

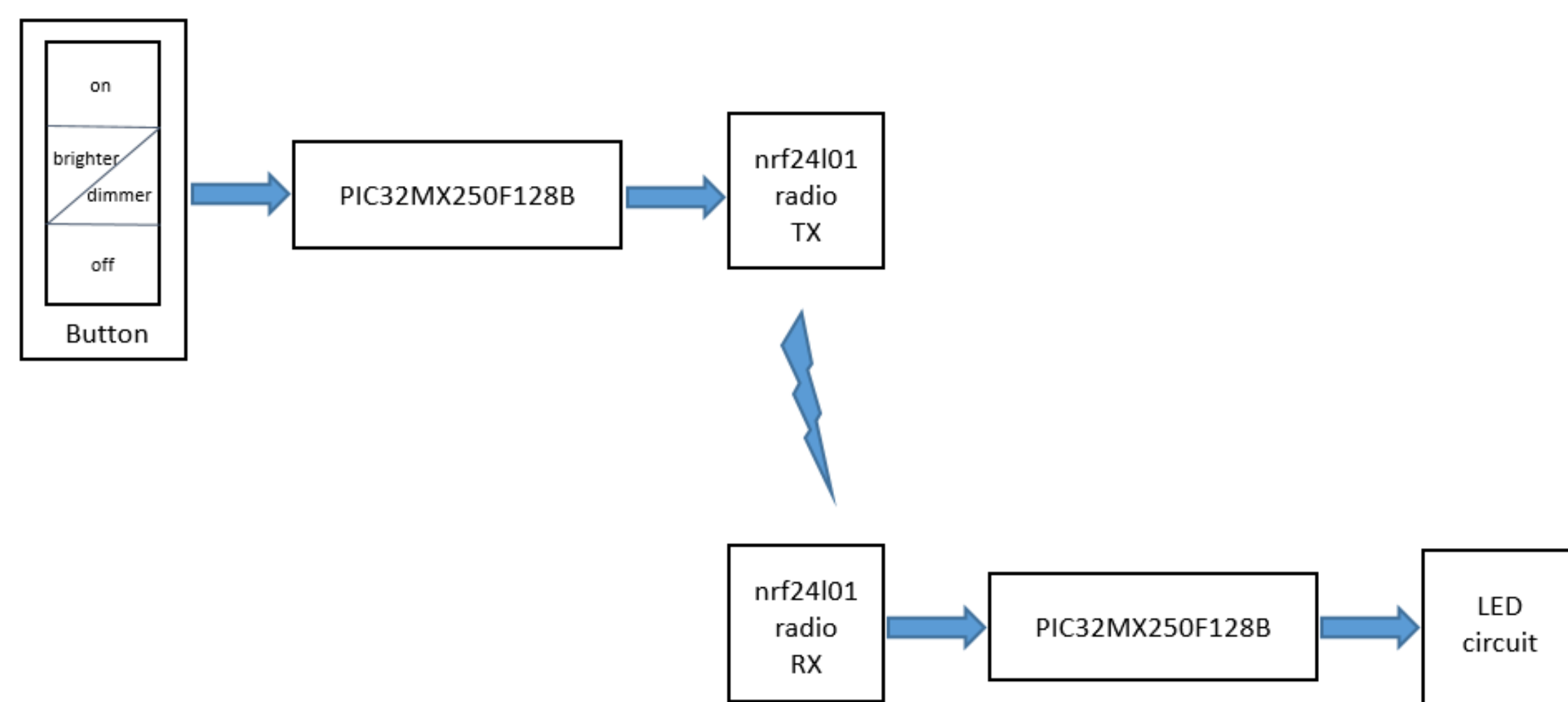
Remote-control LED Dimmer using NRF24L01 Radio and PIC32 Microcontroller

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Handy Remote Control

The goal of this project is to develop a handy remote-control dimmer for a 5W led. The dimmer has four control buttons: on, off, up and down which can turn on, turn off the led and make the led brighter or dimmer as well.

Nowadays, remote control is everywhere since it is handy and convenient. Image that you come back home from work, you can easily turn on the lights in the house even before you enter it with a remote control device. In the future, more and more electric device could be handled remotely by remote controller or cellphone.



