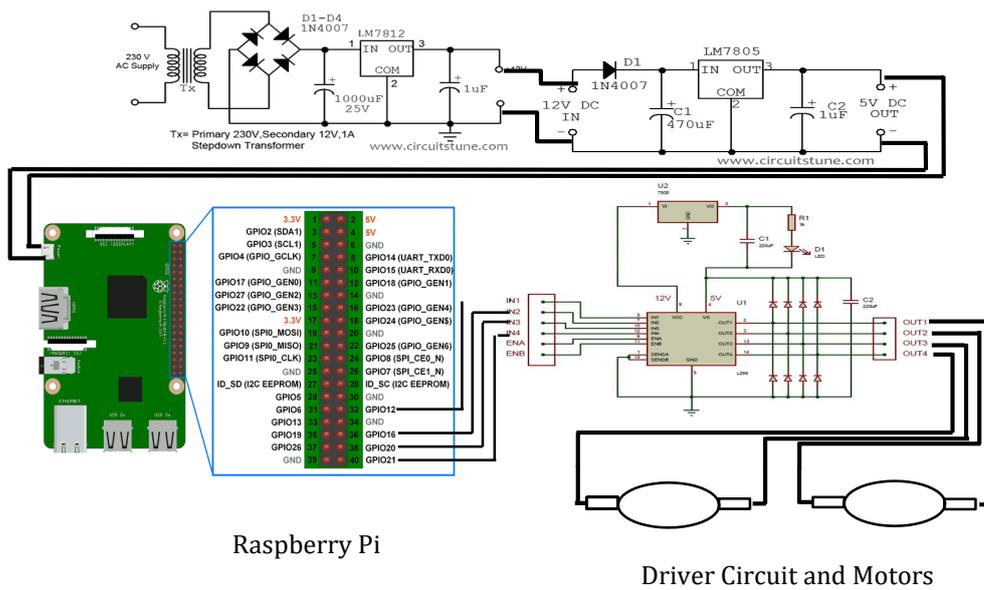


Fig.4.Circuit diagram of Security system for Examination Question Paper Leakage

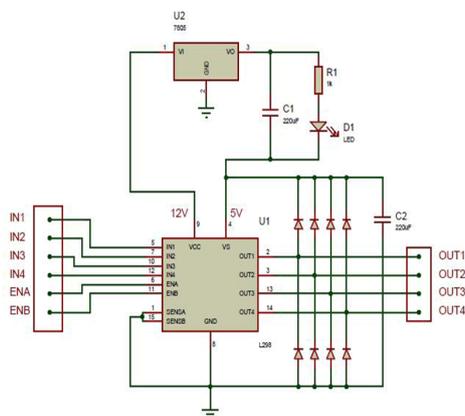
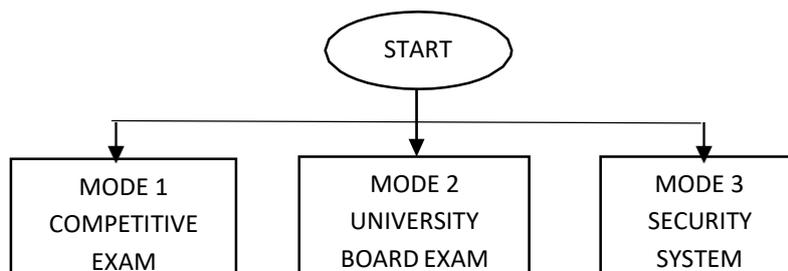
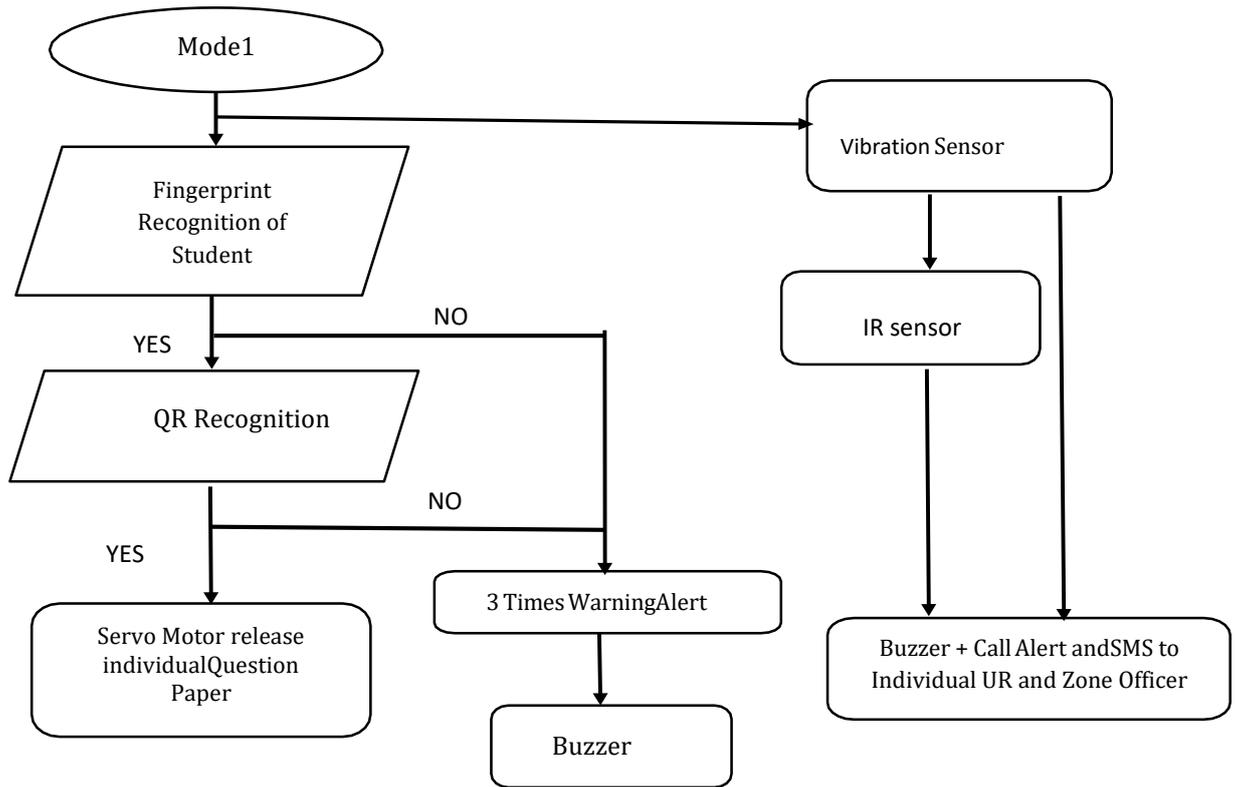


