NYU

ME5643-Mechatronics: Integrated Term Project

Biker Alarm

Aashil Togadia | Bharat Pavuluru | Anish Gupta
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NYU

Biker Alarm

- Why do we need this?
- Overview
- Goals
- How does it work?
- Cost Analysis
- Additional Feature

Why do we need this?

- There were around 4000 bike accidents in NY city in year 2013
- Simple and Smart safety feature which is economical as well
- Compact and easy to carry

Ultrasonic Sensors

- We have used Ultrasonic sensors for the measurement of distance of any object
- Currently there are three (3) sensors for the back vision, with each sensor at different angle
- The coding is done in such a way that it only detects the objects coming towards the bike and not which are going away or still

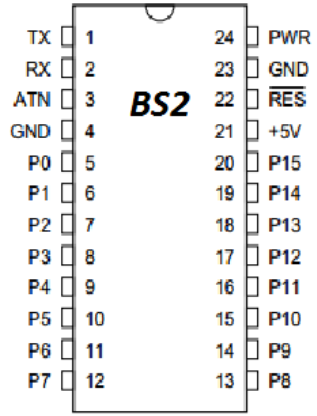
Vibrating Motors and LEDs

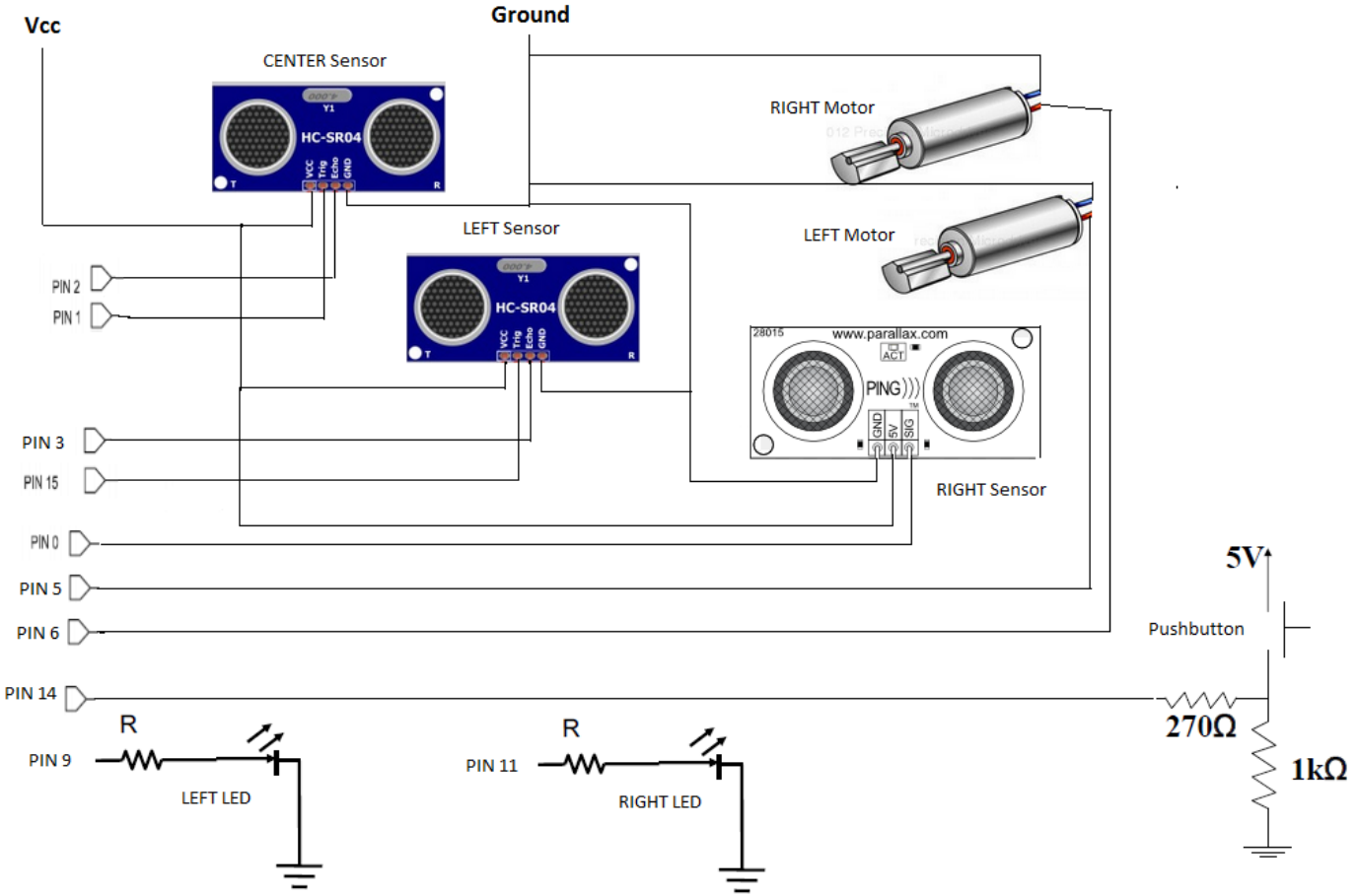
- As and when any object is coming towards the bike, vibrating motors will notify the rider in different ways for different notification i.e. left back, right back, center, very close, left, right, center
- LEDs also notifies in different ways

