

Up Button:



Left Button:



Down Button:



Right Button:



Vol +:



Vol -:



Ch +:



Ch -:



Number 1:



Number 2:



Number 3:



Number 4:



Number 5:



Number 6:



Number 7:



Number 8:



Number 9:



Number 0:



Lab 1 Report

In this lab, we were tasked with interfacing the Tiva Launchpad to receive and analyze signals that came from an infrared remote control. We would connect an infrared receiver to the Tiva Launchpad to help in analyzing the incoming signals. The program would use either polling or interrupts upon detecting the signals. After detecting the signal and analyzing it, the program will analyze and decode the incoming signal and output the symbol corresponding to the character that was pressed.

In the beginning of the lab, I was given a TV remote controller code to configure my remote control to. Then, I connected the infrared receiver in order to record the infrared transmissions that were emitted from the controller upon pressing a button. Every time a button is pressed on the remote controller, it sends out a different signal. The signals are sent through a transmitter that emits pulses of on and off at particular frequencies (which are unique depending on the set up or protocol of the remote). The receiver is in charge of obtaining those signals and demodulating and reading the signal between certain frequencies in order to understand the order sent from the control. Using that, I used the infrared receiver to capture and characterize the transmissions. In my remote control, each button emits a 32 bit signal to the receiver that is different. However, the signal is only different in the last 16 bits. The 32 bit signal is separated into two 16 bit data. The first 16 bits correspond to the address, which tells the receiver what device that is compatible with. This makes each transmission unique to a brand or device and can only be analyzed by its protocol. The data field specifies which button was pressed. Using the different time differences between falling edges, one could tell the difference between 0 and 1.

The hardest part of this lab for me was programming the Launchpad because it is still essentially my first few times using Launchpad. I measured the time differences between falling edges to determine whether the input was a 0 or 1 and then repeated that idea until the end of the 32 bits. I was given a choice on how to store the data that I received in the form of either an integer value or an array of integers. I chose just the single integer value, which I would shift whenever I detected another 0 or 1 until I finish the first 32 bits. I chose this over an integer array because in an integer array, I would have to continuously update the location where it would be stored, which means more possibility for error. Then, I programmed the logic to analyze the data. The hardest part for me was understanding the libraries and their respective functions because this is one of my first times using it and I'm not very familiar on how it works. For example, I wasn't sure how interrupts were detected at all until I was explained a few times by fellow classmates and teaching assistants how the Tiva reads it. Also, I had to learn and understand what is happening with differing GPIO commands because I've never used them before. Another thing I could have changed was how my interrupt handler worked. I put most of my work into the interrupt handler when I shouldn't have. I put the analysis of the data within the interrupt. This causes the interrupt to do more work than it should which can lead it to miss certain cues in a signal. One fix was to just implement a separate function that would be called after the interrupt was dealt with in the handler. Luckily, I didn't encounter that problem, but I will definitely make sure I account for that in the future and keep my interrupt handler small. Overall, for me, this lab was a good introduction to the Tiva board and the differing libraries that are used to control it.