IoT-based Smart Classroom Door Lock System

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Introduction

- As technology evolves, classical solutions become obsolete, inconvenient, and prone to vulnerabilities. An example is a 'Classroom Door Lock'. Imagine leaving the classroom only to remember later that the door was left open, requiring you to return just to lock it. Additional concerns include key duplication risks, inconvenience, loss, mechanical wear, frequent maintenance, and lack of accessibility in emergencies.
- This project aims to design and implement an IoT-based 'Smart Classroom Door Lock System' that incorporates real-time monitoring, remote accessibility, and automated functionalities, making it a valuable modern-day application.

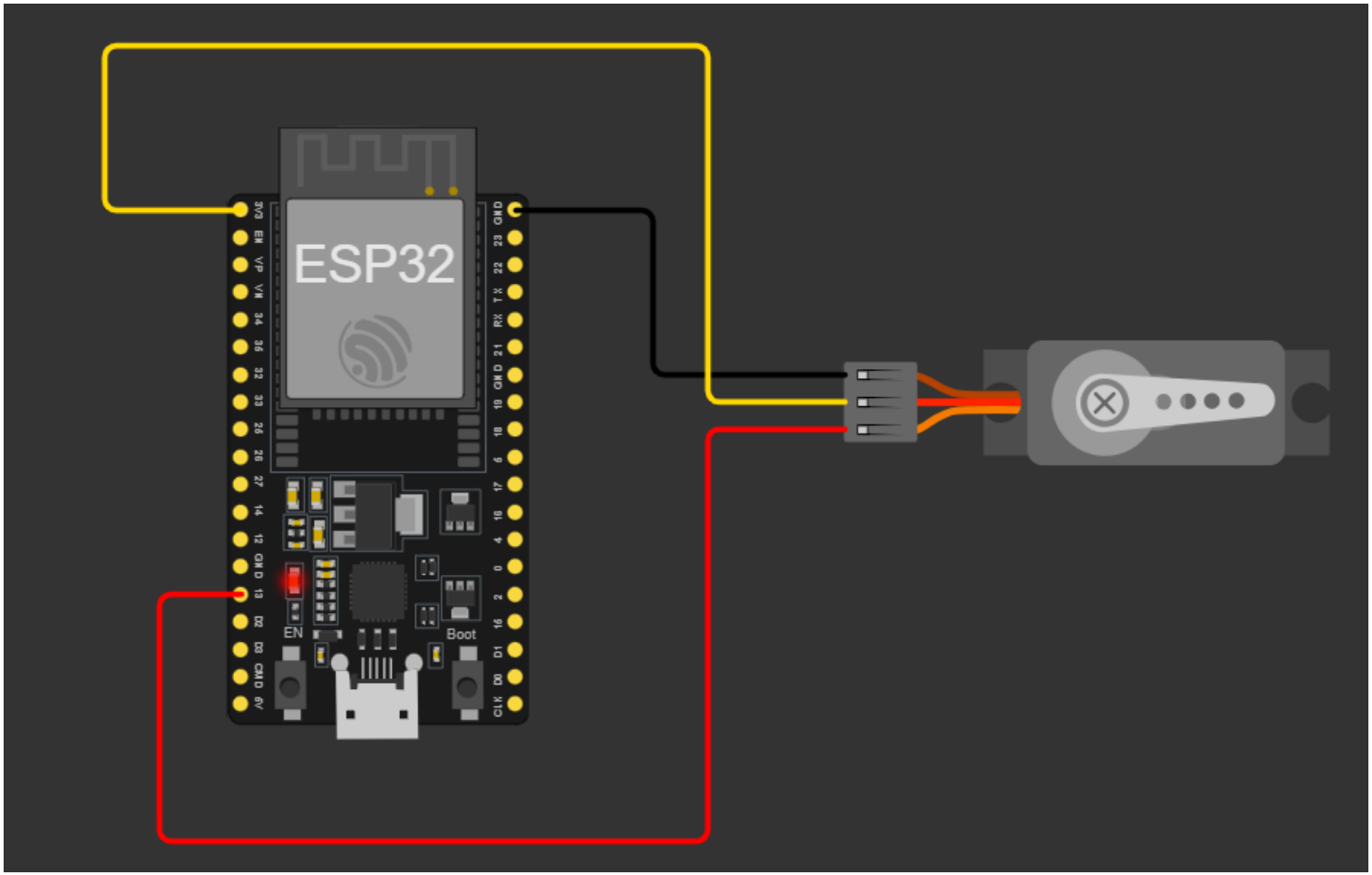
Objectives

- **To build an IoT-integrated efficient and smart system.**
- **To provide remote accessibility and control.**
- **To implement an auto-lock feature within the system.**
- **To implement an emergency lock feature.**
- **To embed data logging based on toggling.**
- **To provide real-time notification of lock status.**

