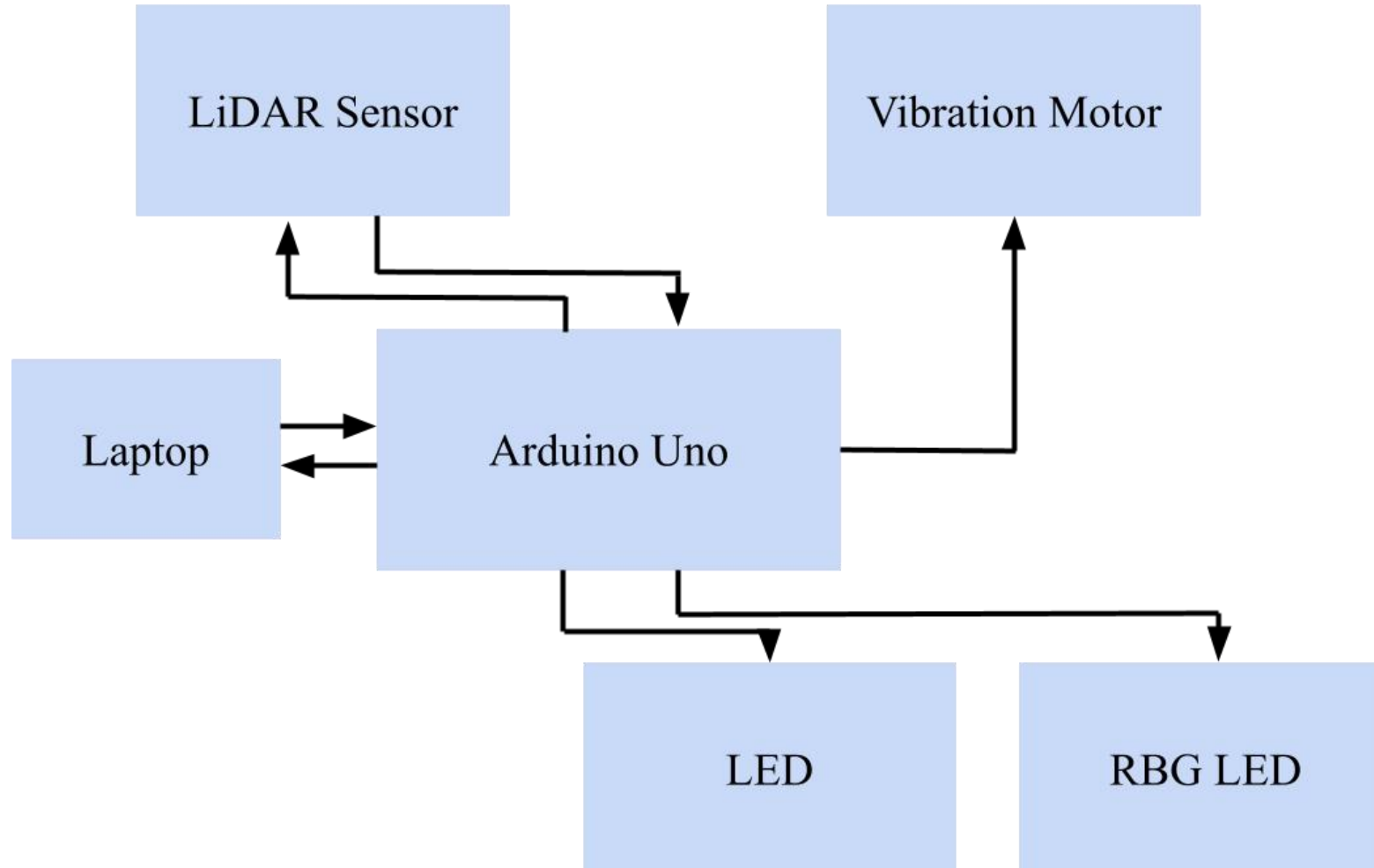


LiDAR Proximity Detection as Sensory Substitution for the Blind

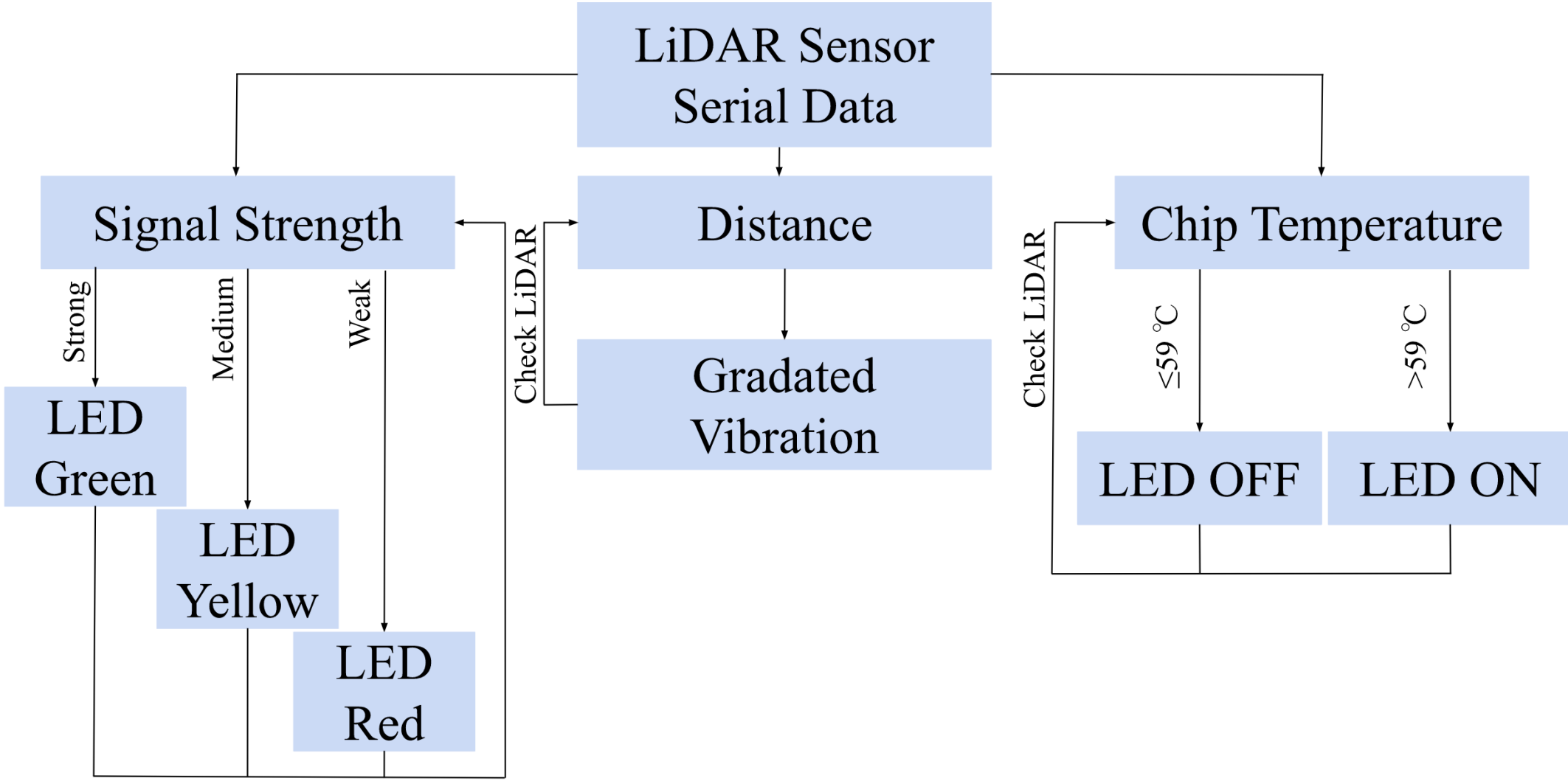


Evelyn Harper

Block Diagram



Software Flowchart



Code

FINALPROJECT.ino

```
1  #include <SoftwareSerial.h> //header file of software serial port
2  SoftwareSerial Serial1(2,3); //define software serial port name as Serial1 and define pin2 as RX and pin3
3  /* For Arduinoboards with multiple serial ports like DUEboard, interpret above two pieces of code and dire
4  int dist; //actual distance measurements of LiDAR
5  int strength; //signal strength of LiDAR
6  float temperature;
7  int check; //save check value
8  int i;
9  int uart[9]; //save data measured by LiDAR
10 const int HEADER=0x59; //frame header of data package
11 int VibPin = 5; // ERM connected to PWM pin 5
12 void setup() {
13 int inverse;
14
15 Serial.begin(9600); //set bit rate of serial port connecting Arduino with computer
16 Serial1.begin(115200); //set bit rate of serial port connecting LiDAR with Arduino
17 }
18
19 void loop() {
20 if (Serial1.available()) { //check if serial port has data input
21
22 if(Serial1.read() == HEADER) { //assess data package frame header 0x59
23 uart[0]=HEADER;
24
25 if (Serial1.read() == HEADER) { //assess data package frame header 0x59
26 uart[1] = HEADER;
27 for (i = 2; i < 9; i++) { //save data in array
28 | uart[i] = Serial1.read();
29 | }
30
31 check = uart[0] + uart[1] + uart[2] + uart[3] + uart[4] + uart[5] + uart[6] + uart[7];
32 if (uart[8] == (check & 0xff)){ //verify the received data as per protocol
