LAB REPORT

ENGINEERING LABORATORY

ENGR 1204, FALL 2022

Laboratory Exercise #10

Laboratory Name: Autonomous Vehicle

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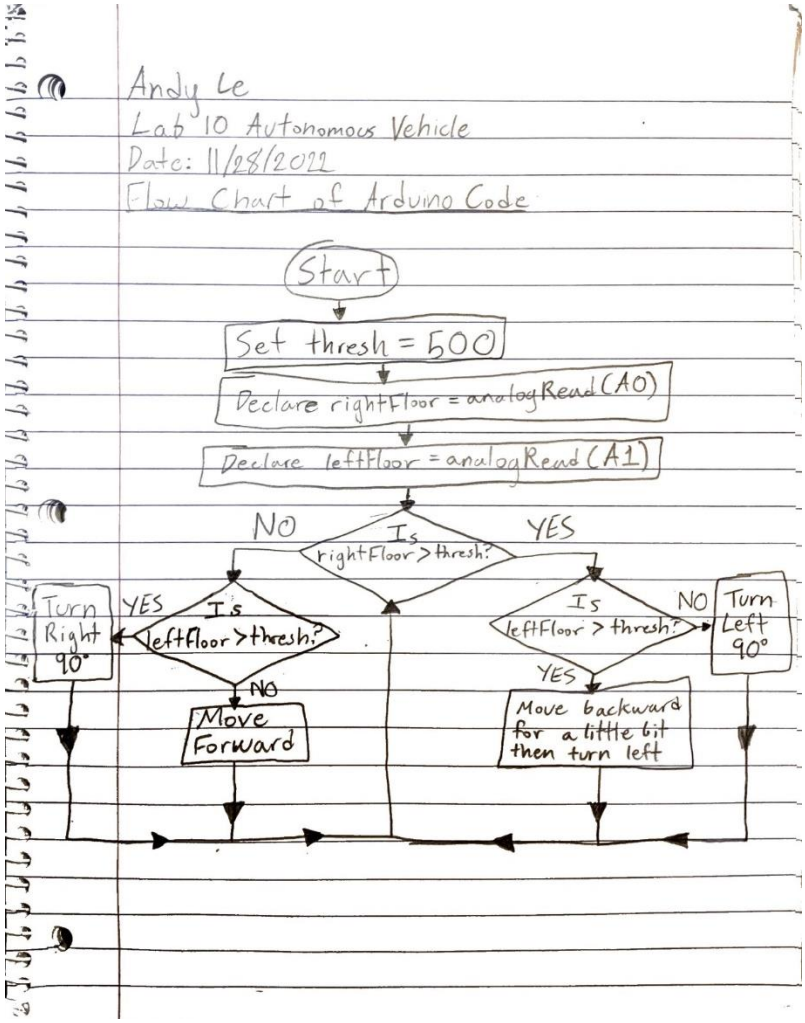
Date of Lab Exercise: 11/22/22

