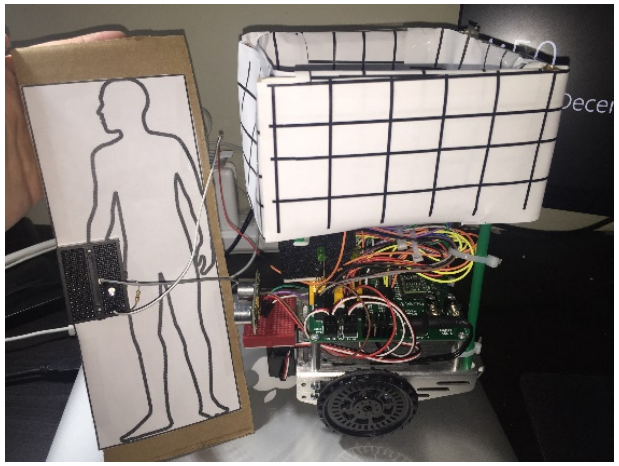
NYU TANDON SCHOOL OF ENGINEERING

MECHATRONICS

INTEGRATED PROJECT

SMART SHOPPING CART



Done By:

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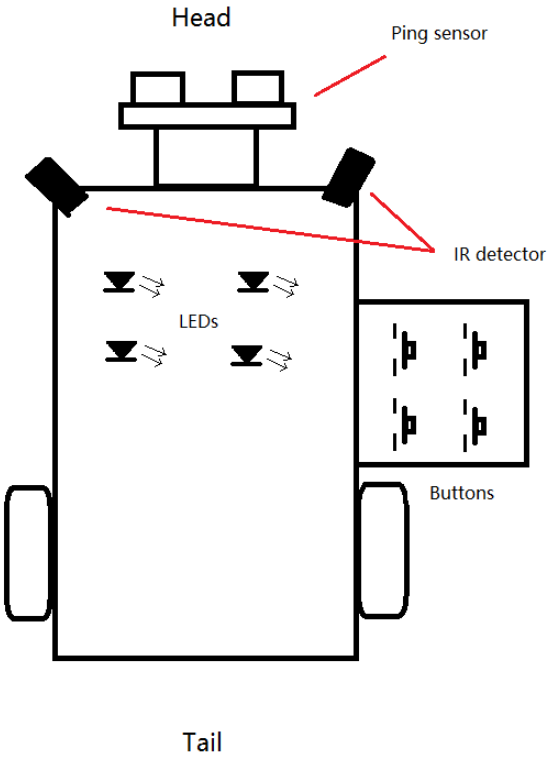
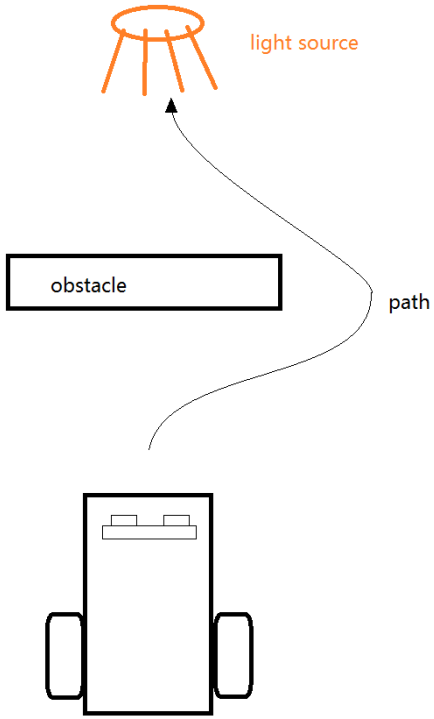
Problem: *Shopping with a heavy cart!*

Smart Cart: *How does it work?*

Feature 1*: Follow customer and avoid obstacles*

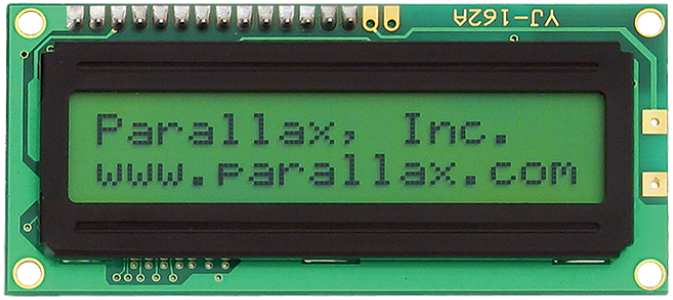




Smart Cart: *How does it work?*

Feature 2: *Calculation Mode*

- Blue Button: Stop following and enter calculation mode
- Red 1: Add fish to the cart
- Red 2: Add beef to the cart
- Red 3: Add Chicken to the cart