Fig.5. Circuit diagram of L298N Motor driver

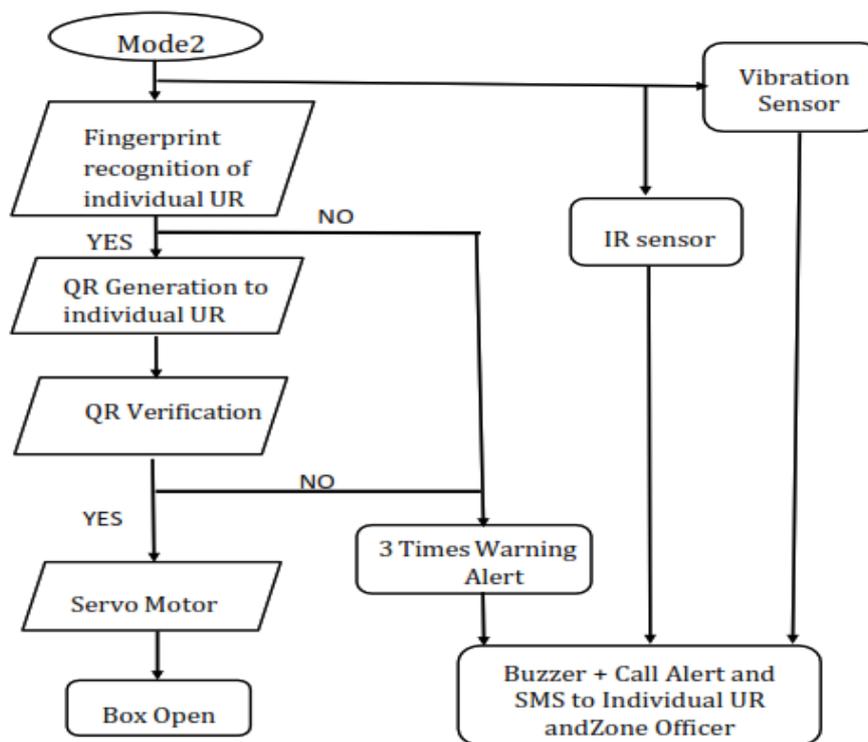
6. FLOW CHART



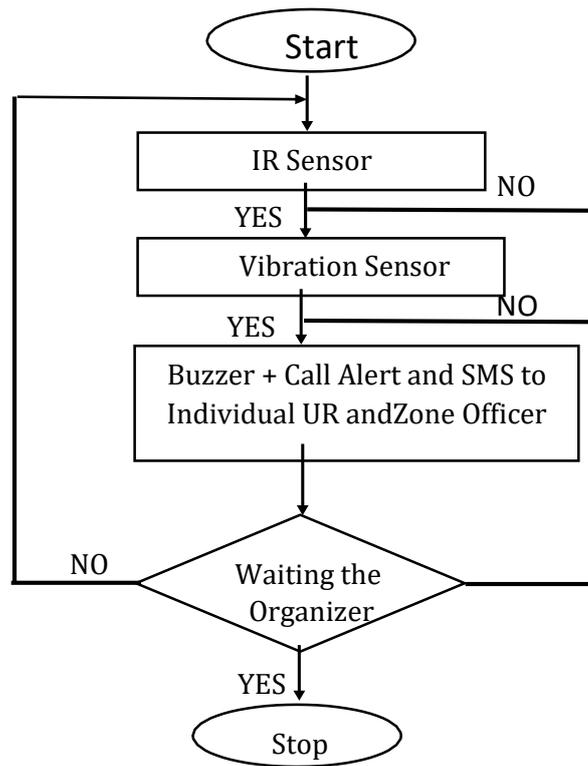
6.1. Mode 1 (Competitive Exam)



6.2. Mode 2 (University Board Exam)



6.3.Mode 3 (Security System)



7. SOFTWARE DESCRIPTION

7.1.PYTHON

Python's concise syntax makes it easier for programmers to develop programs in it with fewer lines of code required than in other popular programming languages like C, C++, or Java.

With Raspberry Pi, you can easily connect your project to the real world using Python, a fantastic and powerful programming language that is simple to use (easy to read and write). Python's grammar is spotless; the language places a premium on legibility and use only generic English terms.

7.2.THINGSPEAK CLOUD

