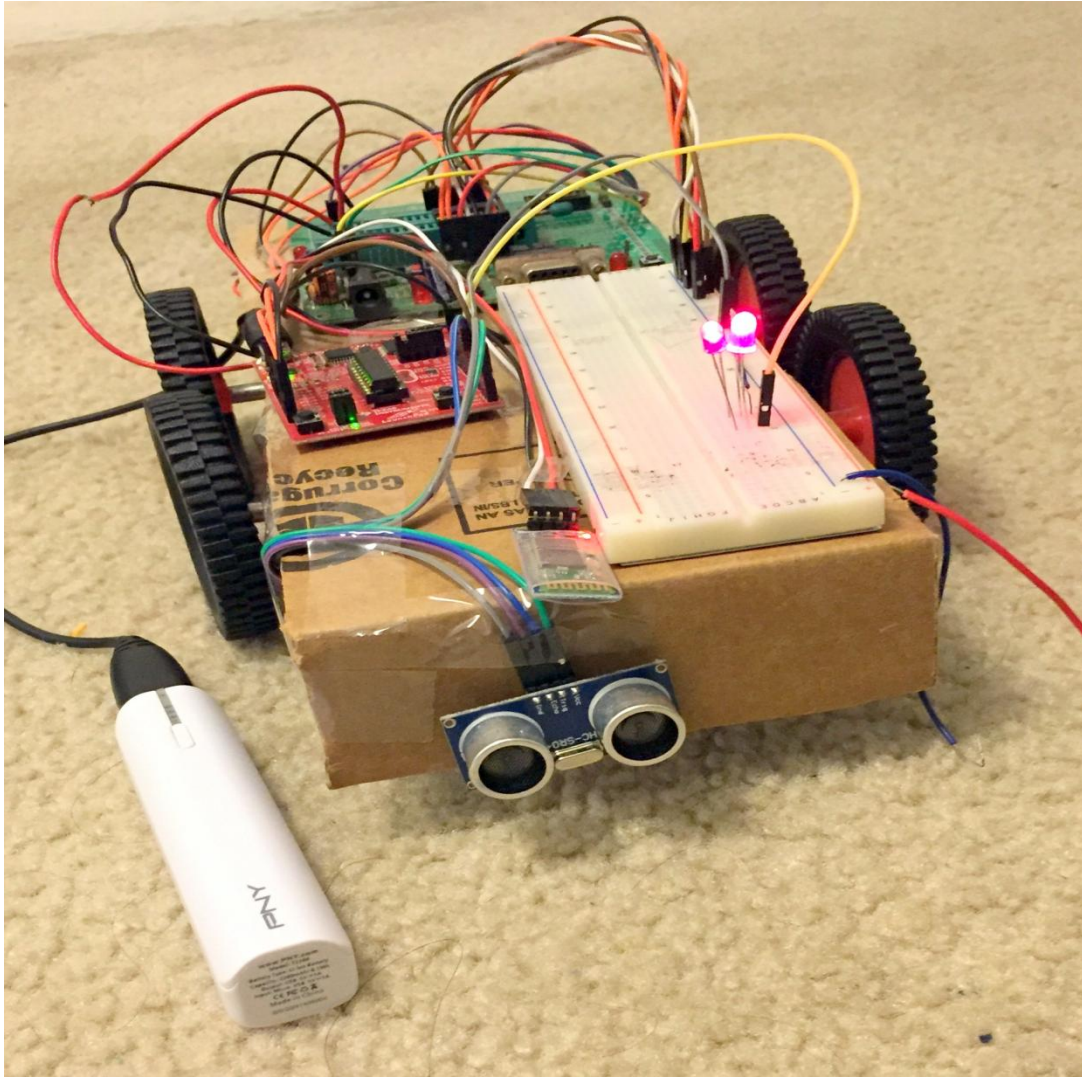


ECE 511 Project Report
Bluetooth controlled Toy car with Android app.