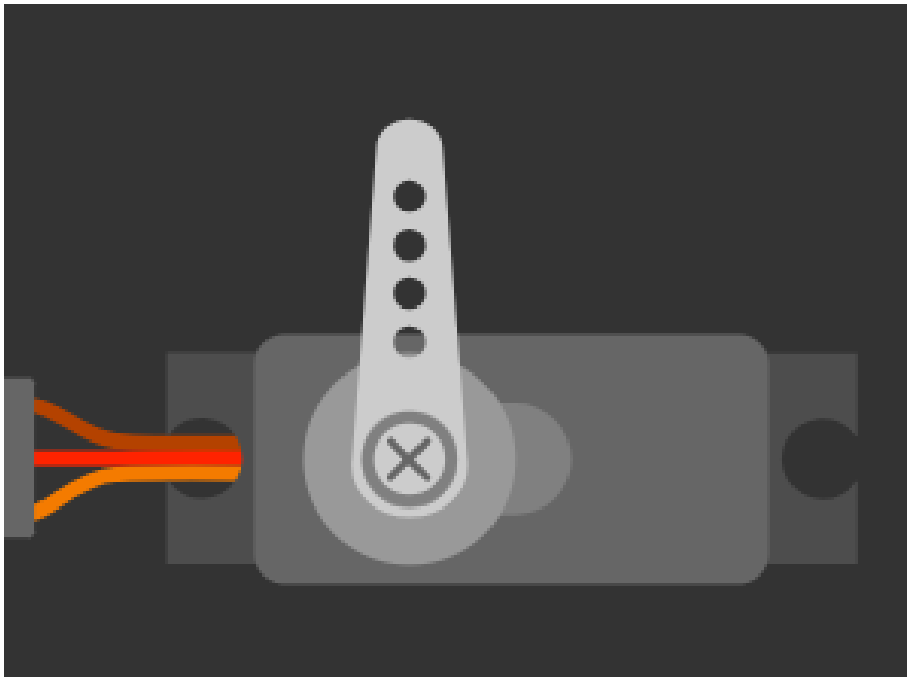
Approach

1. **Problem Identification**
   - Identified security risks of traditional locks.
   - Defined requirements: remote access, automation, and logging.
2. **System Design**
   - Used **ESP32** for IoT functionality.
   - Integrated **Servo Motor** for locking.
   - Connected **Blynk IoT** and **Google Sheets API**.
3. **Implementation**
   - Programmed ESP32 for cloud communication and automation.
   - Developed **auto-lock feature** (locks after 5 PM).
4. **Testing & Optimization**
   - Verified manual control, auto-lock, and data logging.
   - Ensured minimal response time and secure operation.

Circuit Diagram



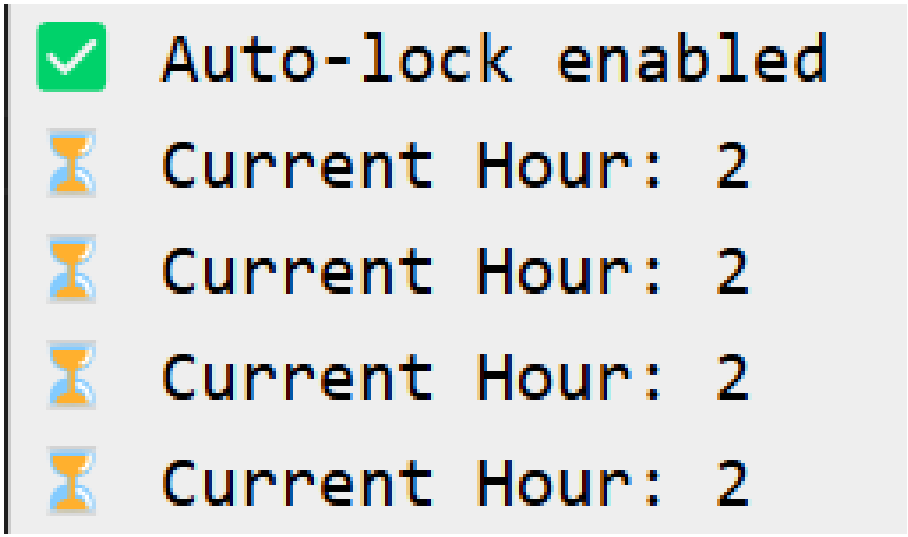
Results



Servo Motor Unlocked

Data Logging Visualization

Results



Auto-Lock Feature in Action

Timestamp	Lock Status	Lock Type	Source
2025-03-28 2:57:50	Locked	Startup	System Boot
2025-03-28 2:58:01	Locked	Manual	Blynk App Button
2025-03-28 2:59:13	Locked	Startup	System Boot
2025-03-28 2:59:25	Locked	Manual	Blynk App Button
2025-03-28 2:59:37	Unlocked	Manual	Blynk App Button
2025-03-28 2:59:48	Locked	Emergency Lock	Emergency Button

Logging Details into Google Sheet