You may collect, display, and analyze real-time phenomenon of data streams being stored and processed in cloud computing environments. with the help of ThingSpeak, A service that provides an Internet of Things (IoT) analytics platform.. Data from your devices can be instantly visualized in ThingSpeak. ThingSpeak's ability to run MATLAB® code means that data may be analyzed and processed in real time, right when it's collected. Many Internet of Things (IoT) systems employ ThingSpeak as a prototype and proof-of-concept tool. Monitoring the Spot.

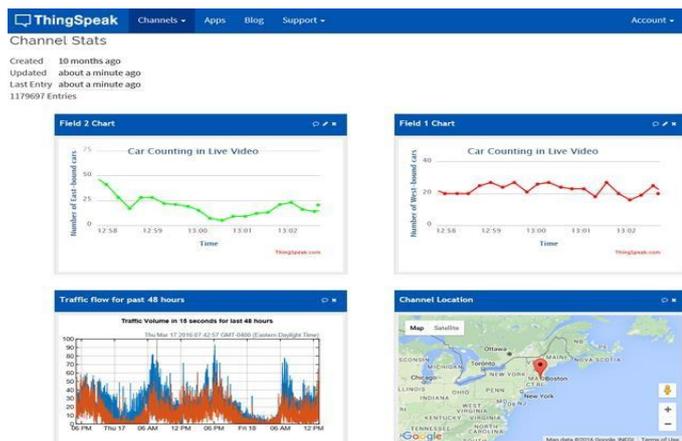


Fig.6.Thingspeak Cloud Sensor Performance

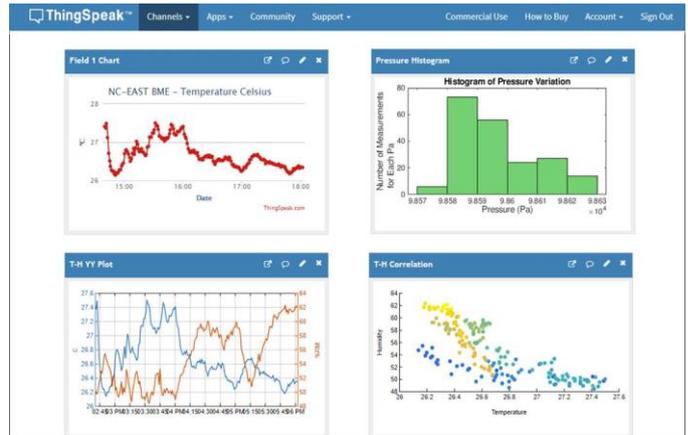


Fig.7. Thingspeak Cloud Data Analysis

The following are the sequential instructions for constructing a Raspberry Pi data logger on a cloud-based platform.