Submitted by Group 12

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ABSTRACT

The world is at the dawn of a smart phone era where everything in our day to day life is, and can be controlled via a smart phone. This smart phone usage is rapidly evolving and has moved on from being just a device for voice calls and texting into a daily driver, which is being used to automate and control various day to day objects near and around us, some of which include lights, televisions, sound systems, air conditioners etc.

So in such a time where people are migrating to a smart phone based life, exercising control over things near and around them, our project is aimed at developing a toy car to entertain kids and which can be controlled through a smart phone app. Making best use of the high end byte crushing processors in their hands, the app facilitates the user to control the toy car which attracts the child, plays with the child and also packs some additional features for entertainment of the user.

MOTIVATION

In today's fast pacing world more and more people are moving into smart phone technology. This is due to the various applications in the smart phones, that allow users to control and automate stuff around them at the press of a button, reducing the time they spend on work they consider unproductive. The time catered for the entertainment of a child is also diminishing in this regard.

SOLUTION

Our solution to this changing trend is to integrate the aspect of child entertainment into the smart phone, so that it aptly fits into this fast growing smart phone world. This is achieved by using an android app that communicates with an on board bluetooth module on the toy car. The user initially connects to the bluetooth on the car, and is then provided with a keypad wherein each key is programmed to perform a specific function. On the press of key:

1. The car starts in child mode wherein it detects a child following the car and moves away from the child.
2. The car starts in a Bluetooth control mode wherein the user is allowed to move the car around using arrow keys.
3. The car blinks various LED's and sounds buzzer to attract any children in the vicinity.

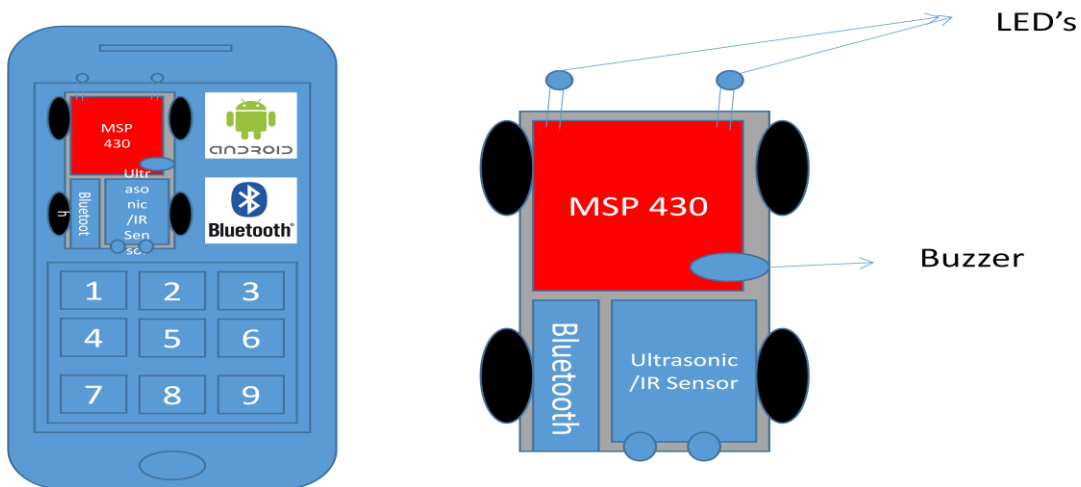


Fig 1. Block Diagram

DESCRIPTION

The overall interfacing of the various components is as follows :

