

05/28/24
Willy
Code.

Lidar for Object Detection

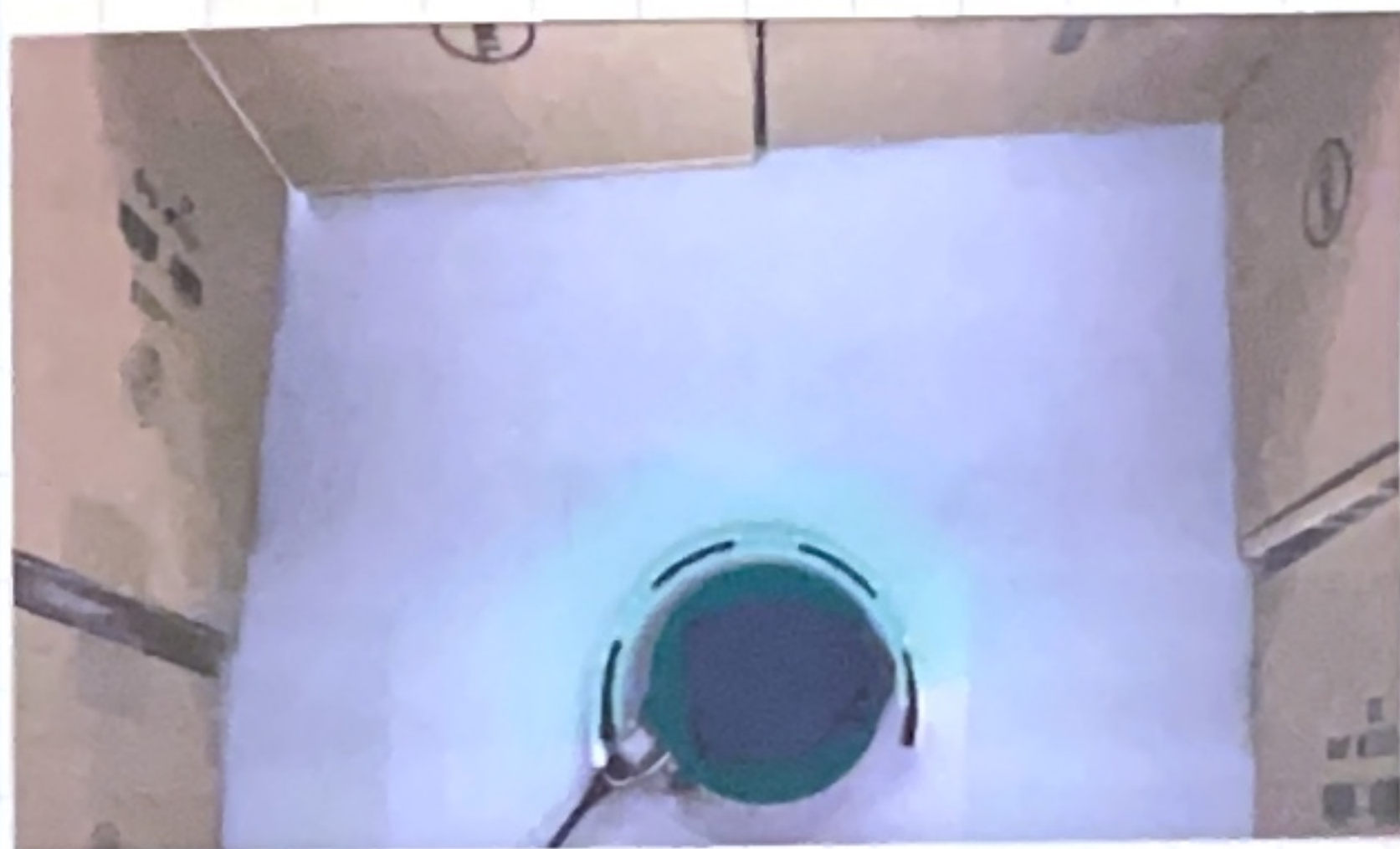
25

Install the robo peak arduino library:
<https://github.com/robopeak/rplidar-arduino>

Sketch → include Library → Add .ZIP

Objective

Detect objects that are close or far away
and light up an led that relates to the
distance.



Results

~~etc~~ Results for
objects far away

Results for objects
at a medium distance



Results for objects
very close.

