EE333 Introduction to Microcontrollers

Lab#7 IR Wireless Communication

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**Lab Overview**

In this lab, students will learn how to use microcontroller to communicate wirelessly. In the first part of the lab, students will use a microcontroller to decode IR remote control signals using the IR communications library written by Ken Shirriff. In the second part of the lab, students will have one microcontroller transmit IR signals to a second microcontroller. The second microcontroller will receive the IR signal and parse the bits to decode the remote control code.

**Required Materials**

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| --- | --- |
| Breadboard | IR Receiver - TSOP38238 |
| Arduino UNO (or Spark Fun RedBoard equivalent) | Build Your Own Arduino Kit |
| ATmega328P Microcontroller Datasheet | Oscilloscope |
| 100 Ohm Resistor | Arduino ISE Software |
| IR LED (950nm) | Standard Remote Control |
|  |  |

**Required Work**

The areas of **bold** text below are items required in your Lab Report.

Install Ken Shirriff’s IR library according to the instructions on the following webpage: <http://www.righto.com/2009/08/multi-protocol-infrared-remote-library.html>

Part 1: IR Communication with a Remote Control

Connect your microcontroller to the IR Receiver according to the datasheet.

Load the IRrecvDumpV2 sketch from the Arduino Examples.

Select an IR Remote from your home and press a button while the Remote is aimed at the IR Receiver.

Connect an oscilloscope to the output pin on the IR Receiver. Observe the output waveform that is generated when you press a key on the Remote.

**Explain the IRrecvDumpV2 sketch** **in detail. You may need to look-up some of the C syntax on the Internet.**

**Include a screenshot of the oscilloscope waveform and the Serial Monitor Output in your Lab Report.**

**Decode all of the bits in the waveform and confirm they match the output from the sketch. Show this in your Lab Report.**

Part 2: IR Communication between Two Microcontrollers

Leave the microcontroller with the IRrecvDumpV2 connected to the IR Receiver.

Connected a second microcontroller (use your Atmega328P from the kit or another Arduino) and connect the IR LED through a 100 Ohm resistor. Load the sketch called IRsendDemo.

Align the IR LED and the IR Receiver. The microcontrollers should not be electrically connected to each other.

Observe the output from the first microcontroller. You should see the second microcontroller sending an IR code periodically.

**Include a copy the Serial Monitor in your Lab Report.**

**Explain the IRsendDemo sketch** **in detail. You may need to look-up some of the C syntax on the Internet.**

**Include a screenshot of the oscilloscope waveform and the Serial Monitor Output in your Lab Report.**

**Decode all of the bits in the waveform and confirm they match the output from the sketch. Show this in your Lab Report.**

**Include a picture of the two microcontrollers and the IR LED and Receiver in your Lab Report.**