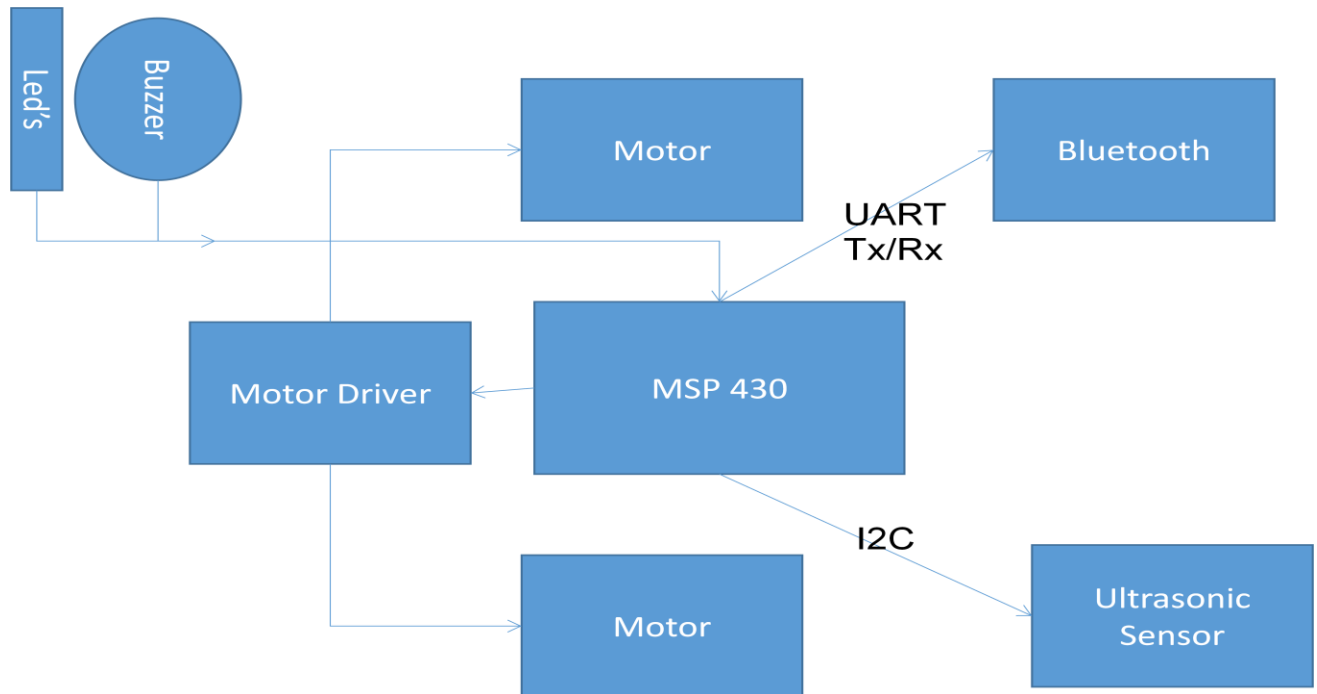


Fig 2. Interfacing Block Diagram