33 | dist = uart[2] + uart[3] * 256; //calculate distance value
34 | strength = uart[4] + uart[5] * 256; //calculate signal strength value
35 | temperature = uart[6] + uart[7] *256;//calculate chip temperature
36 | temperature = temperature/8 - 256;
37 | Serial.print("dist = ");
38 | Serial.print(dist); //output measure distance value of LiDAR
39 | Serial.print('\t');
40 | Serial.print("strength = ");
41 | Serial.print(strength); //output signal strength value
42 | Serial.print("\t\t Chip Temperature = ");
43 | Serial.print(strength); //output signal strength value
44 | Serial.print("\t\t Chip Temperature = ");
45 | Serial.print(temperature);
46 | Serial.println(" celcius degree"); //output chip temperature of Lidar
47 | }
48 | }
49 analogWrite(VibPin, (300 - (255*((800/dist))))); //determines vibration intensity based on lidar
50
51 | if (strength > 1200){ //strength greater than 1200 --> green
52 | | analogWrite(9, 0); //sets relative intensities of R/G/B
53 | | analogWrite(10, 250);
54 | | analogWrite(11, 0);
55 | | }
56 | | else if (strength > 800){ //strength above 800 or 1200 or below --> yellow/orange
57 | | | analogWrite(9, 255); //sets relative intensities of R/G/B
58 | | | analogWrite(10, 120);
59 | | | analogWrite(11, 0);
60 | | | delay (50);
61 | | | }
62 | | | else{
63 | | | | analogWrite(9, 250); //strength 800 or below --> red
64 | | | | analogWrite(10, 0);
65 | | | | analogWrite(11, 0);
66 | | | | delay(50);
67 | | | | }
68
69 | | if (temperature > 59) //temperature out of operation range warning
70 | | | analogWrite(13, HIGH);
71 | | | else{
72 | | | | analogWrite(13, LOW);
73 | | | | }
74 | | }
75
76
77
```

