

Wireless Switchboard Control

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EE381A: EC project

April 12, 2018

1 Objective

To make a wireless control system for household electrical appliances using Arduino controlled relays in switchboards.

2 Components used

Arduino Nano (2), infrared reciever, infrared transmitter, LM358 Opamp, BC547 , jumper wires, Bread-Board, DC LED, resistors, push buttons, 9V battery.

3 Working

The Arduino Nano is a small, complete, and breadboard-friendly micro-controller board based on the ATmega328P. The Arduino Nano is programmed using the Arduino Software which allows it to connect with various sensors and board kits. The sensors and components required for the functioning are as follows:

3.1 Infrared Reciever

Infrared Reciever is a hardware that interprets the incoming infrared signal into an electrical signal which can be amplified and used for further processing.

3.2 Infrared Barrier Module

Ideally the module is used to detect barriers but here it is used as an IR transmitter due to the advantageous high efficiency transmitter integrated in it.

3.3 Inverting Amplifier

Opamp based inverting amplifier is used to amplify the electrical signal generated by the infrared receiver for the arduino for interception.

3.4 BC547

NPN BJT used as switches to simulate relays to control electrical appliances(LEDs in our case).

In Summary, Infrared Barrier Module is used to transmit the signal corresponding to various LEDs (proxies for electrical appliances). The Ardunio Nano hardware is programmed tp generate pulses of different length corresponding to different Push Buttons. To be precise, it generates a pulse of length 1,2 and 3 corresponding to the three Push Buttons. The IR Receiver picks up the signal coming from the transmitter and it is amplified using the Opamp. The resulting signal is fed to an analog input of the Ardunio at the receiver and depending on the pulse length, it is interpreted to be a control for one of the three LEDs.

Thus, based on the length of the incoming Pulse, we are able to generate a control of different electrical appliances.

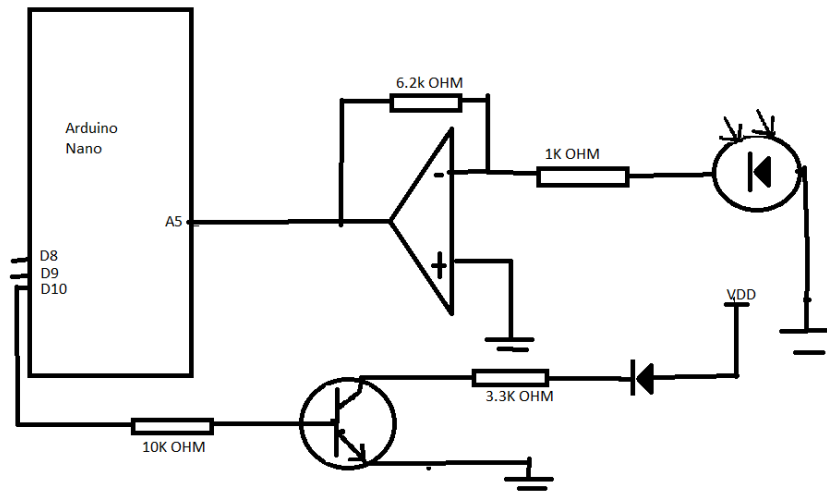


Figure 1: Simplified Representation of Receiver Circuit

4 Cost estimate

Arduino Nano (2) = INR 800
 Infrared Barrier Module = INR 200
 Infrared Receiver = INR 50
 Misc - INR 150
 Total: INR 1,200

5 Future Works

A primary improvement would be development of stable version of the mobile application to interface the control using Bluetooth. One can look forward for inclusion of other sensors, for instance, PIR sensor to control automatic light at the gate.