Code

```

1 #include <RPLidar.h>
2 #include <Adafruit_NeoPixel.h>
3
4 #define LED_PIN 8
5 #define LED_COUNT 19 // These variables are for the neo pixels.
6
7 Adafruit_NeoPixel strip(LED_COUNT, LED_PIN, NEO_GRB+NEO_KHZ800);
8
9 RPLidar lidar;
10 #define RPLIDAR_MOTOR 3 // PWM Pin for motor control.
11
12 // Let's keep an array that has a distance for every integer angle.
13 float distance[360]; // Can access indexes 0-359.
14 // Let's look at 10 rotations before we average our data.
15 int numRotations = 0;
16 int targetRotations = 10;
17
18 void setup()
19 {
20   Serial.begin(115200);
21   lidar.begin(Serial1);
22   pinMode(RPLIDAR_MOTOR, OUTPUT);
23
24   strip.begin();
25   strip.setBrightness(50);
26 }
27 void printData()
28 {
29   // This method shows each angle and their corresponding distance
30   for (int i=0; i<=360; i++)
31   {
32     Serial.print(i);
33     Serial.print(" ");
34     Serial.println(distance[i]);
35   }
36 }

```

```

103 void loop()
104 {
105   if (IS_OK(lidar.waitPoint()))
106   {
107     RPLidarMeasurement currentMeasure = lidar.getCurrentPoint();
108     if (currentMeasure.startBit == 1)
109     {
110       numRotations++;
111       if (numRotations >= targetRotations)
112       {
113         printData();
114         numRotations = 0;
115         lightLED(); // * → all the cool stuff is in here
116       }
117     }
118     else
119     {
120       distance[int(currentMeasure.angle)] = currentMeasure.distance;
121     }
122   }
123   else
124   {
125     analogWrite(RPLIDAR_MOTOR, 0); // Stop the motor
126     rplidar_response_device_info_t info;
127     Serial.println("----");
128     Serial.println(IS_OK(lidar.waitPoint()));
129     Serial.println(IS_OK(lidar.getDeviceInfo(info, 100)));
130     if (IS_OK(lidar.getDeviceInfo(info, 100)))
131     {
132       lidar.startScan();
133       analogWrite(RPLIDAR_MOTOR, 255);
134       delay(1000);
135     }
136   }
137 }

```

→ looking for 10 rotations.

* → all the cool stuff is in here

} handle an
error state
and restart.

05/28/24

W. Aug
Cochran

Lidar for Object Detection

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```

30 void lightLED()
31 {
32
33 // We know we need 19 averages. -> i= (0-18) 10 degrees for each pixel.
34 for(int i=0; i<19; i++)
35 {
36 // We keep a sum and how many value we added to our average.
37 float sum = 0;
38 float averageNum = 0;
39 float averageDistance = 0.00;
40
41 // Here, we need to look at the proper subset of our data.
42 // For iteration one, we want to look at indexes 0-9 (degrees)
43 // For iteration two, we want to look at indexes 10-19 (degrees)
44
45 // So we start by multiplying which average we are on by 10. -> i*10
46 // we go up to an index of i*10 + 9. So that we get 10 total values.
47
48 for(int a = i*10; a<=i*10+9; a++) * -> look at proper subset.
49 {
50 // We are ignoring 0 values since we don't know
51 // this 0 is from being too close, or that the lidar
52 // didn't get data there.
53 if (distance[a] != 0.00)
54 {
55 sum += distance[a];
56 averageNum++;
57 }
58 }
59 // If we actually added a non zero value to our sum.
60 if (averageNum != 0)
61 {
62 // Get the average distance
63 averageDistance = sum/averageNum;
64 }
65 else
66 {
67 // Otherwise, set it to 0 to say either
68 // 1. We didn't actually get distances at those angles.
69 // 2. Something is way too close to the sensor.
70 averageDistance = 0.00;
71 }
72
73 // Set the strip color based on the average distance.
74 Serial.println(averageDistance);
75 if (averageDistance == 0.00) // White for 0's
76 {
77 strip.setPixelColor(i, strip.Color(255,255,255));
78 }
79 else if (averageDistance < 500) // Red for too close!
80 {
81 strip.setPixelColor(i, strip.Color(255,0,0));
82 }
83 else if (averageDistance < 1000) // Yellow for getting close
84 {
85 strip.setPixelColor(i, strip.Color(255,165,0));
86 }
87 else // Green for not close enough
88 {
89 strip.setPixelColor(i, strip.Color(0,255,0));
90 }
91 }
92 strip.show();
93 }
94 }

```

} inner for
loop explanation.

} Light up
the LEDs