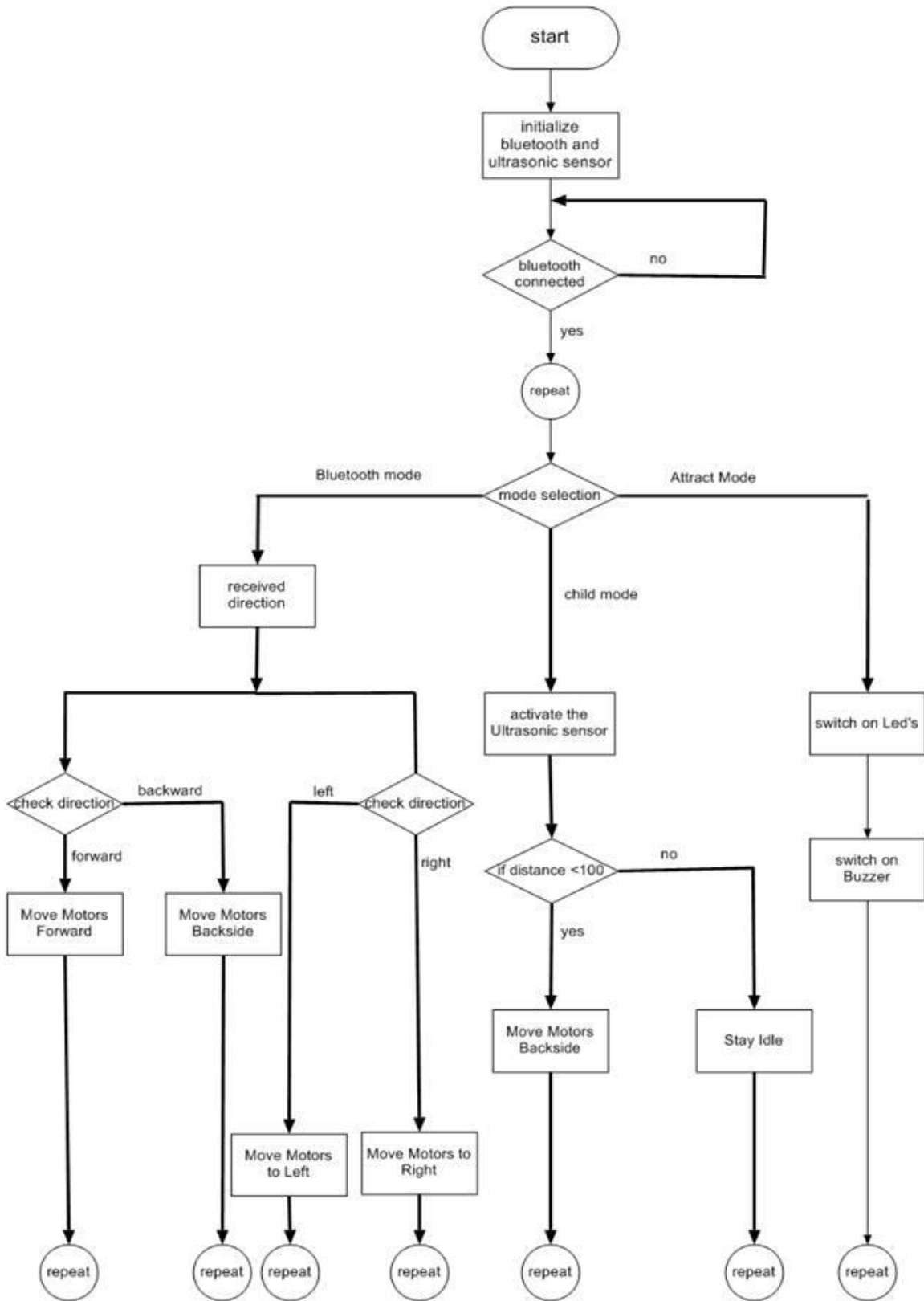
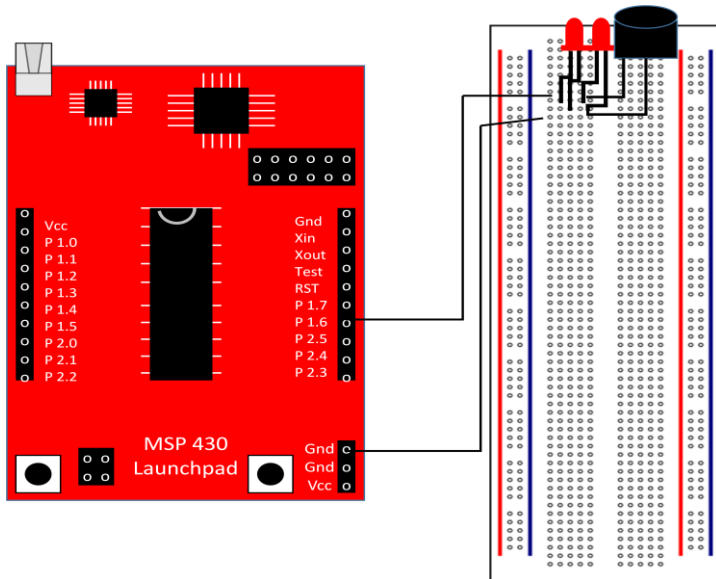


