



VISVODAYA ENGINEERING COLLEGE

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School security system using Finger print sensor

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Problem statement

- The current methods of managing student attendance are often time-consuming, prone to errors, and lack of real-time monitoring or security measures to prevent unauthorized access.
- Requires teachers or staff to manually record and verify attendance.
- Traditional attendance tracking in schools is time-consuming

Abstract

- The proposed school security system uses finger print sensor integrated with Arduino Uno and NodeMCU to efficiently monitor and record student attendance in real-time.
- Each student biometric is taken, which is scanned upon entry or exit, triggering the system to log the data.
- An LCD screen displays the student's name and status, while a buzzer alerts staff to any unauthorized or delayed actions.
- Additionally, the system sends notifications to administrators and logs all attendance data onto a remote server, accessible through a user-friendly interface.
- This centralized system ensures enhanced security, facilitates real-time monitoring, and provides detailed attendance records for school management.

Existing system

- Existing school security systems typically rely on manual attendance tracking, CCTV surveillance.
- Manual systems, such as roll calls or sign-in sheets, are time-consuming, prone to human error, and lack real-time tracking of student movements.
- CCTV cameras monitor areas but do not provide individual student tracking or entry/exit logs.
- These existing methods often fail to provide comprehensive security and real-time monitoring, resulting in a need for more advanced, automated systems.

Proposed system

- The proposed school security system focuses on efficient entry and exit monitoring using finger print sensor integrated with Arduino Uno and NodeMCU.
- Each student finger biometric is taken , which is scanned upon entry or exit, logging the attendance data in real-time.
- This system enhances security by ensuring that only authorized individuals enter or leave the premises.

Requirements:

Hardware Components:

- Arduino Uno
- Node MCU (Wi-Fi Module)
- Finger print sensor
- LCD Display
- Servomotor
- Buzzer

Software Components:

- Arduino
- Blynk software

Hardware components of Micro Controller:

Arduino Uno:

- The Arduino uno is a microcontroller board based on the ATmega328P.



- It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started

NodeMCU:

- The NodeMCU (Node Microcontroller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266.

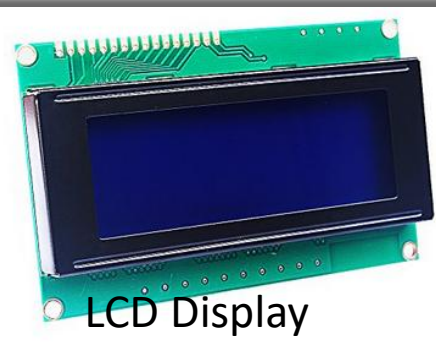


- The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WIFI), and even a modern operating system and SDK. That makes it an excellent choice for the Internet of Things (IoT) projects of all kinds.

Hardware components: Sensors



A fingerprint sensor in an IoT-based security system. Reports Generation: The system generates attendance reports. Stop: The process ends. automation system enables secure access by allowing only authorized users to control appliances through biometric authentication and remote IoT integration. The sensor scans and matches fingerprints, and if verified, the microcontroller (ESP32, ESP8266, or Arduino) activates a relay to switch appliances on or off. This system can be integrated with IoT platforms like Blynk or Firebase for remote monitoring and control.



In IoT-based systems, LCD displays are used to show real-time data, sensor readings, and device statuses, providing a user-friendly interface for monitoring and control. LCD displays in IoT systems enhance user interaction by displaying alerts, connectivity status, and operational feedback, improving real-time monitoring and automation.



Servo motor

A servo motor is a rotary actuator used for precise control of position, speed, and torque in automation and robotics. In IoT-based systems, it is commonly used for tasks like smart door locks, robotic arms, and automated control mechanisms. It operates using a control signal to adjust its position accurately based on user commands or sensor inputs.



Buzzer

In IoT systems, a buzzer provides audible alerts for events like status changes or errors. It is activated by the microcontroller to deliver real-time notifications, enhancing user responsiveness.