6 References

<https://electronics.stackexchange.com>
<https://www.arduino.cc/>

7 Appendix

[GITHUB Link for Codes](#)

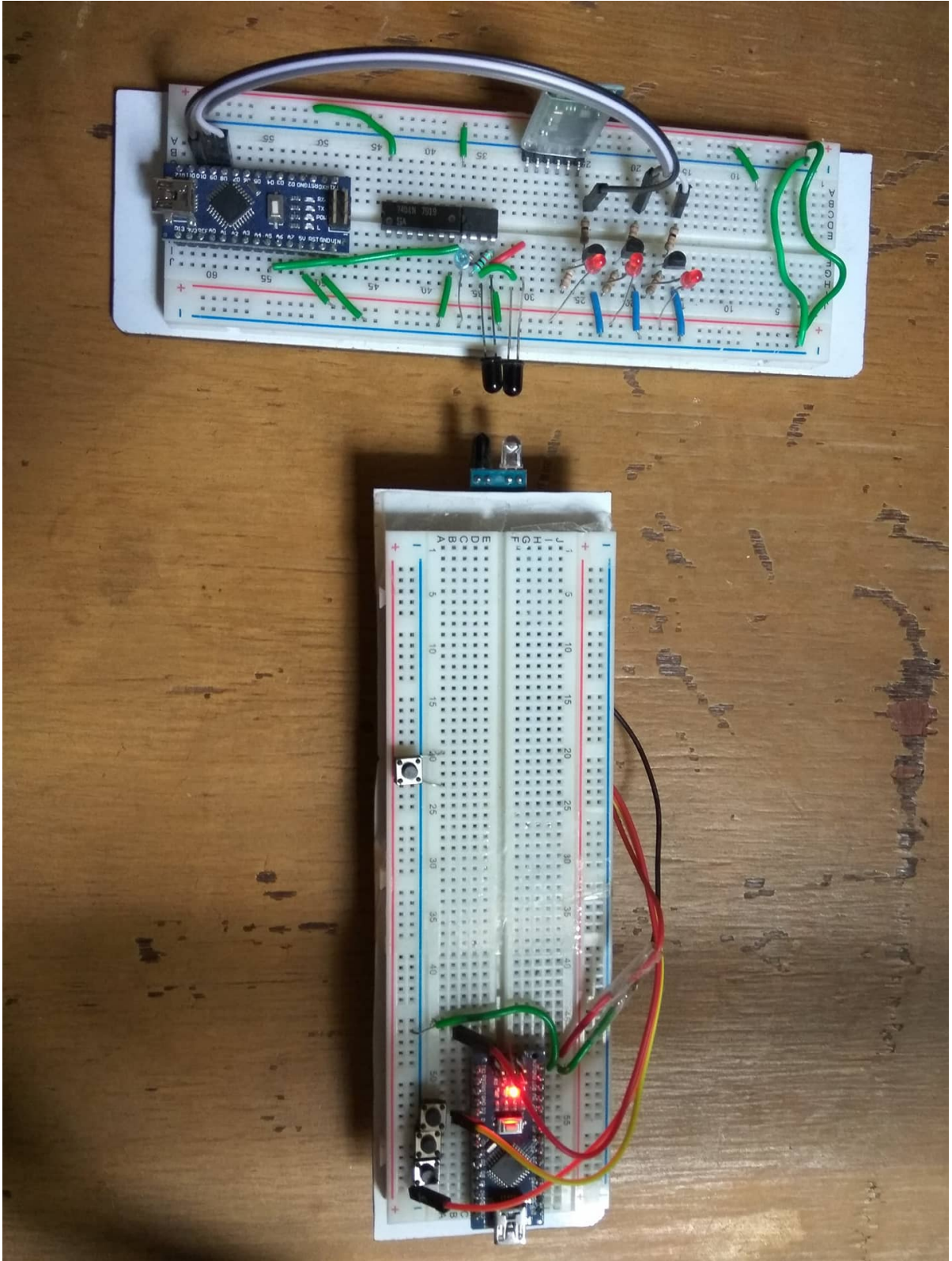


Figure 2: Image of Complete Circuit