

Sri Lanka Institute of Information Technology



IT1040 - Fundamentals of Computing
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Smart Bed Room

Proposal Document

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01. BACKGROUND



Since the earliest times, humans have constantly found new ways to make everyday tasks easier and more efficient. What began with a simple cartwheel has evolved into the modern era of smart machines and intelligent systems. By 2025, technology will have reached a peak, revolutionizing not only industries but also how we live, especially in our homes.

One of the most exciting developments in this journey is home automation. First introduced in 1771 by British inventor Richard Arkwright, who created the spinning machine, automation has come a long way. Today, it powers everything from factory robots to intelligent homes. In our project, we are focusing on one specific and essential part of the home: The bedroom. A smart bedroom aims to improve comfort, convenience, and energy efficiency by using automation technologies.

A smart bedroom can automatically adjust:

- Lighting based on time or activity (e.g., dimming lights at bedtime),
- Temperature for optimal sleep comfort,
- Curtains that open and close according to sunlight,

Three main components power these smart functions:

- **Sensors** – to detect movement, light levels, temperature, etc.
- **Actuators** – to carry out actions like turning on a fan or opening the curtains.
- **Central Controller** – the "brain" of the system that processes sensor data and sends instructions.

The smart bedroom follows a simple but powerful pattern: input (sensors) → process (controller) → output (actuators). This allows the system to react intelligently to your needs, creating a personalized and comfortable environment.

Through this project, we are going to design and implement a smart bedroom setup that demonstrates the future of home living—automated, intelligent, and user-friendly.

02. PROBLEM AND MOTIVATION

Problems

- ☐ Electricity bills are rising because of energy waste.
- ☐ Feeling a lack of comfort and convenience in the bedroom.
- ☐ Having a low-efficiency environment.

When a room is not smart, fans and lights often remain on even when no one is inside. This leads to increased electricity bills. By automatically turning off lights or adjusting other devices when a room is empty, the system can contribute significant energy savings.

It is very uncomfortable when we manually adjust fan speed, turning off lights at nighttime and close curtains. So, we can automate this system, and it can make our lives easier.

An automated curtain system allows the curtains to open or close automatically based on sunlight or room temperature.

Motivations

- └ More comfort for users.
- └ Reduces energy wastage.
- └ Automatically turning ON/OFF will reduce electricity consumption.



03. AIM AND OBJECTIVES

Aim

- The light and fan turn on whenever someone enters the room
- || Automatically controls the speed of the fan
- || Open or close the curtain based on the time of day

