Lab 10

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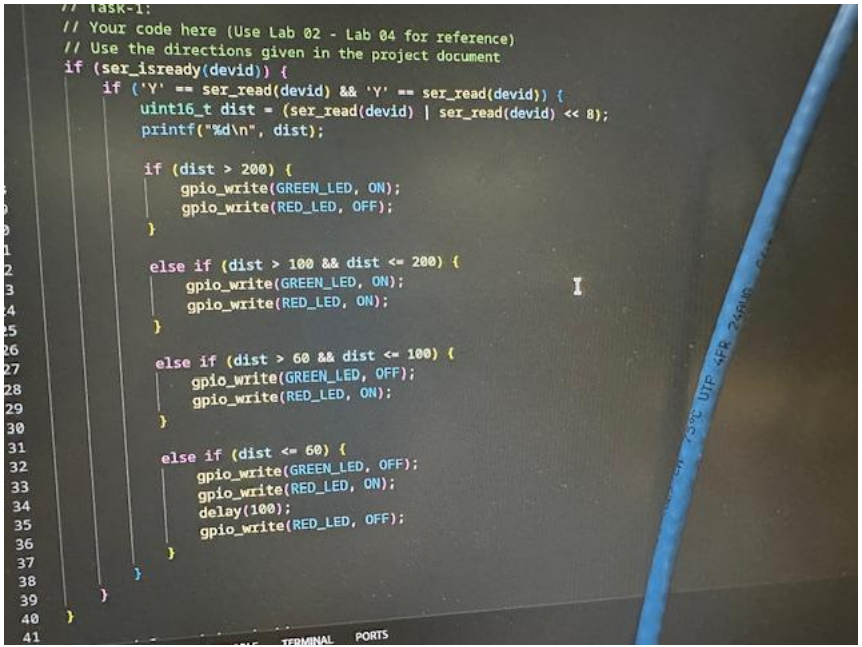
Task 1 - Objective

- Simulate auto-breaking detection using the LIDAR
- If distance is > 200, display green LED
- If 200 >= distance > 100, display yellow LED
- If 100 >= distance > 60, display red LED
- If 60 >= distance, display blinking red LED

Task 1 - Our Implementation

- We first check if the “devid” is ready to receive data
- If so, we read the first two bytes to confirm if they are both ascii “Y”
- We then read the remaining bytes to obtain the distance
- Depending on the distance, varying LEDs will turn off/on



Task 1 - Issues

- The LIDAR tends to read inaccurately
    - It is difficult to show each LED corresponding to distance
    - The range for these LEDs are extremely tight
- The position of the LIDAR can mess up the input

Task 2 - Objective

- Take angle measurements from the driving video

- Send the angle from the Raspberry Pi to the HiFive Board

- Receive the angle and return the degree back to main

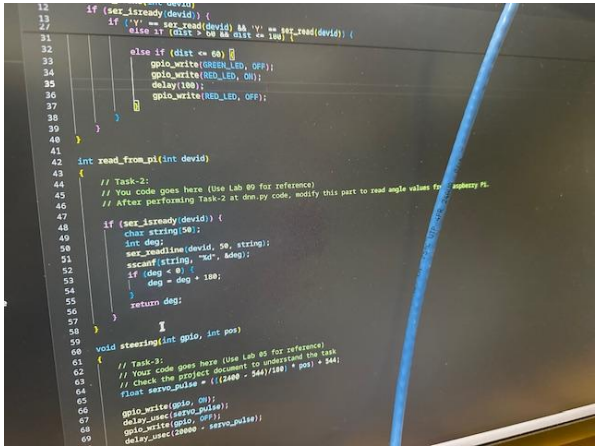
Task 2 - Our Implementation

- We first receive the angle from video and type cast it into an int, and then a string
- We then write the degree to the serial connection as a byte
- Using the c code on the HiFive board, we read the byte and store it in a string
- Using sscanf, we convert the string into an int
- We then return the int to main

```
pred_start = time.time()

#Feed the frame to the model and get the control output
rad = model.predict(img)[0][0]
deg = rad2deg(rad)

# Your code goes here in this if statement
# The if condition is used to send every 4th
# prediction from the model. This is so that
# the HiFive can run the other functions in between
if count%4 == 0:
        strDeg = str(int(deg)) + '\n'
        ser2.write(bytes(strDeg.encode()))
```



Task 2 - Issues

- Establishing the connection between the Raspberry Pi and the HiFive Board
  - We did not receive any data for a good bit of time
  - This was fixed we encoded the degree properly

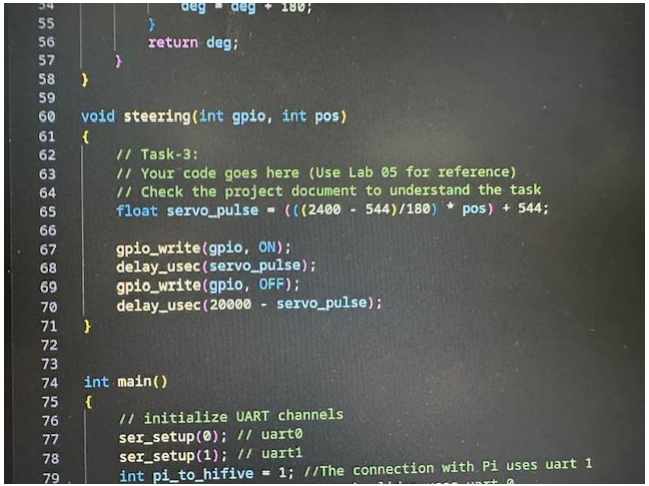
- Getting into the right directory
  - We didn’t realise we were in the wrong directory for a good bit of time

