**Smart Guest Attendance System with Time-based LED Control**

**Project Overview**

The Smart Guest Attendance System is designed to monitor and record the attendance of guests in a designated area. This system utilizes an ESP32 microcontroller for processing, an ultrasonic sensor for distance measurement, a DS1307 RTC for accurate timekeeping, a photoresistor (LDR) to detect ambient light levels, and an LED for visual feedback. The system can be used in various applications, such as event management, conferences, or any scenario where attendance tracking is required.

**Components Required**

1. **ESP32 Microcontroller**: Acts as the main processing unit, handling sensor data and controlling the LED.
2. **Ultrasonic Sensor (HC-SR04)**: Measures the distance to detect the presence of a guest.
3. **DS1307 RTC Module**: Keeps track of the current date and time, allowing for time-stamped attendance records.
4. **Photoresistor (LDR)**: Measures ambient light levels to control the LED based on the surrounding light conditions.
5. **LED**: Provides visual feedback to indicate whether a guest is detected and whether the system is active.
6. **Breadboard and Jumper Wires**: For making the necessary connections between components.

**Working Principle**

1. **Initialization**: The system begins by initializing the ESP32, the ultrasonic sensor, the DS1307 RTC, and the photoresistor. The ESP32 sets up the necessary communication protocols (I2C for the RTC and GPIO for the ultrasonic sensor and LED).
2. **Distance Measurement**: The ultrasonic sensor emits sound waves and measures the time it takes for the echo to return. This data is used to calculate the distance to the nearest object (in this case, a guest). If the distance is below a certain threshold (indicating that a guest is present), the system will proceed to the next steps.
3. **Timekeeping**: The DS1307 RTC continuously keeps track of the current date and time. When a guest is detected, the system retrieves the current time from the RTC to timestamp the attendance record.
4. **Light Level Detection**: The photoresistor measures the ambient light levels in the environment. This information is used to determine whether the LED should be turned on or off. For example, if the ambient light is low (indicating it is dark), the LED can be turned on to provide visibility.
5. **Attendance Logging**: When a guest is detected, the system logs the attendance along with the current date and time. This data can be stored in a local database, sent to a cloud service, or displayed on a connected screen, depending on the implementation.
6. **LED Control**: The LED provides visual feedback to indicate the status of the system. For instance, it can blink when a guest is detected or remain lit when the system is active. The LED's behavior can be adjusted based on the ambient light levels detected by the photoresistor.
7. **Continuous Monitoring**: The system continuously monitors for the presence of guests, updating the attendance records and LED status in real-time. This allows for efficient tracking of attendance without manual intervention.

**Conclusion**

The Smart Guest Attendance System with Time-based LED Control is a versatile and efficient solution for monitoring guest attendance. By integrating various sensors and components, the system provides accurate attendance logging, real-time feedback, and adaptability to different lighting conditions. This project can be further enhanced by adding features such as remote monitoring, data analytics, or integration with a mobile application for better user experience and management.

**PROJECT LINK: https://wokwi.com/projects/417800600758961153**