Pushbutton Feature

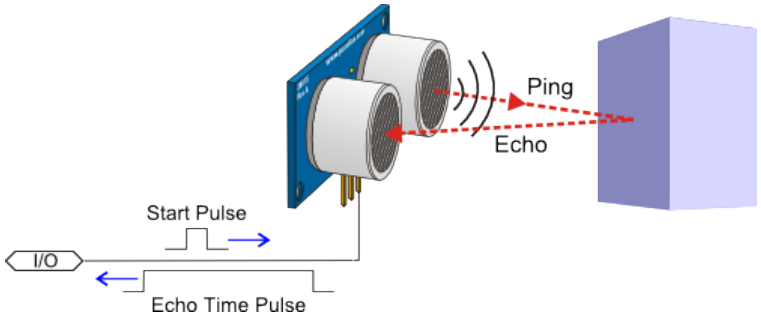
- There is a pushbutton by which one can go into rest mode, in which system will notify the rider for a fixed amount of time

How does it work?

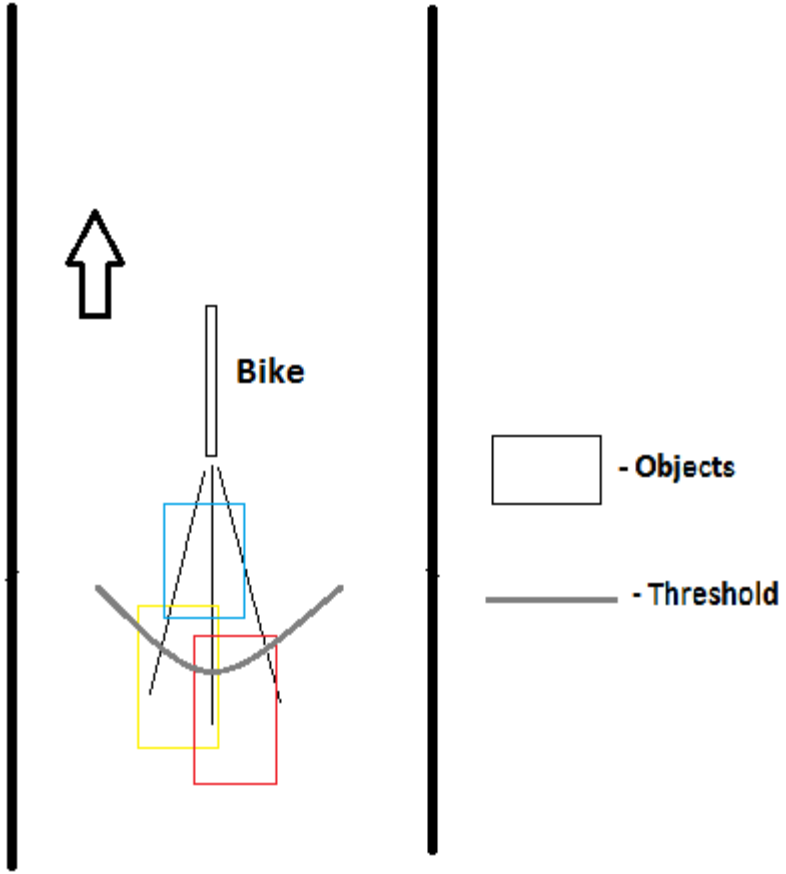




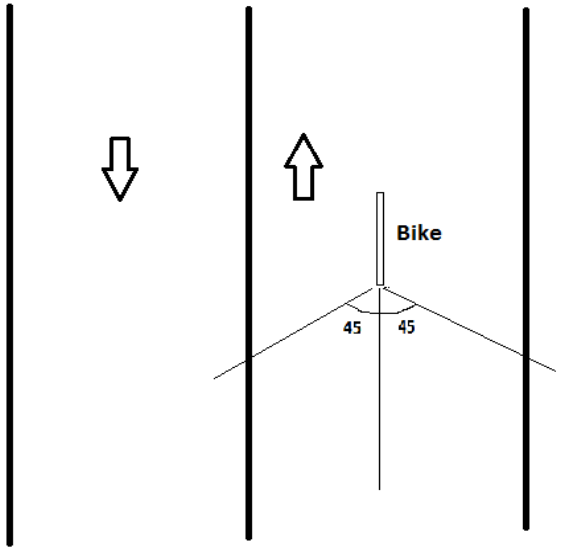
Ultrasonic Sensor:



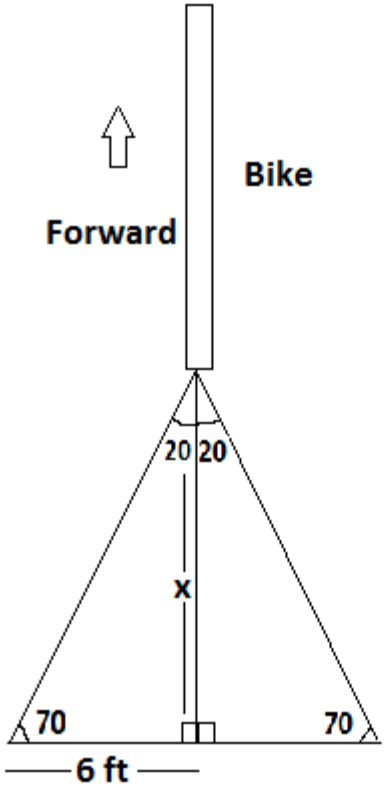
Sensor Angle



Calculating sensor angle



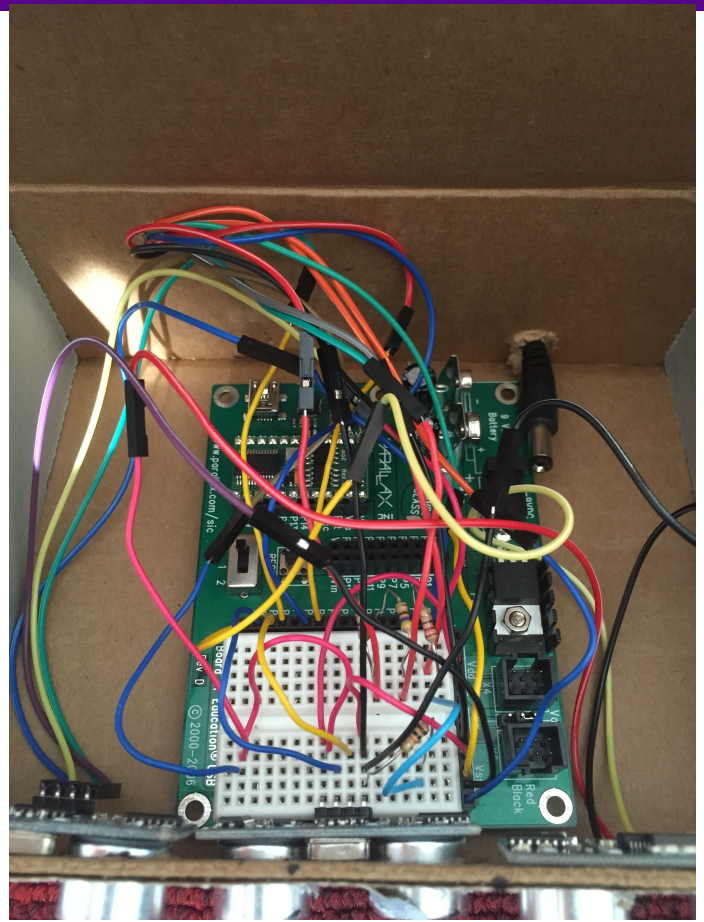
If we want less distance like 10 ft., then it woul