Software Components:

Arduino IDE:

- The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with



buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

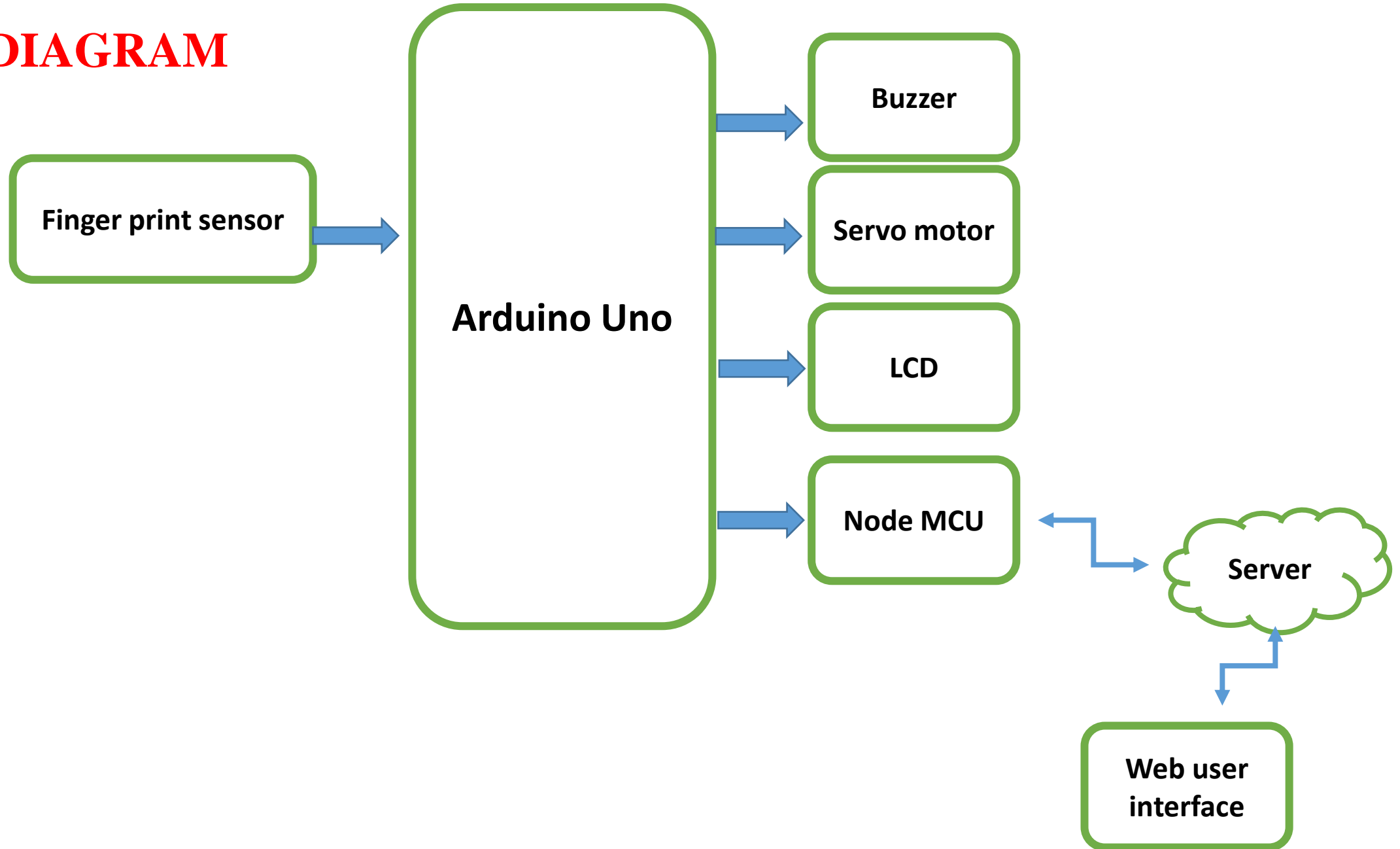
Arduino IOT cloud :

- The Arduino IoT Cloud lets you effortlessly create, develop and manage connected Arduino-based projects.



- The web editor of the Arduino Cloud offers you to work on your Arduino programs virtually and is Designed specifically for IoT applications, it enables remote hardware control, sensor data display, storage, and visualization.

BLOCK DIAGRAM



Working:

Start:

