CS/EE 120B Custom Laboratory Project Report

Ultrasonic Distance Scanner with Remote

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Contents

I) Introduction

The Ultrasonic Distance Scanner with Remote serves the main purpose of providing reliable distance measurements for distances between the device's ultrasonic sensor, and objects within its effective scanning range.

The ultrasonic sensor is attached to a servo motor that has a sweeping angle range of 180 degrees. The direction in which the ultrasonic sensor is pointing can be both controlled by the user, and the microcontroller. The user has the ability to override the microcontroller at any moment, and take control of the servo's heading. The heading can be changed by simply utilizing the joystick to specify the desired direction of the servo motor.

Note: If the user stops providing input from the joystick, the microcontroller will reassume control of the servo

The recorded distance (measured in centimeters) will be displayed onto a 128 *128 resolution display. Alongside, the current heading (angle) of the servo motor will also be displayed back to the user.

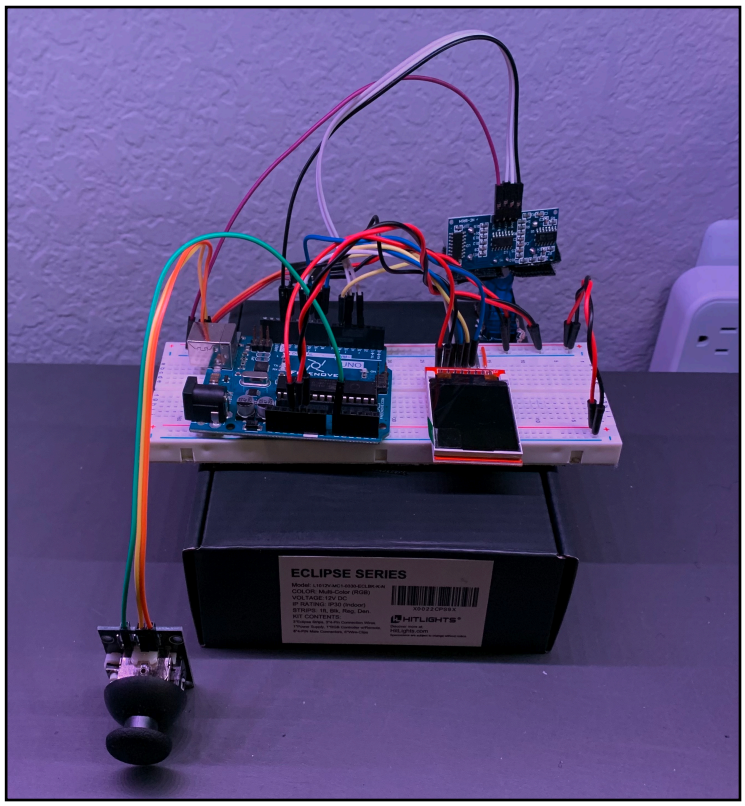
Unresolved behaviors:

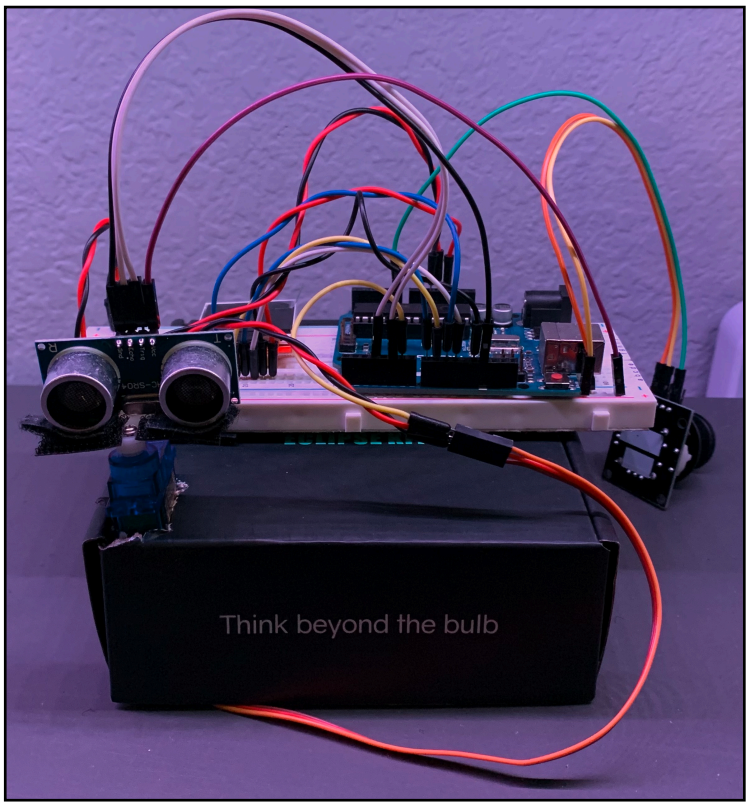
Although the complexities of the custom lab, which will later be mentioned in detail, are adequately operating. There are two main aspects of the project that should be improved for providing a better experience.