Angel = Arc Tan (x) * (10/6)

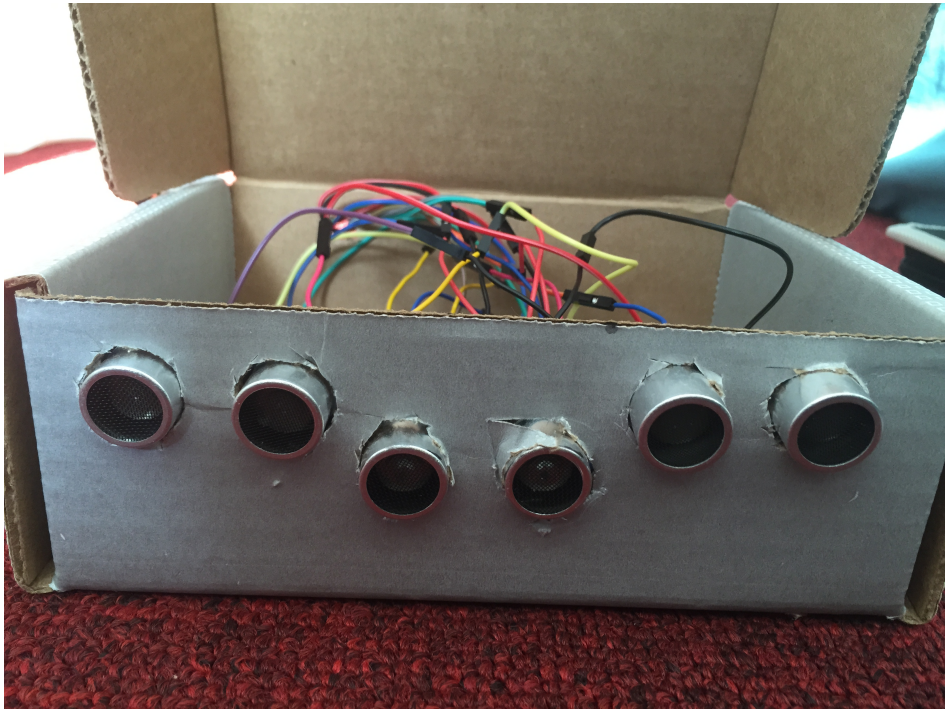


if Angel is 20,
x= Tan 70 * 6
= 17 ft

and if Angel is 22,
x= Tan 68 * 6
= 15 ft

How does it work?