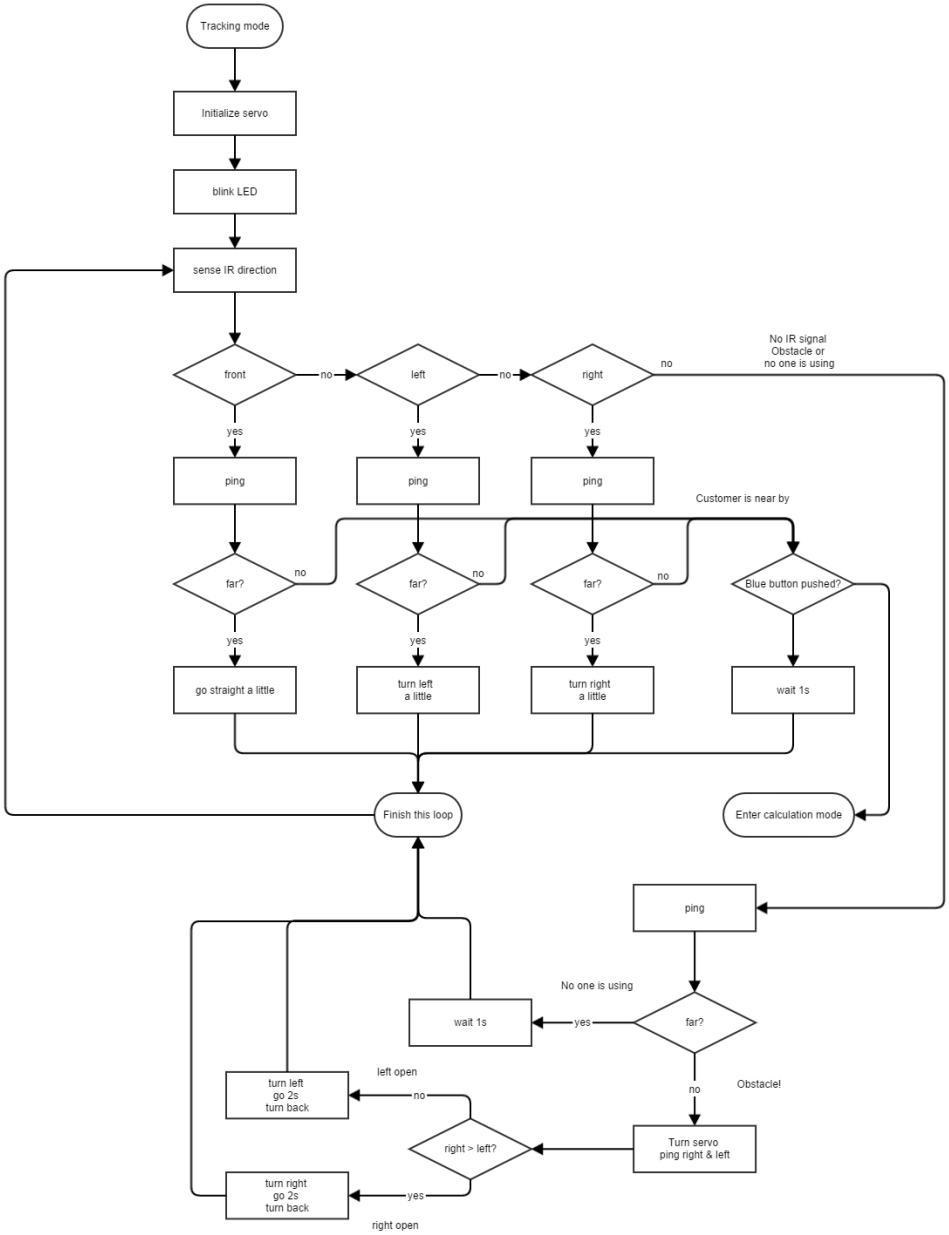


Item cost is displayed in Line 1

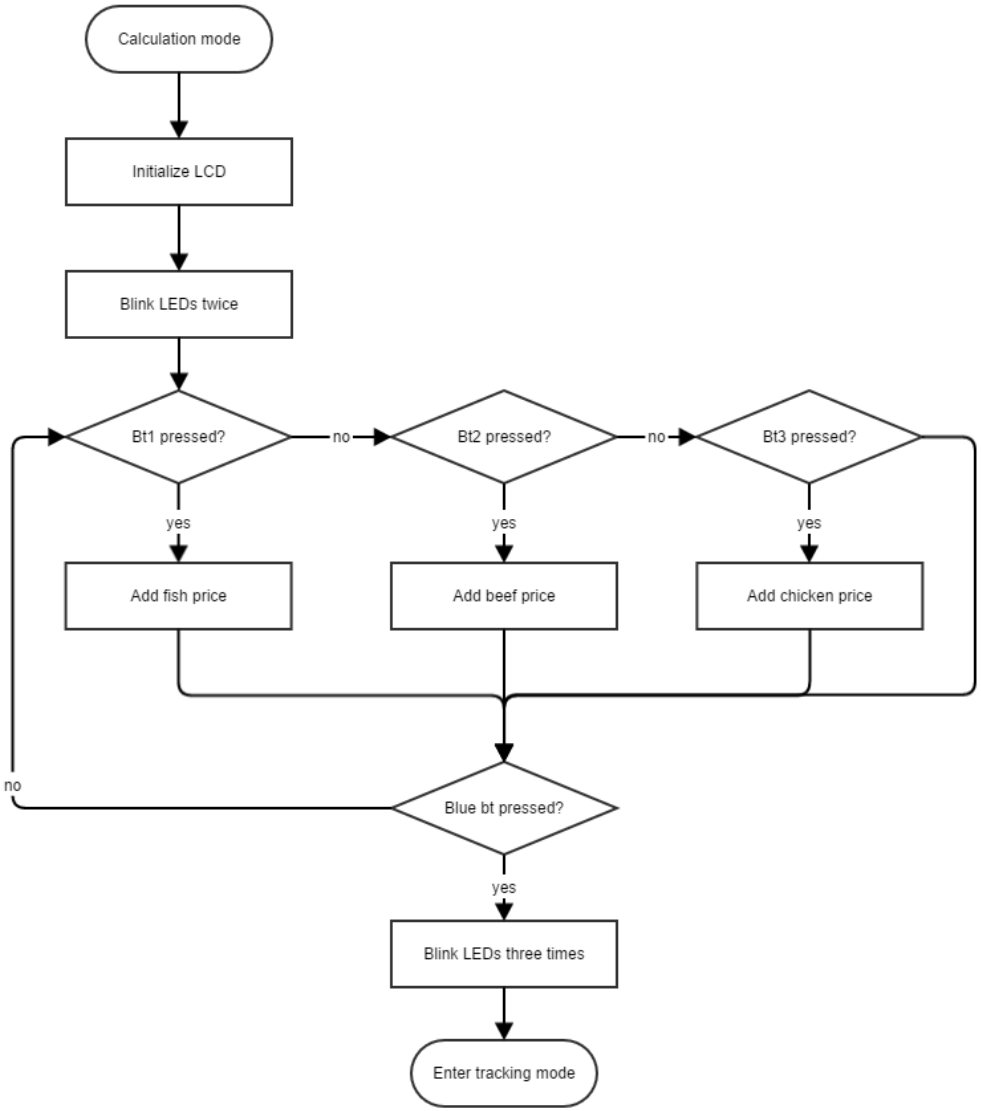
Total is displayed in Line 2

Press Blue Button to start tracking mode again

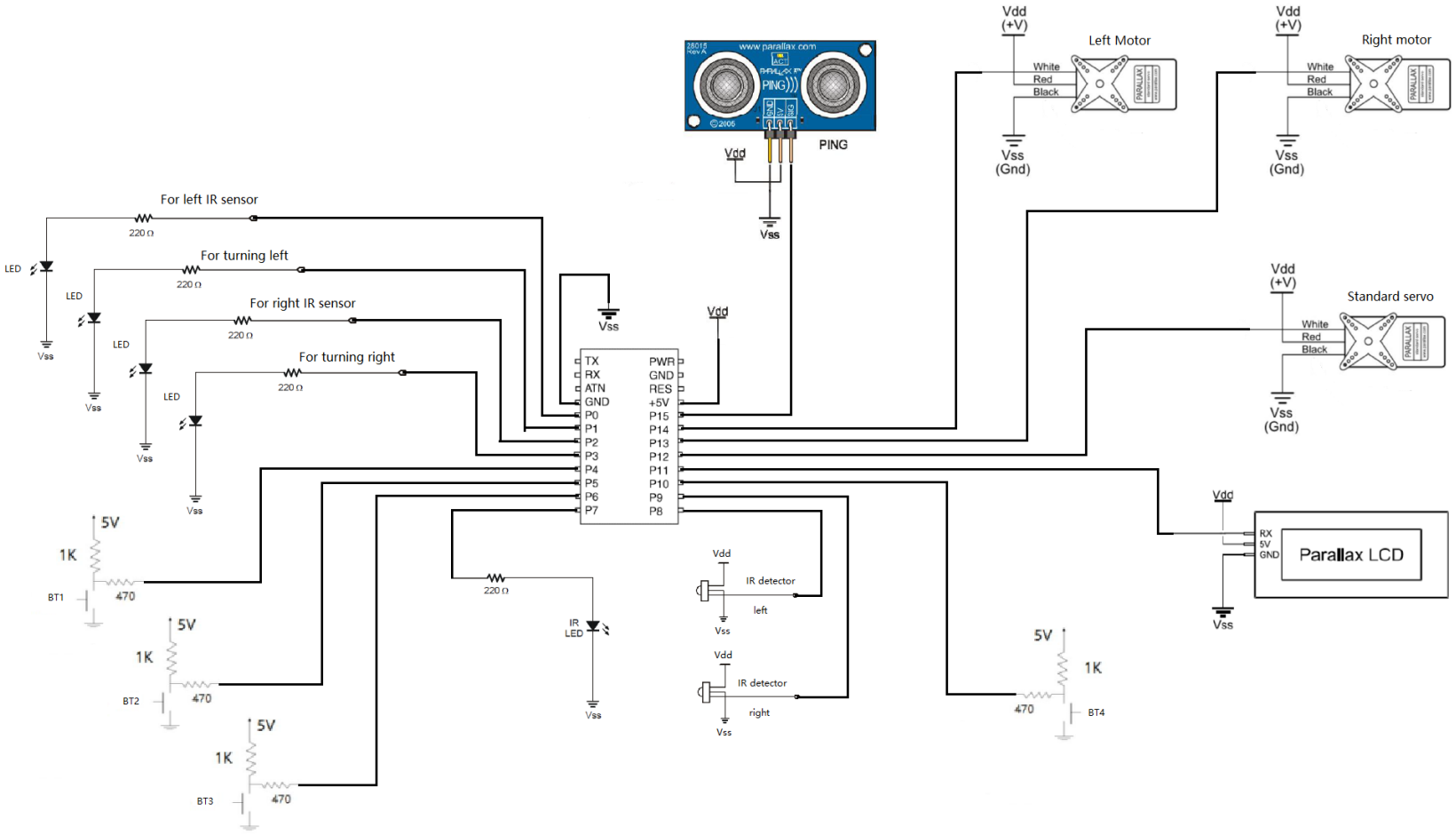
Logic diagram – *Tracking Mode:*