Fig 3. Flow Chart

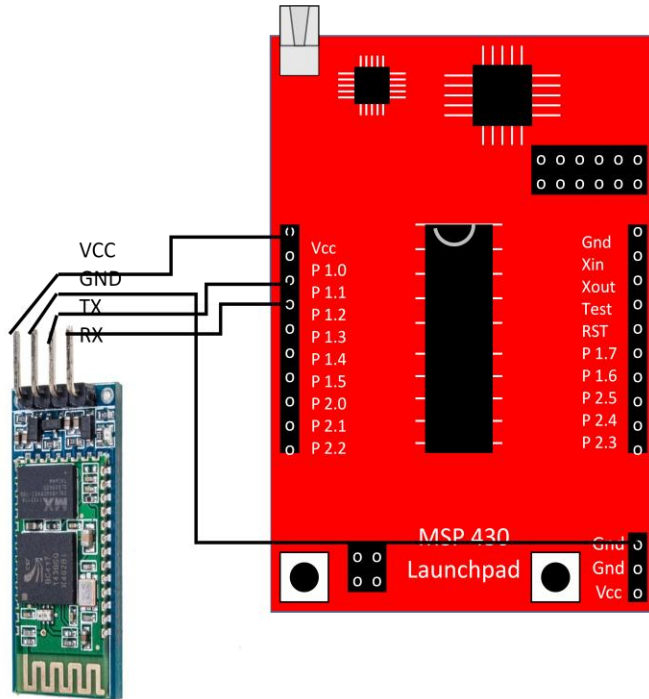
Led's and Buzzer interfacing :



The Led's and buzzer are interfaced to the P1.6 pin of MSP 430. They are used in the attract mode to blink alternatively to attract the child.

Fig 4. Led's and buzzer interface

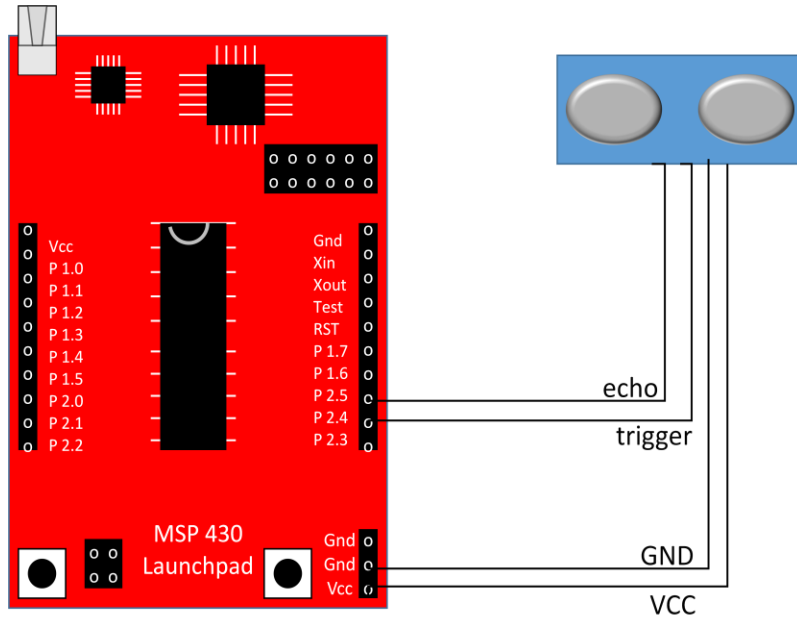
Bluetooth interfacing :



The Bluetooth module (HC-06) communicates with MSP 430 using universal synchronous and asynchronous receive transmit (USART).The transmission and receiver pins are connected to pins P1.1 and P1.2 and the VCC and ground are connected as shown. This is used to communicate with the android app.