The first issue comes from the LCD display. When refreshing the screen to update new information, there is a significant flickering effect, which could prove detrimental for the user experience.

The second issue is attributed towards the jitter motion of the servo motor as it approaches its edge positions. Those being the 0 degree and 180 degree heading. The issue seems to be caused by the tension of the ultrasonic sensor's wires applying resistance against the movement of the servo motor.

Pictures of the Custom Project:





II) Complexities

Note: All complexities were able to be properly implemented, and functional.

1. First complexity was the ultrasonic sensor, and getting it to measure distances properly.
2. Second complexity was the integration of the joystick for to serve as an interface for control by the user.
3. Third complexity was the use of a 128*128 resolution LCD display for displaying parameters such as distance measured, and servo's current heading to the user.

III)User Guide

The Ultrasonic Distance Scanner with Remote is very simple to setup and use.

Steps:

1. Position the device in the desired location that will be scanned.

2. Provide power to the Arduino Microcontroller, to start the device.

(At this point the device would start to scan from left(0 degrees) to right(180 degrees) and display the current servo's/ultrasonic sensor's heading, alongside the distance measured by the ultrasonic sensor (in centimeters).

3. If manual control is needed to change the desired heading, simply push towards the direction you want the heading of the sensor to change.

4. Microcontroller will regain control of the sensor's heading after 3 seconds have passes, and the user has provided no additional inputs via joystick.

IV) Hardware and components

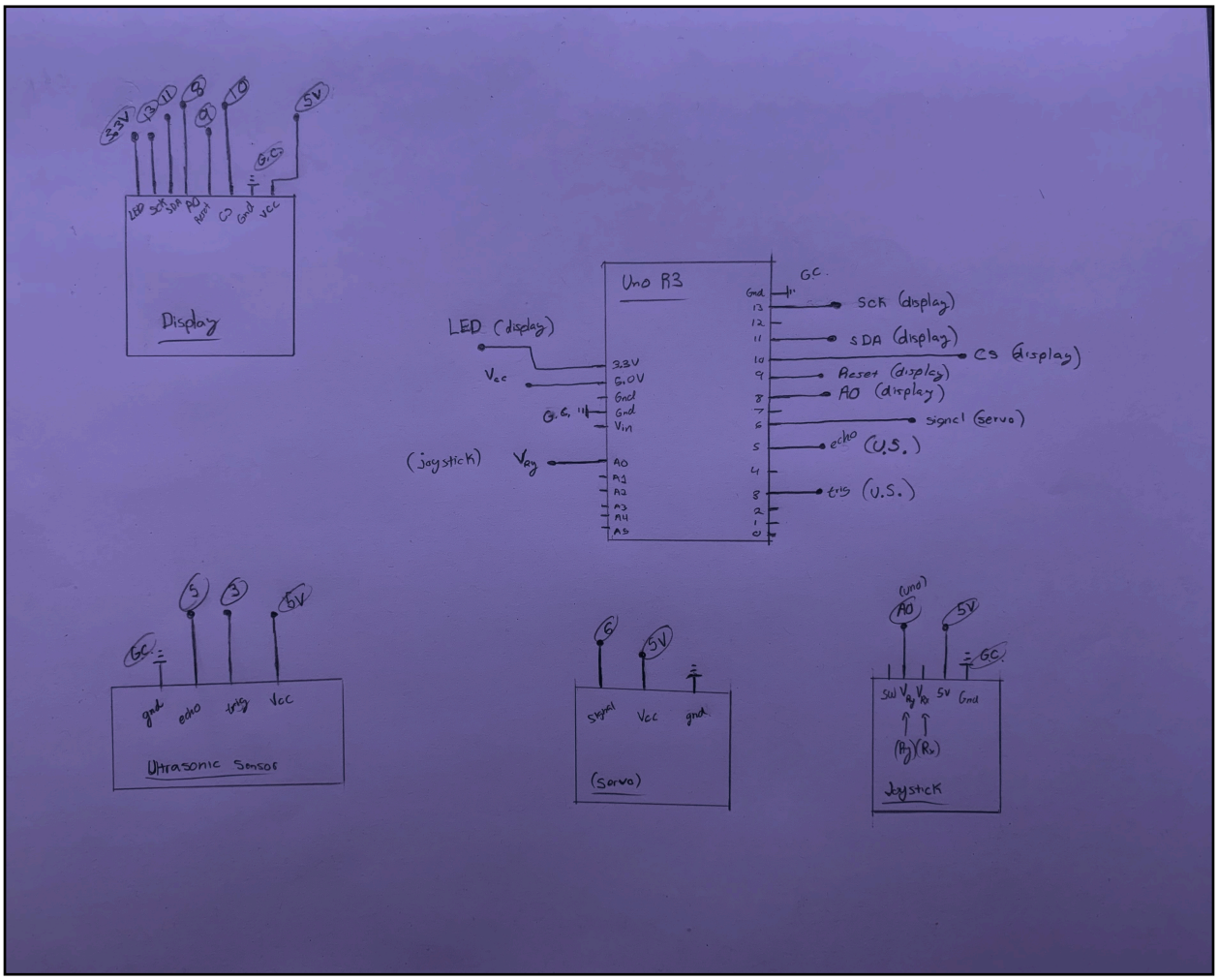
1. Uno R3 Microcontroller
2. Supersonic Sensor
3. Servomotor
4. Joystick
5. HiLetgo 1.44" colorful SPI TFT LCD Display (ST7735) 128*128
6. Breadboard + wires