Step 1: Register for ThingSpeak

Step 2: Create a Channel for Your Data

Step 3: Acquiring an API key in ThingSpeak

Step 4: Python code implementation designed for the Raspberry Pi platform.

7.3. TWILIO

Twilio, founded in 2011, is a Communications Platform as a Service (CPaaS) provider with headquarters in San Francisco. Using its web service APIs, Twilio enables programmatic phone calls, text messaging, audio/video transmission, and other communication services.

Without Twilio, the act of transmitting and receiving telephone calls. and texts over traditional telephone networks requires knowledge of specialized telecommunications protocols like The Session Initiation Protocol (SIP) is a communication protocol used in computer networks to initiate, modify, and conclude multimedia sessions. With Twilio's application programming interface (API), developers can utilize their preferred programming languages and frameworks without worrying about the underlying telecoms infrastructure. Here's an illustration of how to use Python to send an outgoing text message:

```

from twilio.rest import Client

account = "ACbde0681ba7c54abf59ee6290332cbb67" token = "80752ccfd77eab5029306a51ca3a5863" client
= Client(account, token)

message = client.messages.create( body="someone tries to Open ",to="+918270828508",

                                from_="+15404015231",

                                )

print(message.sid)

```

8. RESULT AND ANALYSIS

8.1.SOFTWARE RESULT.

Exam Superintendents, Zonal Officers, and Supervisors who use this program can choose from a variety of exam formats. It was developed with Python 3.7. It's simple to use anywhere in the world.

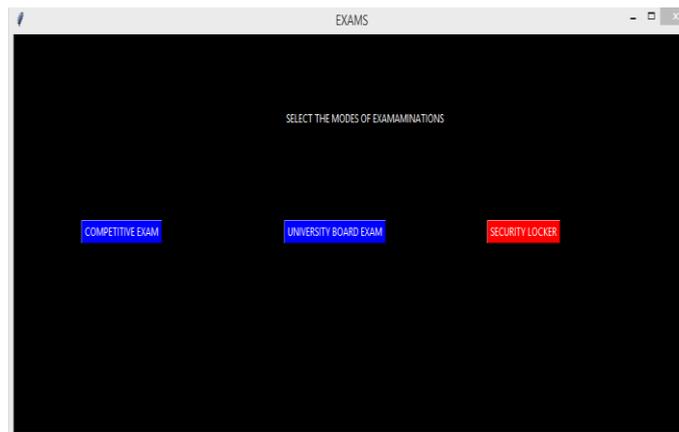


Fig.8. Select the Modes of examinations

8.2. HARDWARE RESULT



Fig.9 a. OTP generate through Raspberry Pi



Fig.9.e.Electronic Control Box will be opened



Fig.9.b. OTP sent to Exam Superintendent officer



Fig.9.f. Total Hardware Kit



Fig.9.c.OTP verification



Fig.9.g. OPT is incorrect



Fig.9.d. After OTP is verified correctly



Fig.9.h. Buzzer alarm is ON

9. CONCLUSION AND FUTURE ENHANCEMENT

Minimal peripheral interfaces, low power consumption, low cost, and great mobility are just some of the benefits of the micro controller-based security solution for examination question paper leakage that the design and implementation were carried out. All of the system's conditions have been tested with a positive result. Using a Micro controller built on the Raspberry Pi, we were able to produce a compact and low-priced solution for the exam paper leaking system. This work can be expanded to include safeguarding the response sheets before they are submitted to the university administration. It has many further uses when security of documents or other valuables is required. Upon the completion of the examination, the electronic control box has the capability to be programmed to initiate an automatic shutdown process through the utilization of the embedded system.

9.1. Features

1. Some secret and confidential documents relating to our country need to be safeguarded, and we need a way to keep exam papers from leaking.
2. The answer sheet should be securely sealed and afterwards dispatched to the evaluators inside the confines of the same container.
3. Financial firms have the potential to employ this technology as a means of protecting customer monies and critical documents.

9.2. Applications

- University Exams
- Civil service Exams

- Neet Exams
- Secret Documents

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