Fig 5. Bluetooth interface

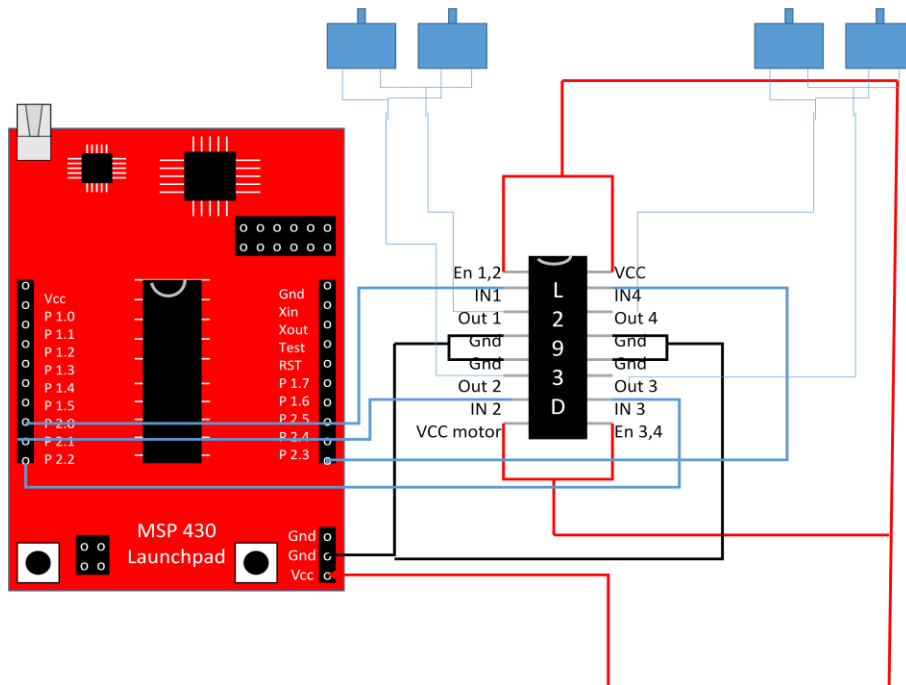
Ultrasonic Sensor interfacing :



The ultrasonic sensor HC-SR04 is used in child mode wherein it detects the child from a distance. It's input trigger pin is connected to pin P2.4 and it's output echo pin is connected to pin P2.5 of MSP 430. A pulse input is provided at the trigger pin and the echo is received at the echo pin.

Fig 6. Ultrasonic sensor interface

L293D and Motor interfacing :



The motors connected to the wheels of the car are interfaced via a motor driver L293D which is connected to MSP 430 using pins P2.0, P2.1, P2.2, P2.3. Based on the signals from the pins, the motors turn in forward or reverse directions and thereby moving the car forward, backward, left and right.

Fig 7. L293D and motor interface

RESULTS AND CONCLUSION

We were successfully able to complete all our goals that include

- ✚ Android Application
- ✚ LED and Buzzer interfacing
- ✚ Bluetooth Interfacing
- ✚ Motor and L293D Interfacing

All the components function as intended. We have learnt how to initialize and set the USART registers, how to interface an L293D with MSP 430 and set the corresponding pins on it to run the motors by using the PxIN, PxOUT and PxREN registers.

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APPENDIX

Task Division:

- Dheeraj Naga Prasad Kothapalli : LED's and Buzzer interfacing, Testing.
- Naveen Chandra Vallurupalli : Ultrasonic and motor interfacing , Debugging.
- Viswanath Anudeep Belaganti : Android App (Development, Testing and Debugging) and Bluetooth interfacing.

List of Components:

Component	Quantity	Cost
MSP 430 Launch Pad	1	\$7.50
Ultrasonic Sensor	1	\$5.00
Bluetooth	1	\$10.00
Motors	4	\$20.00
L293D	1	\$3.00
Led's	2	\$2.00
Buzzer	1	\$1.00
Total Cost		\$48.50