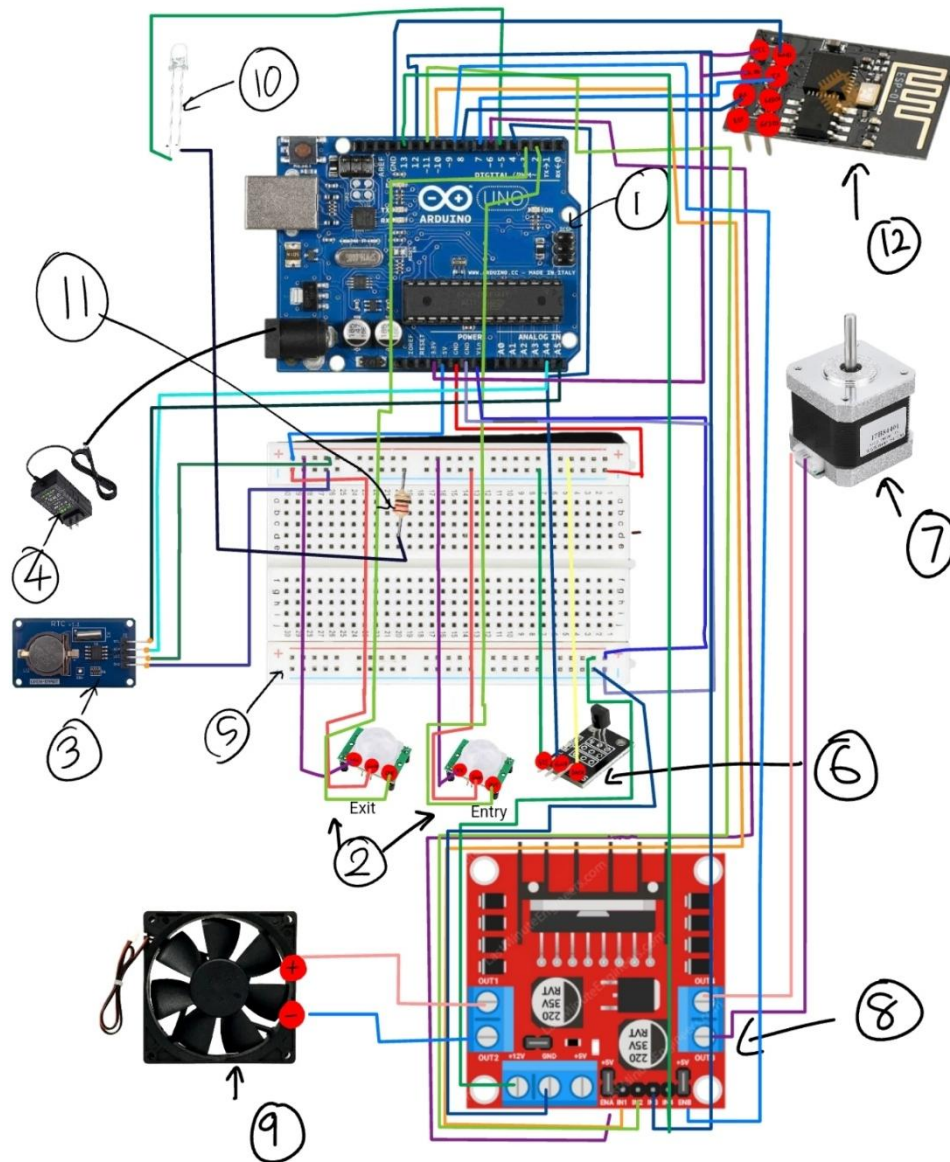


Objectives

- || The motion sensor fixed to the door recognize any movement a er enter the room and the system would automatically turn on the light bulb.
- || The temperature sensor monitor the surrounding environment and helps with an Arduino. It adjusts speed based or room temperature.
- || Automatic curtain system use a motor to open and close curtain help with the input that we put to the Arduino.(And, they can be controlled through smartphone apps)



04. SYSTEM DIAGRAM



- | | |
|--------------------------------|-----------------------------|
| 1. Arduino Uno | 7. Stepper Motor |
| 2. PIR Motion Sensor | 8. L298N Motor Driver |
| 3. RTC module (DS3231) | 9. DC Fan |
| 4. 12V power supply | 10. LED bulb |
| 5. Breadboard | 11. 220-ohm resistor |
| 6. Temperature Sensor (DHT 11) | 12. ESP 8266 (Wi-Fi Module) |

05. METHODOLOGY

Micro-controller

- Arduino Uno – Central processing unit

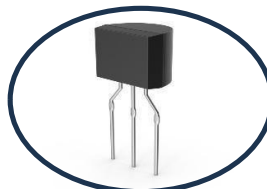


Sensors

- PIR Motion Sensor x2 – To detect motion from the outside and inside the room.
- DHT 11 Temperature Sensor – To control the fan speed based on the temperature
- RTC Module (DS3231) – To provide accurate data to the Arduino.



PIR

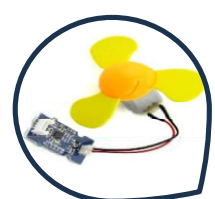


Temperature
Sensor



RTC

- Stepper motor– For curtain system
- LED Bulb – For lighting
- L298N Motor Driver – To control fan speed.
- DC Fan – Ventilation device
- Breadboard & Jumper Wires – For circuit connections
- Wall Adapter (12V DC) – Power supply
- Glue Sticks/Wire Ties – For mounting accessories



06. EVALUATION METHOD.

01. Light Bulb System

- Motion Detection : Two PIR sensors detect the direction of movement across the doorway.
- Signal Processing : The Arduino board processes the sequence of signals from both sensors to determine entry or exit.

Light Activation :

- When the person enters the light will be turned ON.
- If at least one person inside the room the light will be turn on.
- After the person leaves the room ,light automatically turns off.

02. Fan Speed Control System

- Temperature Detection : The DHT 11 sensor measures room temperature .Then sends the information to the Arduino.
- Signal Processing : The Arduino reads the temperature value and then compares it with the set limit.
- Fan Control : If the temperature is above the limit, the fan will run at high speed. If the temperature is below the limit, it slows down or turns off.
- System Response : The speed of the fan adjusts based on the current room temperature.

03. Curtain Control System

- Time Detection: The RTC module gives accurate time to the Arduino.
- Signal Processing: The Arduino will checks if it is morning (7:00 AM) or if it is evening (7:00 PM).
- Motor Control: The Arduino activates the stepper motor to open and close the curtains.

07. REFERENCES

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