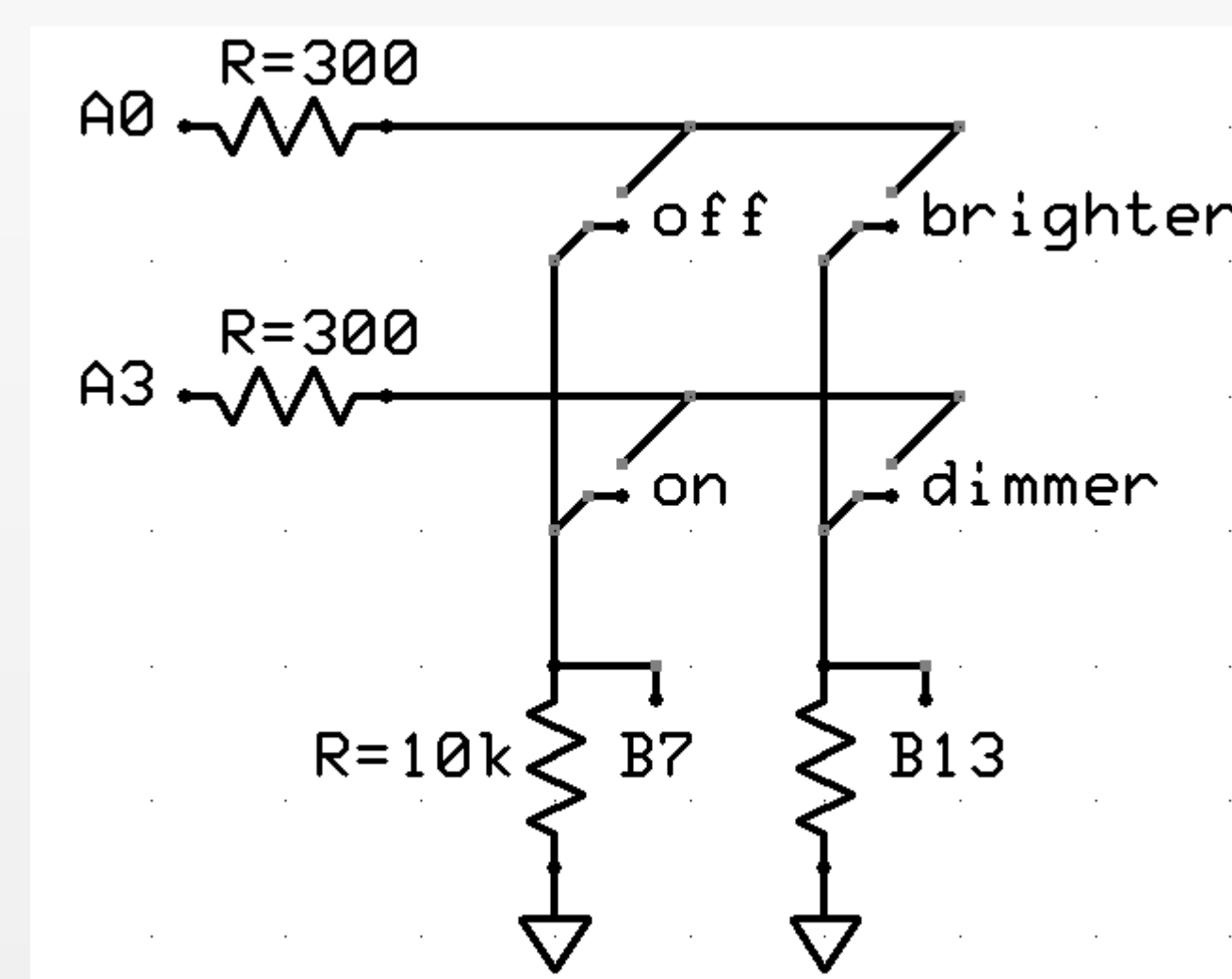
After the button is pressed, it sends data to PIC32. NRF Radio transmitter sends data to receiver. Receiver gets data and send it to another PIC32. The microcontroller output voltage signal with different duty cycle to led to get different level of light.

The microcontroller used in this project is PIC32MX250F128B from Microchip. It is a 32-bit RISC CPU with 32KB RAM and 128KB program memory size.

Circuit Elements

• Button Detection

Connect buttons to I/O pins of PIC32 then scan each line to decide whether a certain button is pressed.