V) Software Libraires

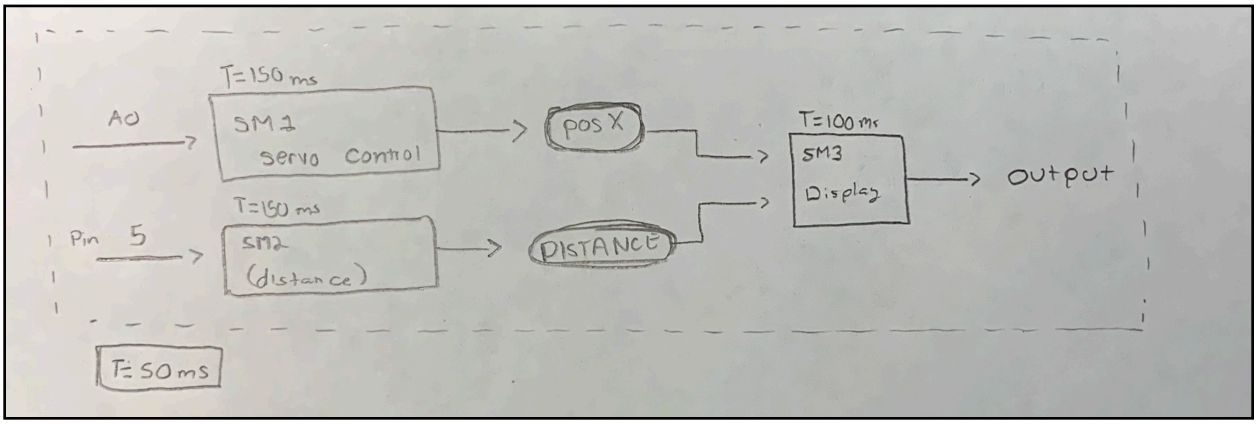
1.<Servo.h> => Responsible for controlling the servo motor.

2.<SPI.h>.	|	Libraries 2-4, work together, which is the reason
3.<TFT_ST7735.h>	| =>	they were grouped together. They only serve as the
4.<fonts/fluide_caps.h>	|	the driver responsible for displaying onto the LCD display.

VI)Wiring Diagram



VII)Task Diagram



VIII)SynchSM Diagrams