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ECE 315
3/29/17

Lab 1: Digital and Analog Inputs

Lab Goals
The goals of this lab are to become familiar with the Keil uVision environment, to learn how to configuring GPIO pins as digital, analog, and alternate function, to parse analog input pin data, to learn how to initialize UART peripherals, to use SysTick Timer, and to learn how to write interrupt service routines.

Steps taken to accomplish goals
We initially worked together to understand the problem as a whole. Once we understood the problem, we broke up the tasks. Shyamal took care of the setup and configuration of the GPIO pins and UART. Sneha and James worked together to define the SysTick Timer and the interrupt service routine. The distance sensors were configured starting with the analog signal (middle sensor). This was accomplished by reading the ADC value. Next we worked on the left facing sensor, where we had to read each ascii value one at a time. Lastly, we worked on the right facing sensor, which required us to translate the pulse width into a distance. The work was shown using an oscilloscope, with the frequency vs time graphs

Problems Faced
We had difficulties translating the pulse width into a distance for the right facing sensor because we could not figure out how to read the GPIO pin values. After some trial and error, we discovered we initialized the GPIO incorrectly. It also took us some time to develop the logic for translating the width into a distance given the correct pulse width.

Another issue we faced was timing. We only have one interrupt, so we had to keep track of how many times the 50us interrupt happened in order to generate 10ms and 1s timings. We used looping counters to accomplish this.

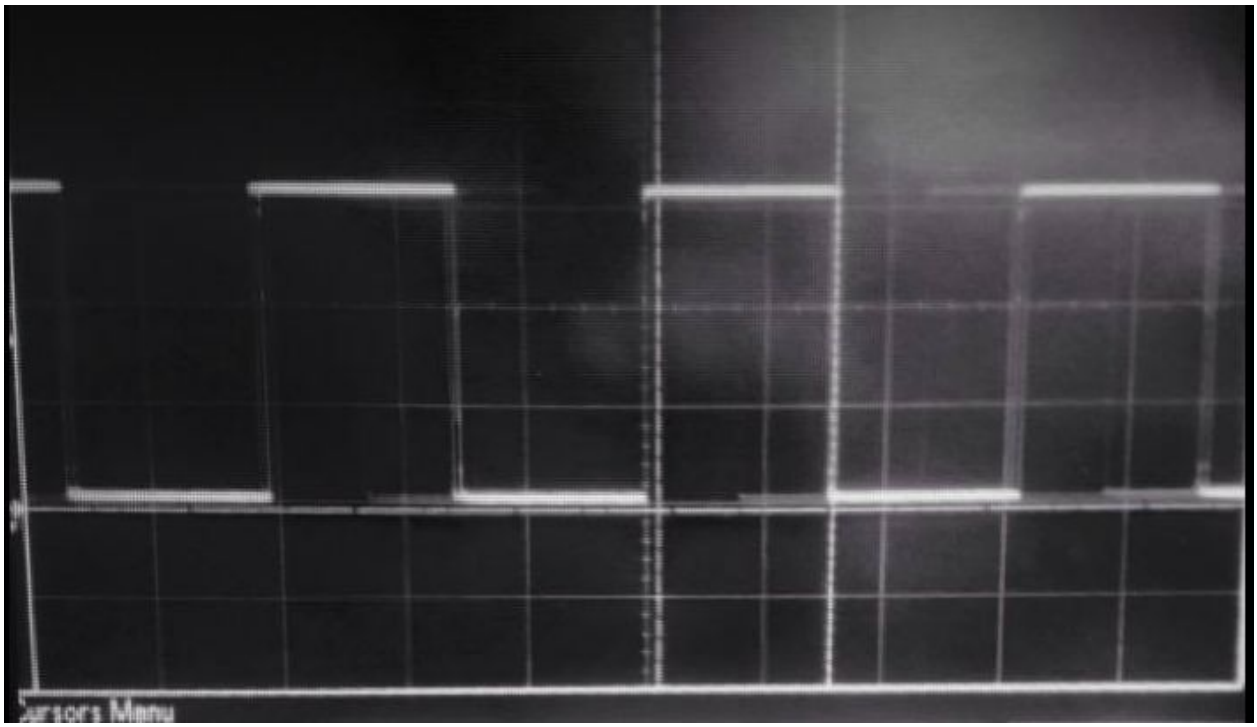
One problem we were not able to fix was that our left facing sensor required us to enable blocking to poll for a valid signal. Since blocking was enabled, it halted instruction which altered our timing.