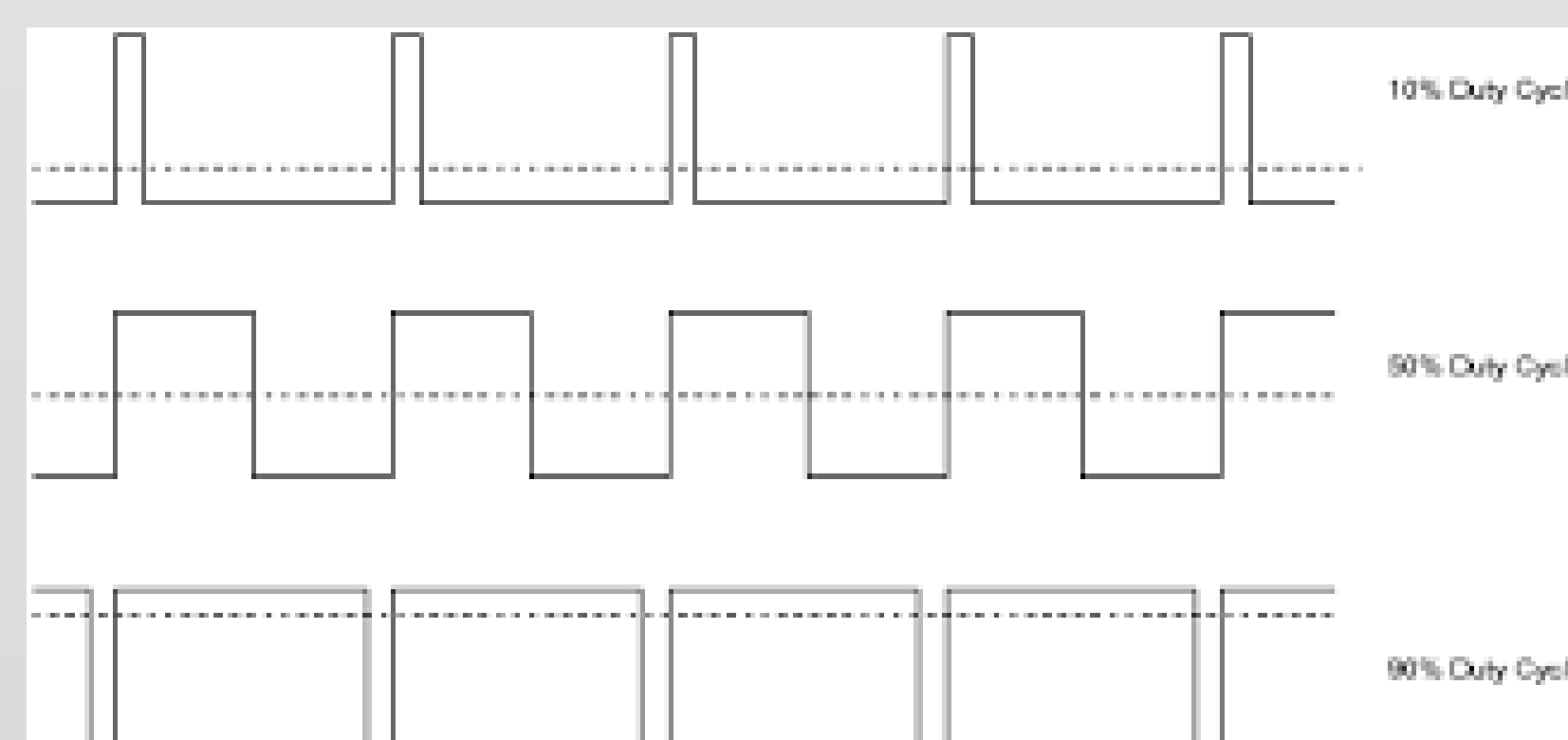


• Remote Communication

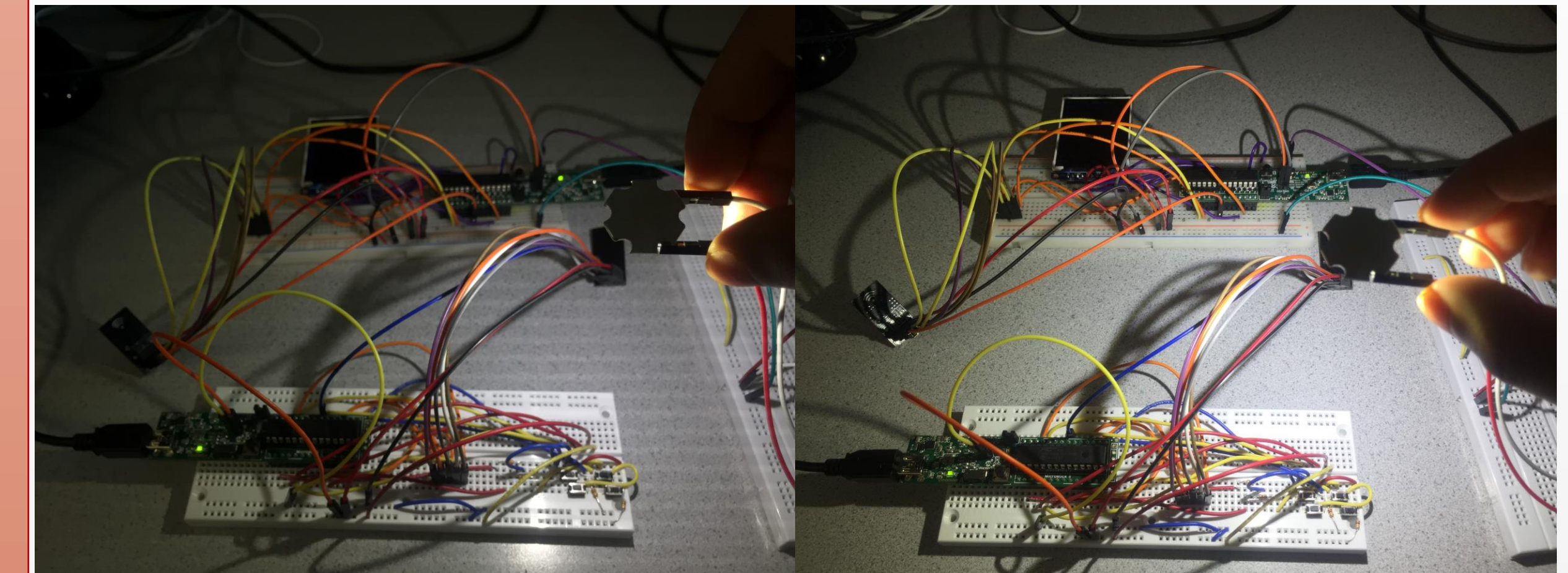
The remote communication in this project is realized by NRF24L01 radio. It has worldwide 2.4GHz ISM band operation with 126 channels, 6 pipes that data can be received on. NRF24L01 library is a handy library to implement remote communication in PIC32 projects. It is developed by Douglas Katz and Fred Kummer.

• Pulse Width Modulation

Depending on different input signal, we set different pulse width to control the light level of the led.