Logic and Coding:

- All three sensor, sense the data twice every second and compares whether object coming towards the bike or going away.
- If something is coming near to bike and crosses the threshold, then it compares from where it is coming towards the bike.
- There are six conditions:
  1. Very close: All three sensors below threshold
  2. Left Center: Left and Center one blow threshold
  3. Right Center: Right and Center one blow threshold
  4. Center: Only Center one
  5. Left: Only Left one
  6. Right: Only Right one

How does it work?

```
FOR counter = 1 TO 2
c1=c
l1=l
r1=r
PULSOUT 1, 5
PULSIN 2, 1, time_center
PULSOUT 15, 5
PULSIN 3, 1, time_left
'PULSIN 4, 1, time3
PULSOUT 0, 5
PULSIN 0, 1, time_right
cen_sen = (time_center) / 74
left_sen = (time_left) / 74
right_sen= 890 ** time_right
'right = (time3) / 74
c=cen_sen
l=left_sen
r=right_sen
DEBUG CR, "Center    ", DEC cen_sen, "   Left    ", DEC left_sen, "   right    ",DEC right_sen        ' Display result
PAUSE 500
NEXT

'c=a-a1

IF (c < c1 OR r < r1 OR l < l1 ) THEN
 IF (c < 10 OR l < 10 OR r < 10) THEN
   IF (c < 9 AND l < 9 AND r < 9) THEN
   GOTO alarm_close
   ELSEIF (c < 10 AND r < 10) THEN
   GOTO alarm_cright
   ELSEIF (c < 10 AND l < 10) THEN
   GOTO alarm_cleft
   ELSEIF (c < 10) THEN
   GOTO alarm_c
   ELSEIF (l < 10 AND l<l1) THEN
   GOTO alarm_l
   ELSEIF (r < 10) THEN
   GOTO alarm_r
   ENDIF
 ENDIF
ENDIF

LOOP
```

Vibration:

- Using two vibrating motors in left and right hang-grips of bike, (one each side) rider is notified
- Different notification for rider:
  1. Very close: Both vibrates for 5 Seconds
  2. Left Center: Left vibrates for 3.5 Seconds
  3. Right Center: Right vibrates for 3.5 Seconds
  4. Center: Both vibrates for 2 Seconds
  5. Left: Left vibrates for 2 Seconds
  6. Right: Right vibrates for 2 Seconds

Pushbutton:

- Whenever Pushbutton is pressed during notification, system sleeps for 10-15 Seconds and then again checks for the object coming closer to bike

Cost Analysis

Sr. No.	Item	Quantity	Unit Price ($)	Price ($)	Mass Production Rate
1.	BS2 Microcontroller	1	44	44	25
2.	Ultrasonic Sensor (By Parallax)	1	26	26	25
3.	Ultrasonic Sensor (HR-SC04)	2	5	10	5
4.	Vibrating Motor	2	1	1	1
5.	LED (Green)	1	0.1	0.1	0.08
6.	LED (Red)	1	0.1	0.1	0.08
7.	Resistor (470 Ohm)	2	0.2	0.2	0.1
8.	Resistor (220 Ohm)	1	0.2	0.2	0.1
9.	Resistor (10K Ohm)	1	0.2	0.2	0.1
10.	Pushbutton	1	0.3	0.2	0.1
11.	Breadboard	2	2	4	3.5
12.	Jumper Wire (Female/Female)	15	0.2	3	3
13.	Battery Pack	1	5	5	3
14.	Battery (AA)	4	1.25	5	1.28
15.	Bike Handle Grip	2	2.5	5	4
Total				103	71.34

Additional Feature:

- Change the angle between two sensors using servo motors
- According to road width and traffic, one can change the angle between two Ultrasonic Sensors to make it more efficient