Logic diagram – *Calculation Mode:*



Circuit:


PING
Vdd
Vss
Left Motor
Right motor
Standard servo
White
Red
Black
Vss (Gnd)
For left IR sensor
For turning left
For right IR sensor
For turning right
220 Ω
LED
TX
RX
ATN
GND
P0
P1
P2
P3
P4
P5
P6
P7
PWR
GND
RES
+5V
P15
P14
P13
P12
P11
P10
P9
P8
5V
1K
470
BT1
BT2
BT3
BT4
IR LED
IR detector
left
right
RX
5V
GND
Parallax LCD

Design for safety

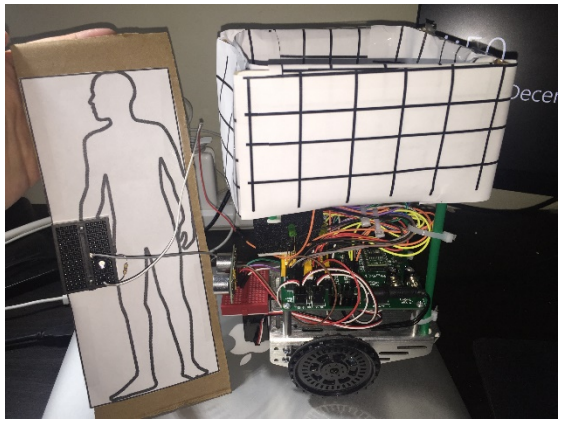
Hardware:

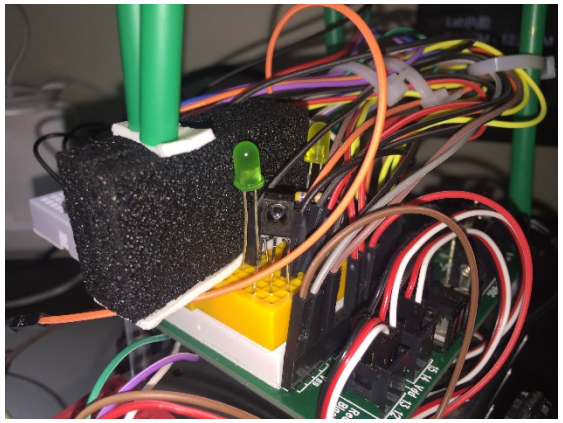
- Power switch.
- Reset button.