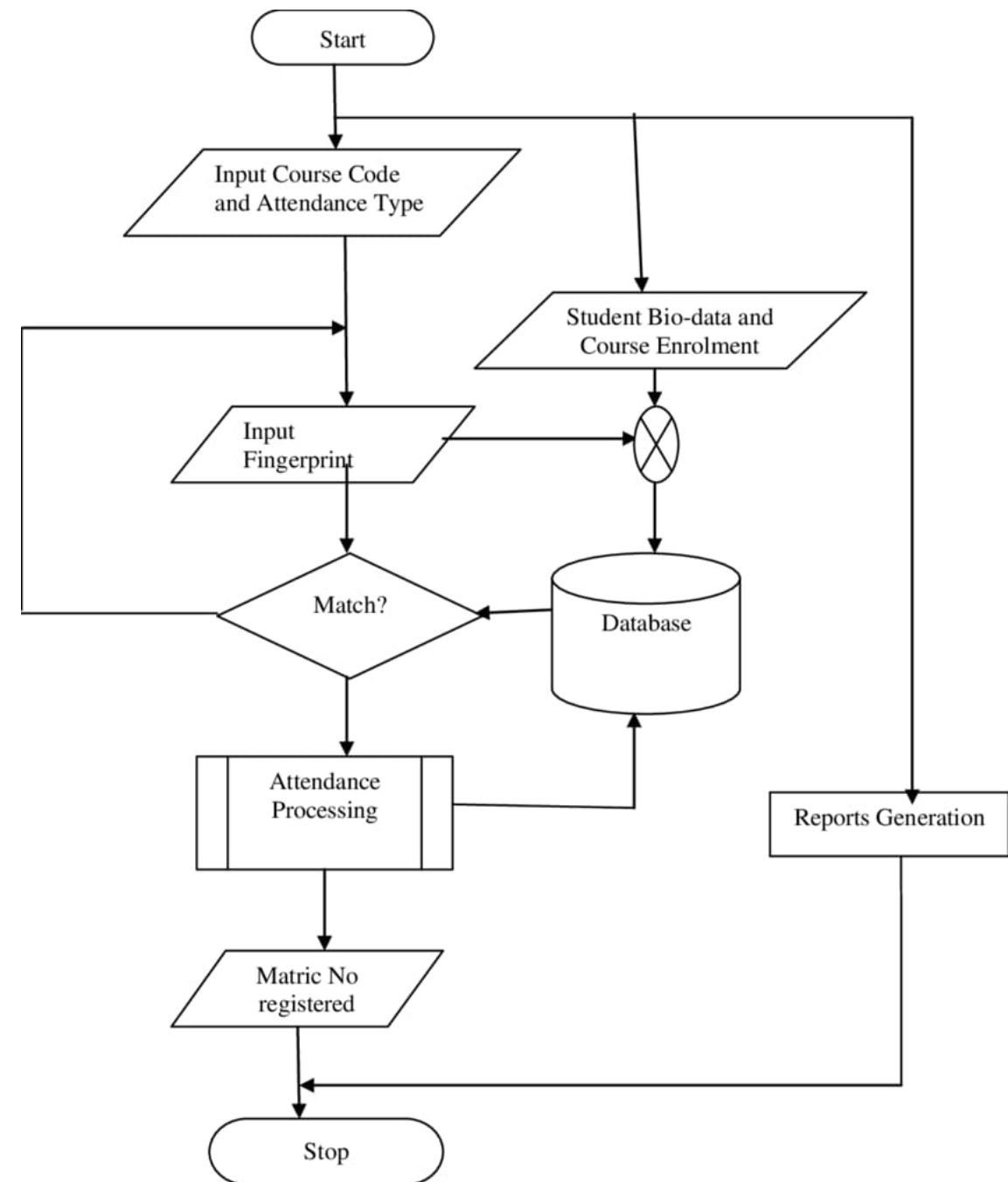
The process begins when the system is activated.

Input Course Code and Attendance Type :

Input Course Code and Attendance Type The user (student or administrator) enters the course code to specify which class attendance is being taken. The attendance type (e.g., lecture, practical, or tutorial) is also specified.

Input Fingerprint:

Input Fingerprint The student places their finger on the biometric scanner. The system captures the fingerprint data.



Working:

Match?:

Match? (Fingerprint Verification)The system compares the captured fingerprint against stored records in the database.If the fingerprint does not match, the system prompts the student to retry.If the fingerprint matches, the attendance is processed.

Student Bio-data and Course Enrollment :

The system retrieves the student's details and enrolled courses from the database.

Attendance Processing:

If the fingerprint is verified, the system records the student's attendance for the given course and updates the database.

