**Project Requirements: Arduino-Based IR Remote Control for LED On/Off System**

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1. **Introduction:**

**1.1 Name**

- Arduino IR Remote LED Control System

**1.2 Overview**

- The project aims to develop an embedded system using Arduino that utilizes an IR remote control to turn on/off an LED, providing a simple and efficient remote-control solution.

**1.3 Purpose**

- The purpose of the system is to offer a user-friendly and cost-effective solution for remotely controlling the state of an LED through infrared signals, using the Arduino platform.

**1.4 Objectives**

- Design a compact embedded system using Arduino capable of receiving IR signals for LED control.

- Implement a reliable mechanism for LED activation and deactivation using Arduino.

- Ensure user-friendly operation with an IR remote control interfaced with Arduino.

**2. System Architecture:**

**2.1 Hardware Components**

- Arduino microcontroller with IR receiver module

- Infrared remote control

- LED

- Power supply unit

- Transistor for LED control

**2.2 Software Components**

- Arduino code for decoding IR signals

- Arduino code for LED control algorithm

- User interface for LED status indication using Arduino

**3. Functional Requirements:**

**3.1 IR Signal Reception**

- The Arduino system must accurately receive and decode IR signals from the remote control.

- Support for multiple remote control commands using Arduino.

**3.2 LED Control**

- Toggle the LED state (on/off) based on the received IR command using Arduino.

- Ensure reliable and instantaneous LED response to remote control commands with Arduino.

**3.3 User Interface**

- Implement a simple LED status indicator, either on the Arduino display or through the remote control.

**4. Non-functional Requirements:**

**4.1 Reliability**

- The Arduino system should be reliable, with minimal latency between receiving IR signals and controlling the LED.

**4.2 Performance**

- Achieve real-time response for LED state changes using Arduino.

**4.3 Size and Form Factor**

- Ensure the Arduino-based embedded system is compact and suitable for integration into various applications.

**5. Testing Requirements:**

**5.1 Unit Testing**

- Test the IR signal reception and decoding using Arduino in isolation.

- Validate the LED control functionality independently using Arduino.

**5.2 Integration Testing**

- Verify the interaction between the Arduino-based IR module and LED control within the embedded system.

**5.3 System Testing**

- Conduct end-to-end testing using Arduino to ensure the entire system functions as intended.

**6. Manufacturing:**

**6.1 Assembly**

- Provide step-by-step instructions for assembling the Arduino-based IR remote control system for LED on/off.

- Include clear diagrams or images to aid in the assembly process.

**6.2 Components**

- Arduino microcontroller with IR receiver module

- Infrared remote control

- LED

- Power supply unit

- Transistor for LED control

**6.3 Testing during Manufacturing**

- Outline simple tests that can be performed during the manufacturing process to ensure each component functions correctly.

-Troubleshoot and fix any issues that may arise during assembly.

**7. Costs:**

- Arduino microcontroller: … VND

- IR receiver module … VND

- Infrared remote control … VND

- LED … VND

- Power supply unit … VND

- Transistor for LED control … VND

**8. Deliverables:**

**8.1 Source Code**

- Provide well-documented Arduino code for the embedded system.

**8.2 User Manual**

- Create a user manual explaining the system's operation and troubleshooting, with reference to Arduino.

* 1. **Test Reports**

- Document testing procedures and results related to Arduino functionality.

**9 Appendix**

**Flow chart:**