Ready Reference

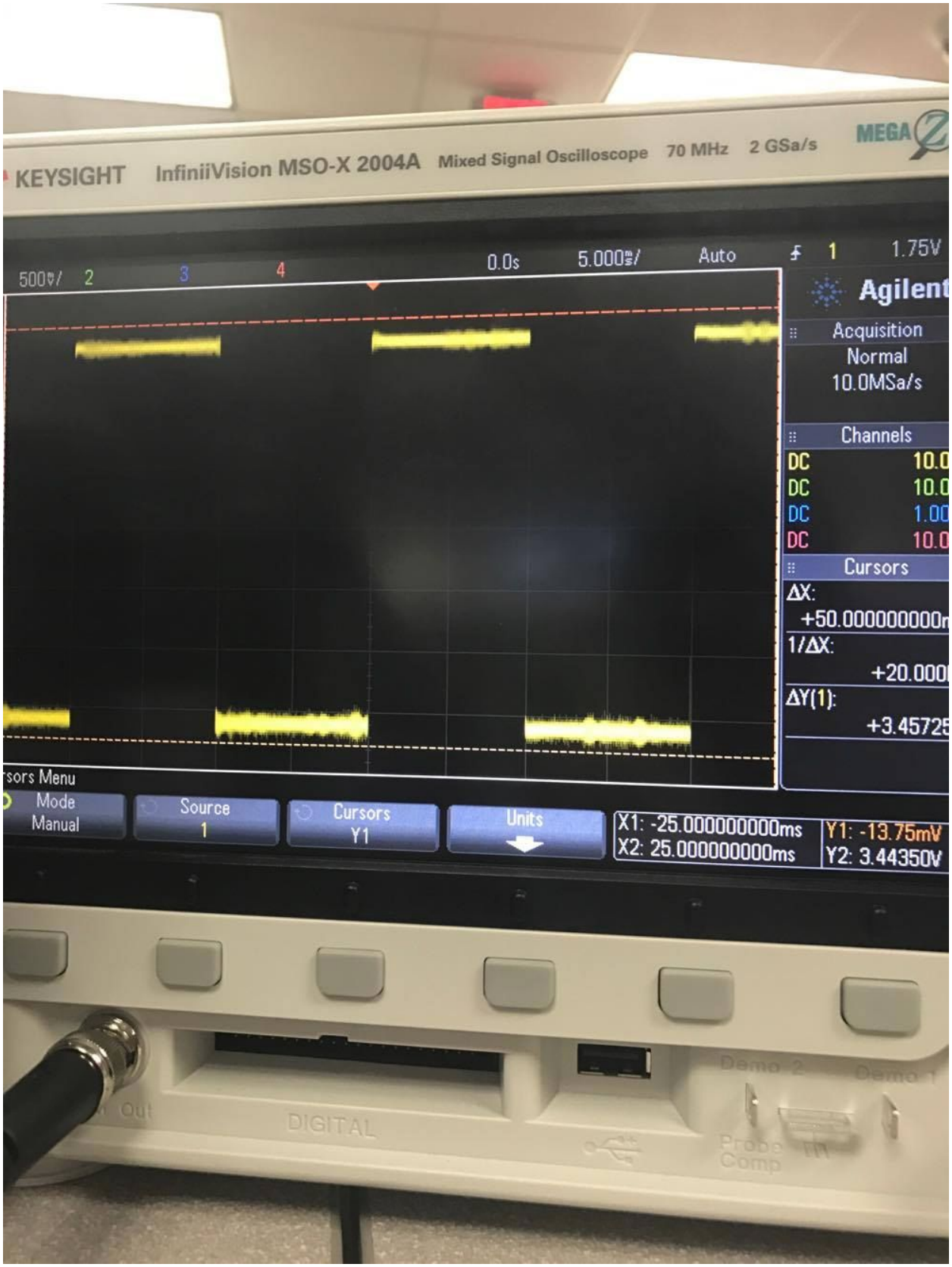
Right Sensor: This sensor measure the GPIO pin every 50us. It counts the number of consecutive 1s to measure the pulse-width. This count is multiplied by 50/147 to get the total number of inches.

Middle Sensor: This sensor was measured every 10ms. We kept track of every 50us interrupt and waited until this count reached 200, thus generating the 10ms timer.

Left Sensor: The data for this sensor is only valid if the first ascii character sent is ‘R’, so we poll for this. Then the following three characters are the valid distance.


Cursors Menu

SysTick Oscilloscope Measurement



Analog Oscilloscope Measurement