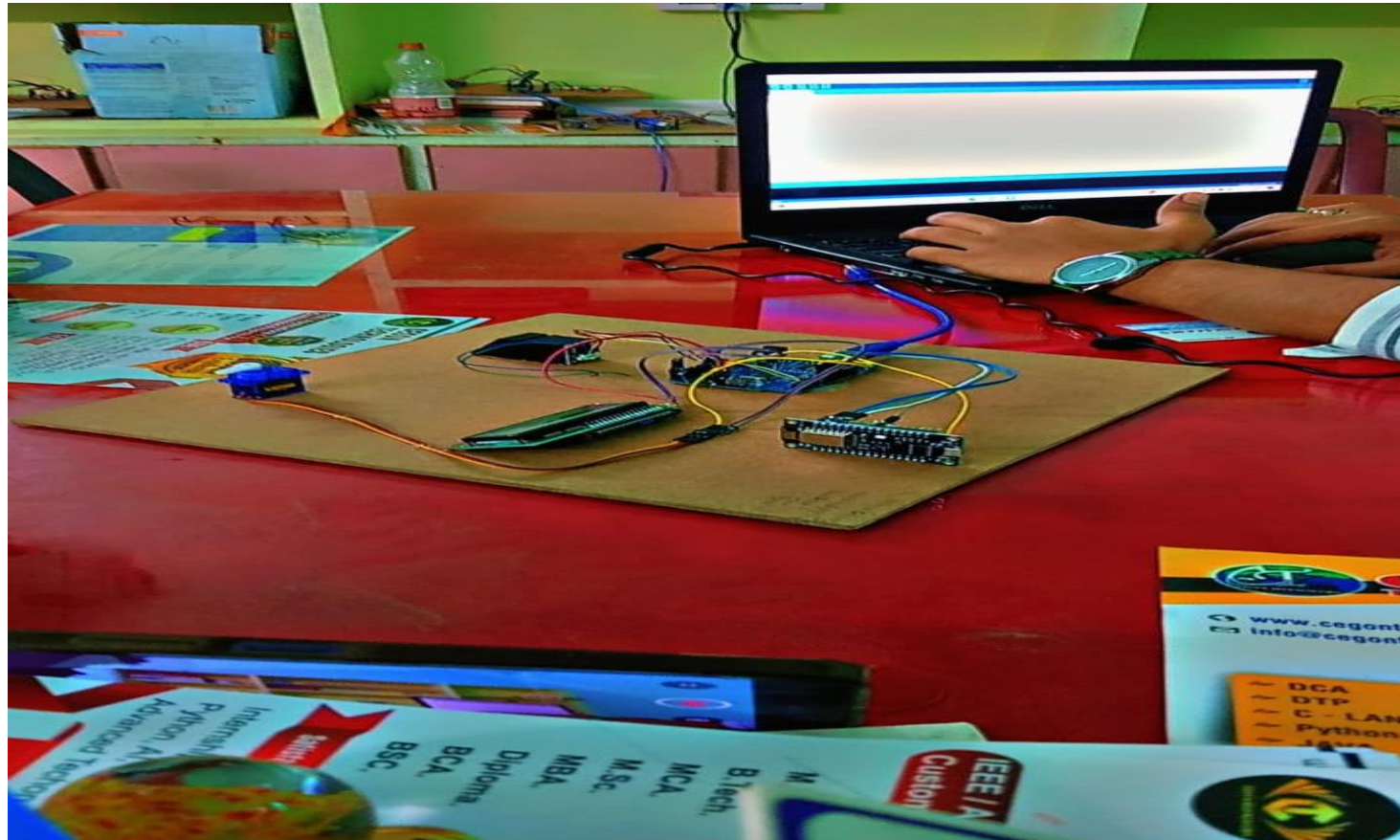
Matric No Registered?:

The system checks if the student's Matric Number (University Registration Number) is already recorded in the database.If the student is registered, the attendance is confirmed and saved.If the student is not registered, an error message is generated.

Reports Generation: The system generates attendance reports.

Stop: The process ends.

Results&output:



8:06



School Security

Inactive

Student-1 Status



Student-2 Status



Student-3 Status



Student-4 Status



Student-5 Status



Advantages:

- Enhanced Security only authorized students, staff, and personnel can access school premises.
- Prevents strangers or unauthorized individuals from entering the school.
- Fingerprint scanning is fast ,reducing Overcrowding at entry and exit points.
- Fingerprints cannot be lost ,stolen ,or duplicated easily.
- If a student is absent automatically notification are sent to their parents phones.
- It also prevent ford attendance.

Application:

- Student Attendance System
- Emergency & Safety Monitoring
- Restricated Access to Sensitive Areas

Conclusion:

A fingerprint-based school security system enhances safety by ensuring accurate identification and preventing unauthorized access. It automates attendance, controls entry to restricted areas, secures examinations, and manages visitors efficiently. The system improves school security, reduces manual errors, and enhances transparency with real-time monitoring and parental notifications. By integrating biometric technology, schools can create a safer, smarter, and more organized environment. Implementing this system ensures efficient security management and a secure learning atmosphere for students and staff.

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Thank You
For Your Attention!

Any Questions