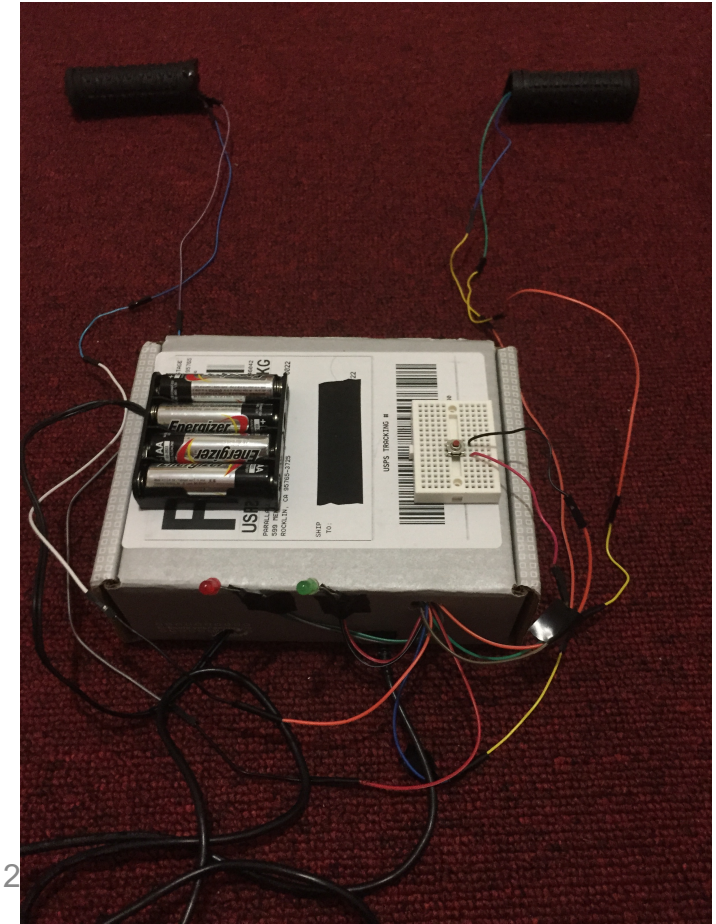
Additional Cost:

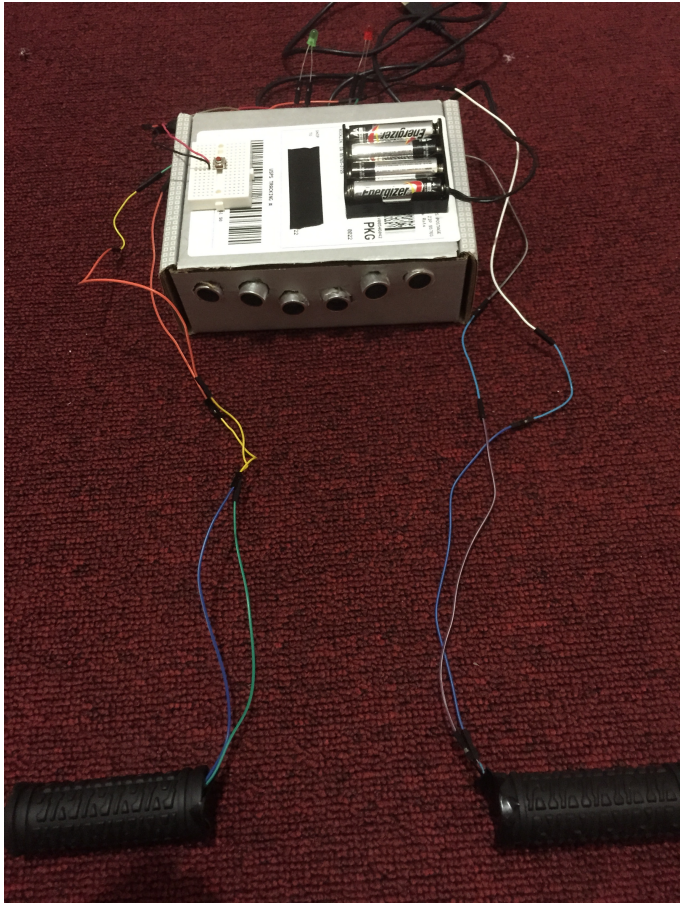
Servo Motor : $ 7

Total Cost with feature : $ 79

It can be used for people with disabilities.

Final Model


Energizer
Energizer
USPS TRACKING #
SHIP TO: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Questions