Task 3 - Objective

- Use the received angle data from the previous task to turn the servo motor

Task 3 - Our Implementation

- We used a similar implementation as Lab 5
- We first calculated the servo pulse using:
  - ((pulse_max - pulse_min)/180 * angle) + pulse_min
- Turn on gpio connected to the servo motor
- Delay by the calculated pulse
- Turn off the gpio
- Delay by the remaining time in the period
- We do this to create the appropriate duty cycle for the input position

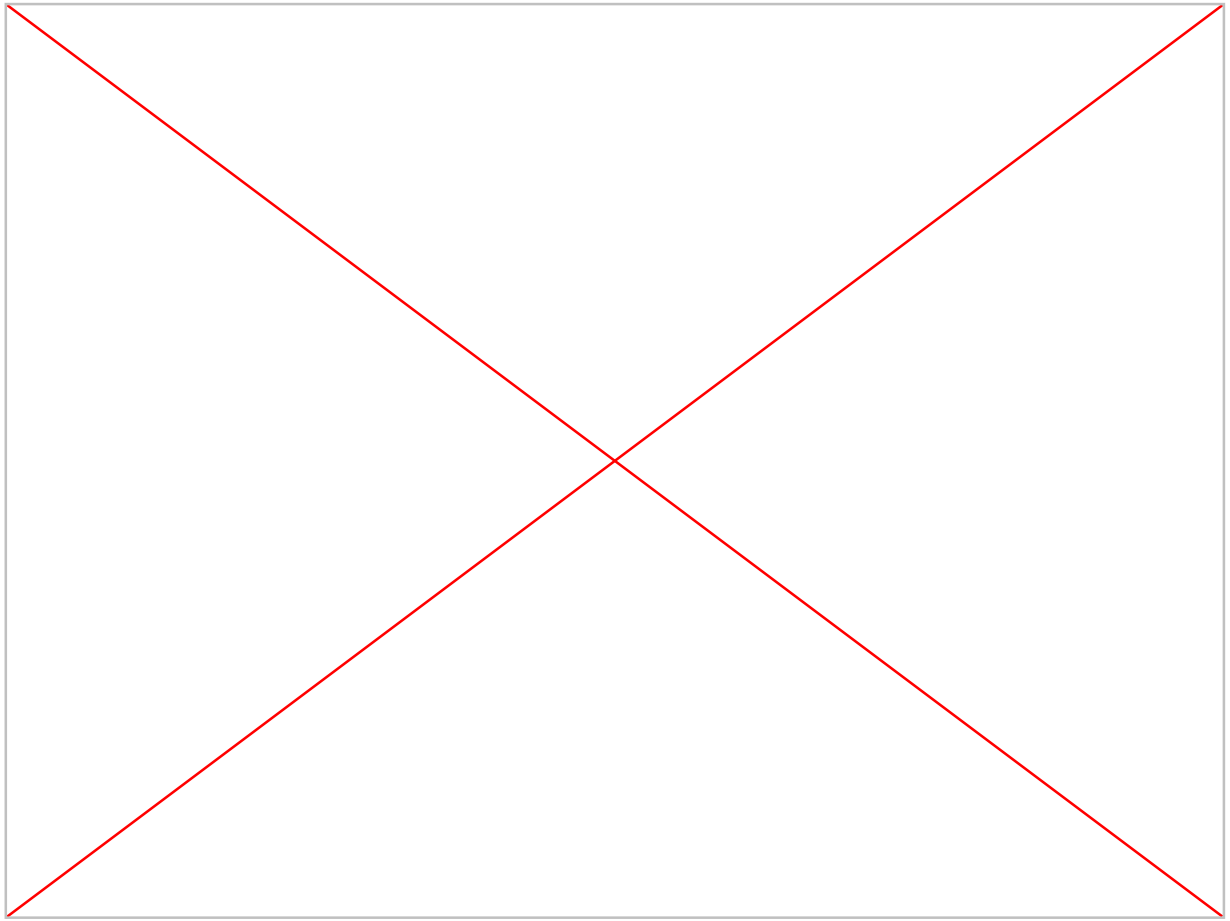


```
55          }
56          return deg;
57      }
58  }
59
60  void steering(int gpio, int pos)
61  {
62      // Task-3:
63      // Your code goes here (Use Lab 05 for reference)
64      // Check the project document to understand the task
65      float servo_pulse = (((2400 - 544)/180) * pos) + 544;
66
67      gpio_write(gpio, ON);
68      delay_usec(servo_pulse);
69      gpio_write(gpio, OFF);
70      delay_usec(20000 - servo_pulse);
71  }
72
73
74  int main()
75  {
76      // initialize UART channels
77      ser_setup(0); // uart0
78      ser_setup(1); // uart1
79      int pi_to_hifive = 1; //The connection with Pi uses uart 1
```

Task 3 - Issues

- Main Issue: Hardware
  - We ran the code multiple time only to receive no output from the servo motor
  - This was fixed by restarting the computer and changing out components

Demo Video



Future Improvements

- Take the time to write the entire code
  - This would help us gain a better understanding of the entire system
- Make sure to check for hardware related issues before rewriting code
  - This would have saved us a lot of time

Thank You For Listening