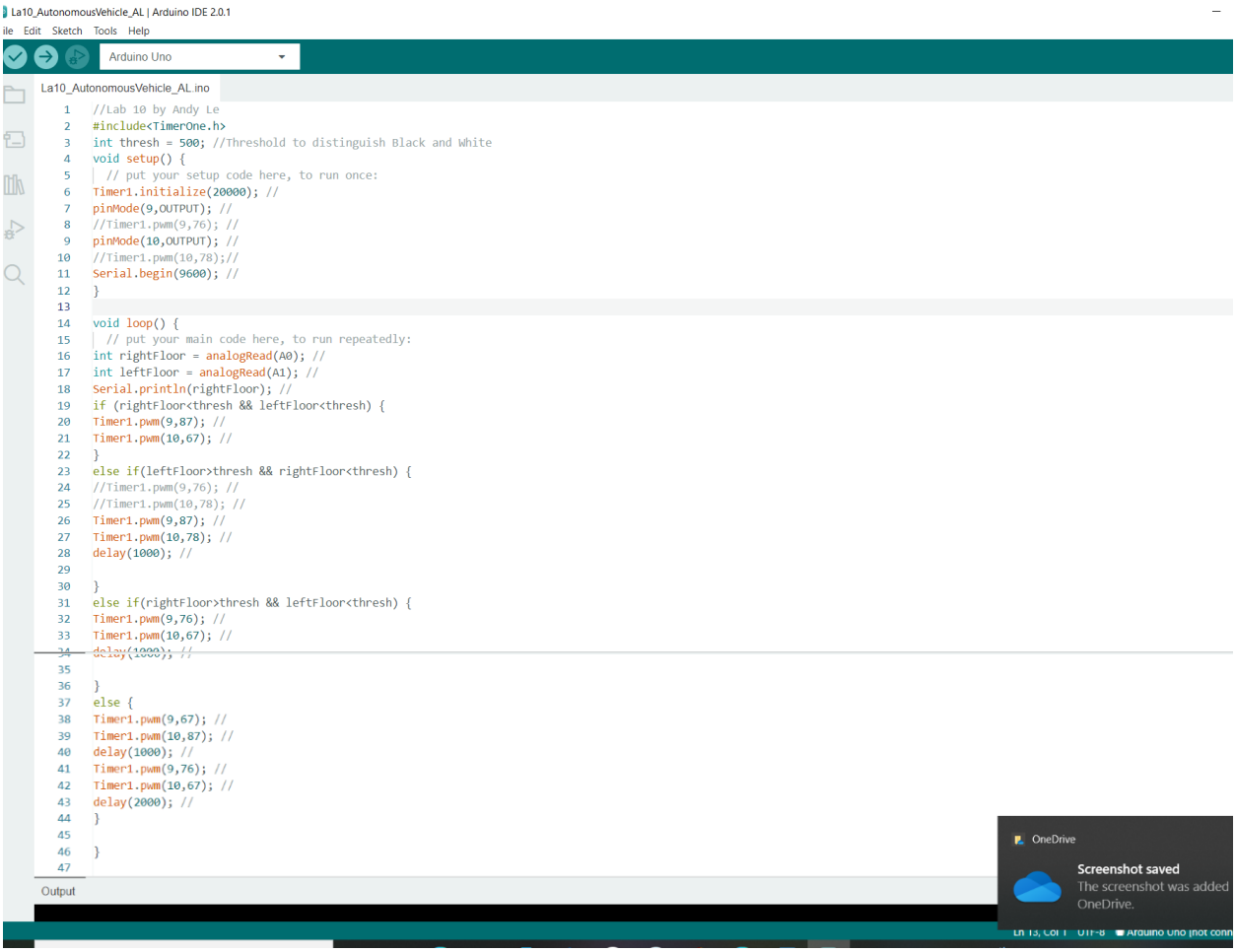
WENTWORTH
Institute of Technology

Objective: This lab uses Arduino code editor to program a Sumobot car to perform 4 specific goals when its sensors detect either black or white.

Procedure & Results:



Above is the flow chart used to help create the Arduino Software code that controls the sumobot. Below is the Arduino software code that was created by following the thought process of the flow chart.



The first goal that the sumobot must accomplish is that it must turn approximately 90° to the left when its right sensor detects white, and its left sensor detects black. It is accomplished using the code below:

```
else if(rightFloor>thresh && leftFloor<thresh) {
Timer1.pwm(9,76); //
Timer1.pwm(10,67); //
delay(1000); //
}
```

These lines of codes state that if the right sensor gives a serial value that is above the value of the thresh and if the left sensor gives a value below the thresh, then the sumobot will run the command:

```
Timer1.pwm(9,76); //
Timer1.pwm(10,67); //
delay(1000); //
```

Timer1.pwm 9 and 10 correspond to the left and right wheels of the sumobot. The second value inside the parentheses (76 for pin 9 and 67 for pin 10) correspond to the speed and direction of rotation of the wheels. The line of code “delay” indicates how long this command will run. It is also important to note that the “thresh” value is a global variable and has already been declared in line 3 of the code.

The same process goes for the second goal, and it is that the sumobot must turn approximately 90° to the right when its right sensor detects black, and its left sensor detects white. The code for how the sumobot was programmed can be found inside the line of code:

```
else if(leftFloor>thresh && rightFloor<thresh)
```

The third goal is to move the bot forward when both sensors detect black and that is achieved when both sensors give a serial value below the thresh value. The lines of code that makes the sumobot move forward can be found inside the if statement:

```
if (rightFloor<thresh && leftFloor<thresh)
```

and the fourth goal is to reverse the bot a little bit, then turn the Sumobot in any direction and that goal is achieved through:

```
else {
Timer1.pwm(9,67); //
Timer1.pwm(10,87); //
delay(1000); //
```

```
Timer1.pwm(9,76); //
Timer1.pwm(10,67); //
delay(2000); //
}
```

The first half of the else statement makes the robot reverse with a delay of 1000 milliseconds (1 second).

```
Timer1.pwm(9,67); //
Timer1.pwm(10,87); //
delay(1000); //
```

and the second half of the else statement turns the robot to the left approximately 90° to the left for 2000 milliseconds (2 seconds).

```
Timer1.pwm(9,76); //
Timer1.pwm(10,67); //
delay(2000); //
```

Summary: This lab successfully programmed the sumobot to perform the specified goals above in an efficient manner. While programming, some problems were encountered with the length of the delay of many (if not all) of the “if” and “else if” statements. At first, the delays were too short, and I could not tell whether or not my “if” statement ran because it looked as if nothing happened. After several tweaks, suitable values for the delays were put in place and the robot ran the commands as desired.