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CSC615

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HW2 – Tapeless Ruler

This lab uses wiringPi library and an echo sensor to implement a ruler.

Implementation

In order to measure the distance "wirelessly," we can use SONAR. Such device like the sensor used in this lab sends a sound wave forward towards an object. This high frequency sound wave reflects from an object and back towards the sensor. Once the sensor detects that sound, it sends a signal to the ECHO pin. The ECHO pin will move to HIGH for the duration of the pulse, then back to LOW.

By counting the start and end of the ECHO, we can use $distance = speed * time$ to calculate the distance of an object. Of course, since the distance from the formula takes into account the echo's journey to and from the object, it is required to divide the distance by two to get a somewhat accurate measurement.

A quick pulse was sent to the trigger pin which sends out a short-duration sound wave. In order to measure time, I used $gettimeofday()$ which provides a $c\ structure$ that stores microseconds, among other time-related data. I measure the time component by subtracting the end and start time of the ECHO pulse duration.

Difficulties

The circuit was initially difficult to understand and put together. Figuring out how to measure time accurately was also hard. I started by using $clock()$ but soon realized that it returned the number of CPU ticks elapsed, not the time. $clock()$ also had a way to convert the ticks to seconds but it was not precise enough. So, I used $struct\ timeval$ instead.