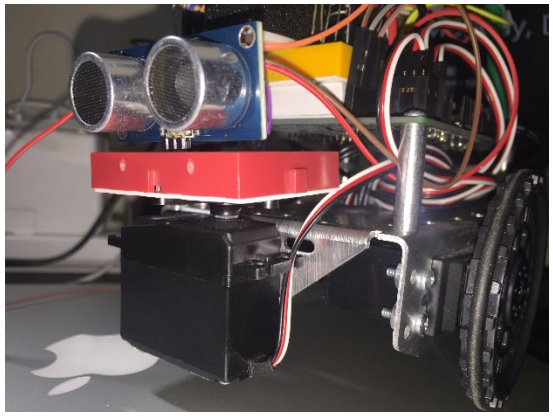
Software:

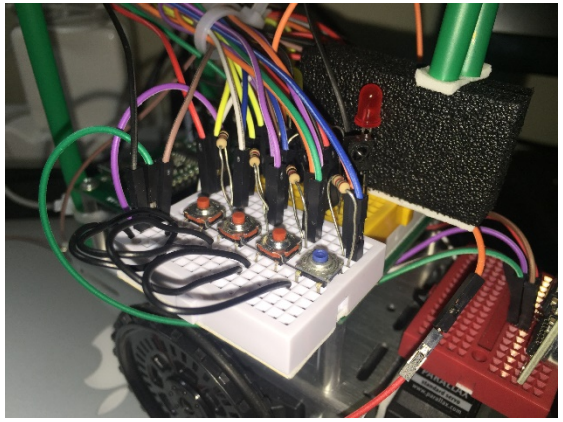
- Design philosophy "**stop first, passive guidance**".
- **Stop first:** It will only take action for the exact programed condition.
  - This design philosophy decreases the possibility of non-normal performance.
- **Passive guidance:** It will only be activated when customer is at the correct position.
  - Do not allow the cart randomly go straight, turn around, to find its customer if target is lost.
  - This design philosophy decrease the possibility of collision and helps protect other customers.

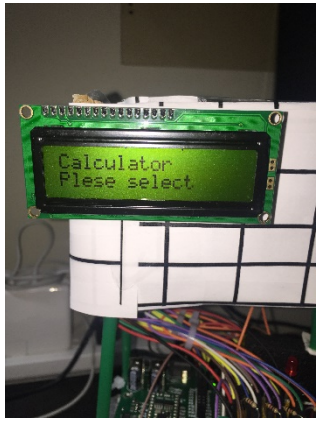
Working Demo

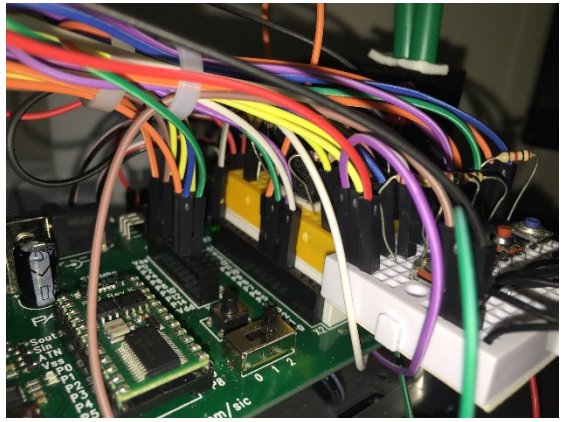












How Much Does It Cost?

Cost of Manufacture:

COMPONENT	QUANTITY	COST ($)	COST FOR MASS MANUFACTURING($)
BS2 BOARD OF EDUCATION	1	69.99	49.99
I/R SENSOR	2	1.98	1.49
PING SENSOR	1	22.49	17.99
SERIAL LCD	1	27.99	21.00
CART	1	-(19.99)	EXISTING(14.99)
WHEELS	2	7.99	6.99
SERVO MOTOR	3	51.99	34.99
LED	4	2.99	2.49
BREADBOARDS	4	10.99	5.99
I/R EMITTER	1	1.99	1.49
BATTERY	4	6.99	4.99
MISCELLANEOUS	-	10	4
TOTAL		**208.4**	**153.41**

Source: Parallax website

Future Improvement

- Better circuitry (Arduino Mega) and sensors
- Coded IR emitters and sensors
- Bar-code scanner or RFID
- More rugged wheels
- Budget alert feature

Conclusion:

OTHER USES:

- A robot that could escape from a maze
- A robot that aids with disaster relief
- A robot that will chase the ball