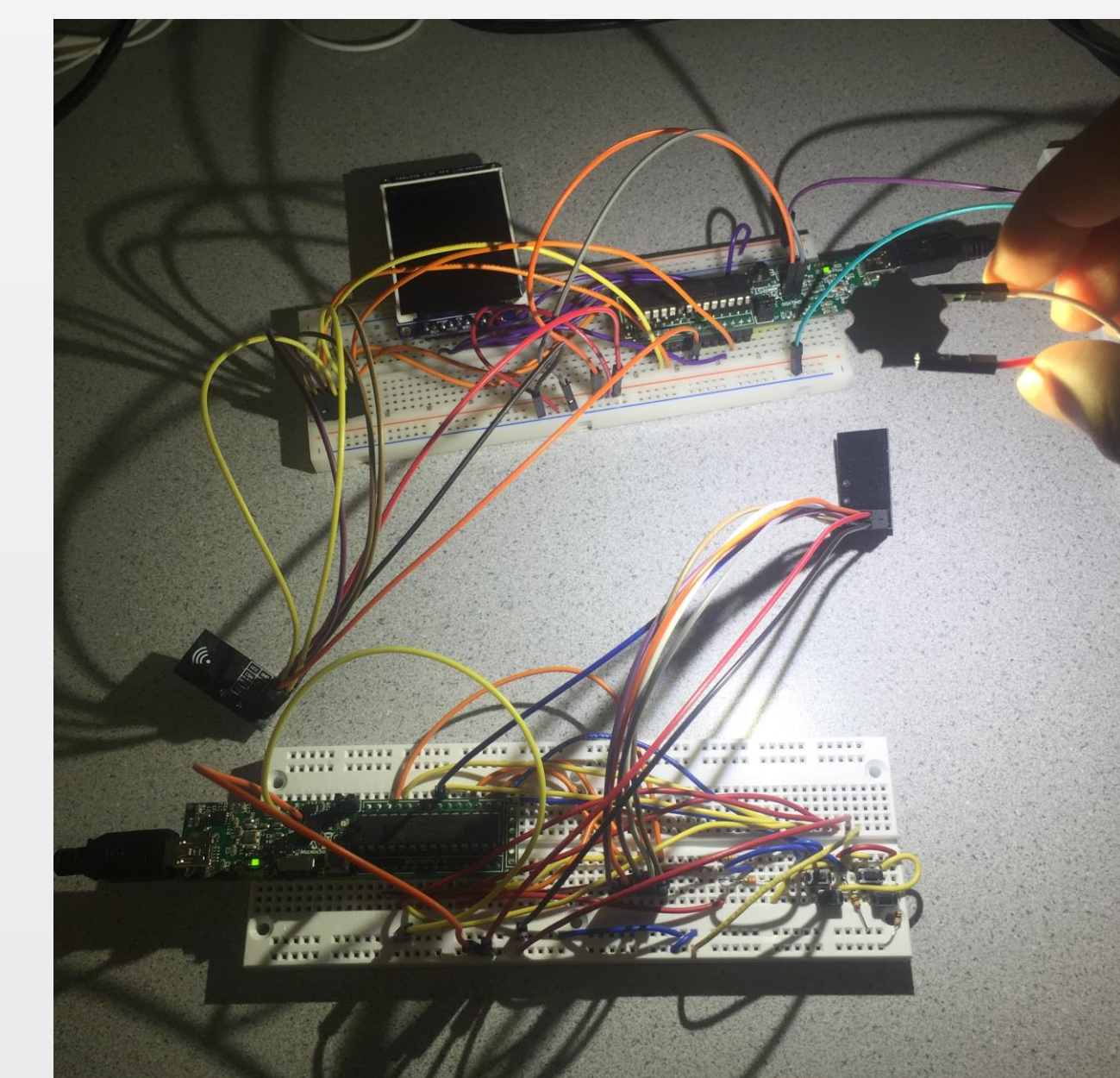


Circuit Build



dark

medium

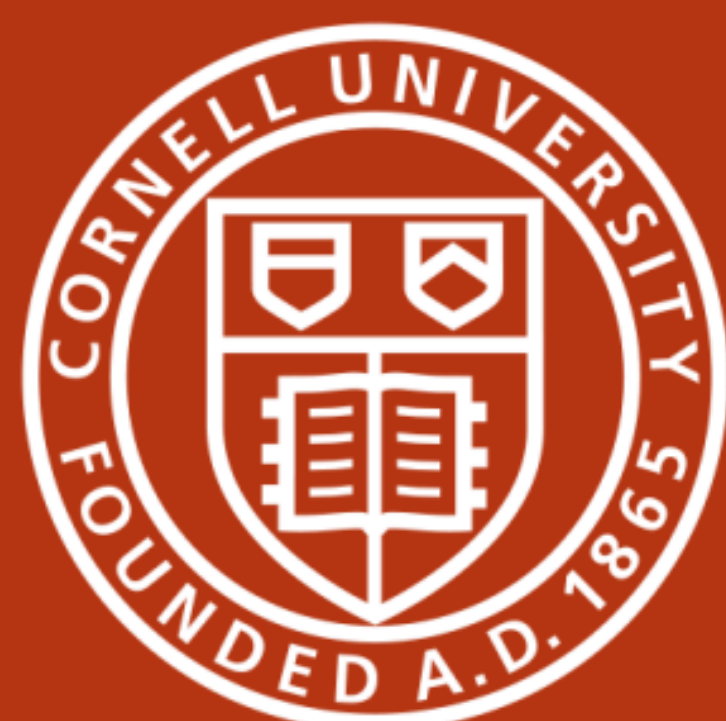


bright

REFERENCE & ACKNOWLEDGEMENT

I would like to express my deepest appreciation to Dr. Bruce Land and Fred Kummer for their precious supports and guidance. Also, I want to thanks ECE department of Cornell University for the best lab environment.

- Douglas Katz, Fred Kummer, *nrf24l01 Library for PIC32MX250F128B, Cornell University*
- *ECE 4760 website*



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Poster Abstract

The poster contains five parts. The first part 'Handy Remote Control' introduces the object of the project, background of remote control and some brief overview of the components in the project. The second part 'Circuit Elements' shows details about three modules in the project: button detection, remote communication and pulse width modulation. Each of them contains of brief introduction or diagram. Next part is 'Circuit Build'. This part shows the picture of the whole design and three examples of led light control. The last part is 'Reference & Acknowledgement'. It expresses my thanks to my M.Eng advisor and Fred Kummer who inspire me solve small bugs while I am doing the project. It also includes references which guide me complete my M.Eng project.