

## Intro to Embedded Systems: Final Project Report

### Team 5: Remote Control Car

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#### I. Objective

Our goal was to program a remote control car to move forward/reverse and left/right by programming an MSP430 microcontroller, along with other components such as LEDs, DC Motors & a joystick.

#### II. Methods of Operation

The car came with a rechargeable 6.4V battery pack and 2 DC motors. We soldered two wires to the positive & negative ends of the existing battery pack in order to supply power to other components controlling the vehicle. A 5V regulator was used to distribute power according to the needs of individual components. A joystick was used to receive input from the user and feed that input to the microcontroller, which then outputs this information to the chip controlling the 2 DC motors.

There is one motor in the front of the vehicle, controlling left and right movements, and one in the back, controlling forward and reverse movements. There are also 4 LEDs connected to indicate direction. There are two LEDs in the front—red indicates forward direction; blue is for reverse direction—and two LEDs in the rear of the vehicle—green is left and yellow is right.

#### III. Software Operation

The software uses a function inside of a loop called “getanalogvalues( )”, which constantly retrieves analog values transmitted from the joystick to the MSP430, converts them to digital values and stores them in two different assigned variables (one for left/right and another for up/down).

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After conversions are finished, the value stored then determines the direction of the motor. For instance, if the value for the variable “upDown” is less than 300, the red LED turns on, the rear motor receives input to move the car in the forward direction. If the value is between 450 and 750, the car stops until further instructions. A value greater than 800 prompts the car to move in reverse and the blue LED to turn on. The same procedure happens with the front motor controlling left and right direction.

### **IV. Future Enhancements**

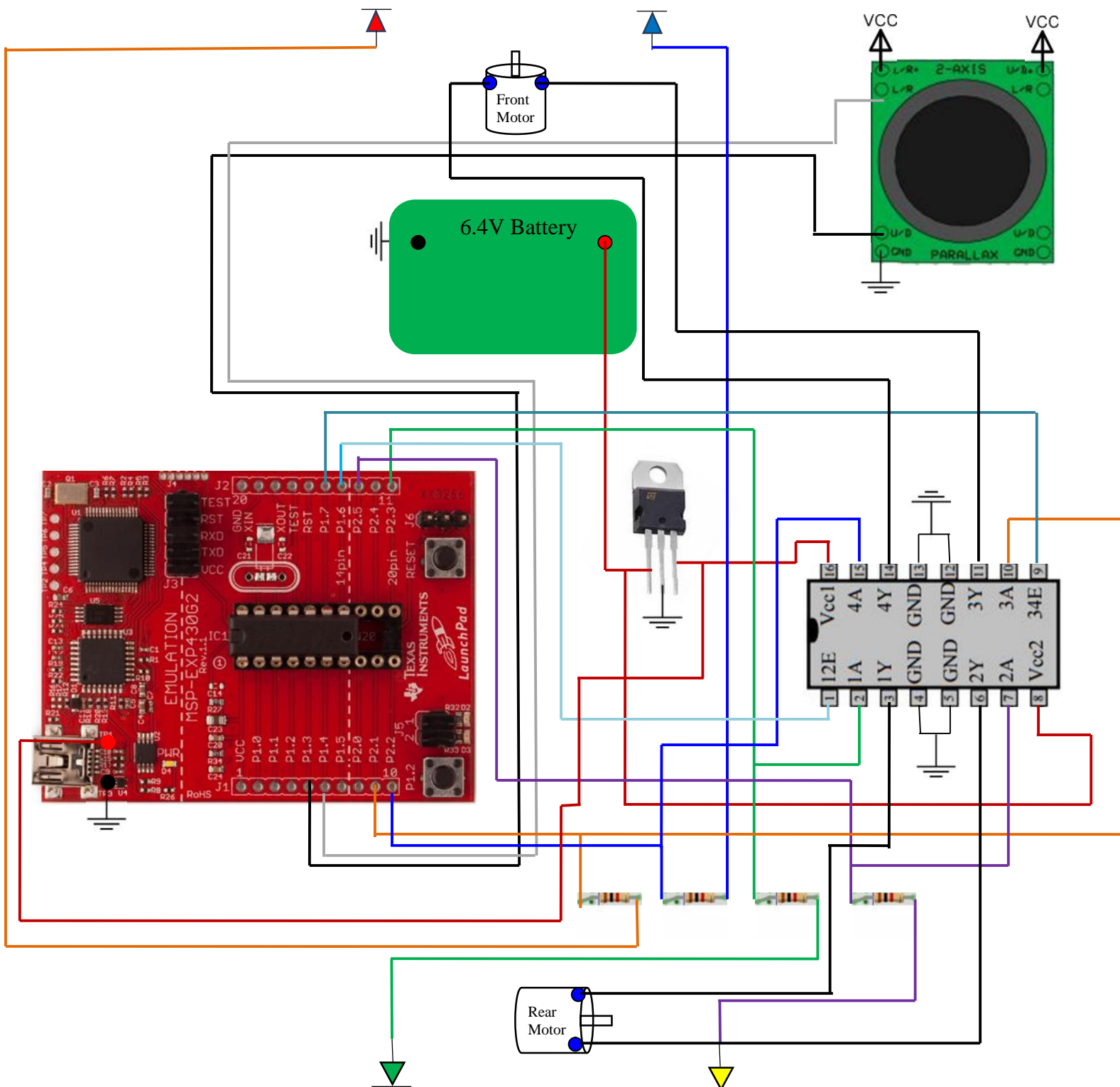
We would like to improve this car by making it wireless (possibly Bluetooth); giving it distance and object avoidance sensors & giving it the ability to follow its user. An alternate and more efficient power supply will also be used, as the battery pack for this car drains the battery relatively quickly, given all the components it's trying to power.

### **V. Components Used**

- ) MSP430 Microcontroller
- ) Remote Control Car
- ) H-Bridge chip (L293DNE)
- ) Parallax 2-axis Joystick
- ) 4 LEDs
- ) 5V regulator
- ) Four 1k Ohms resistors

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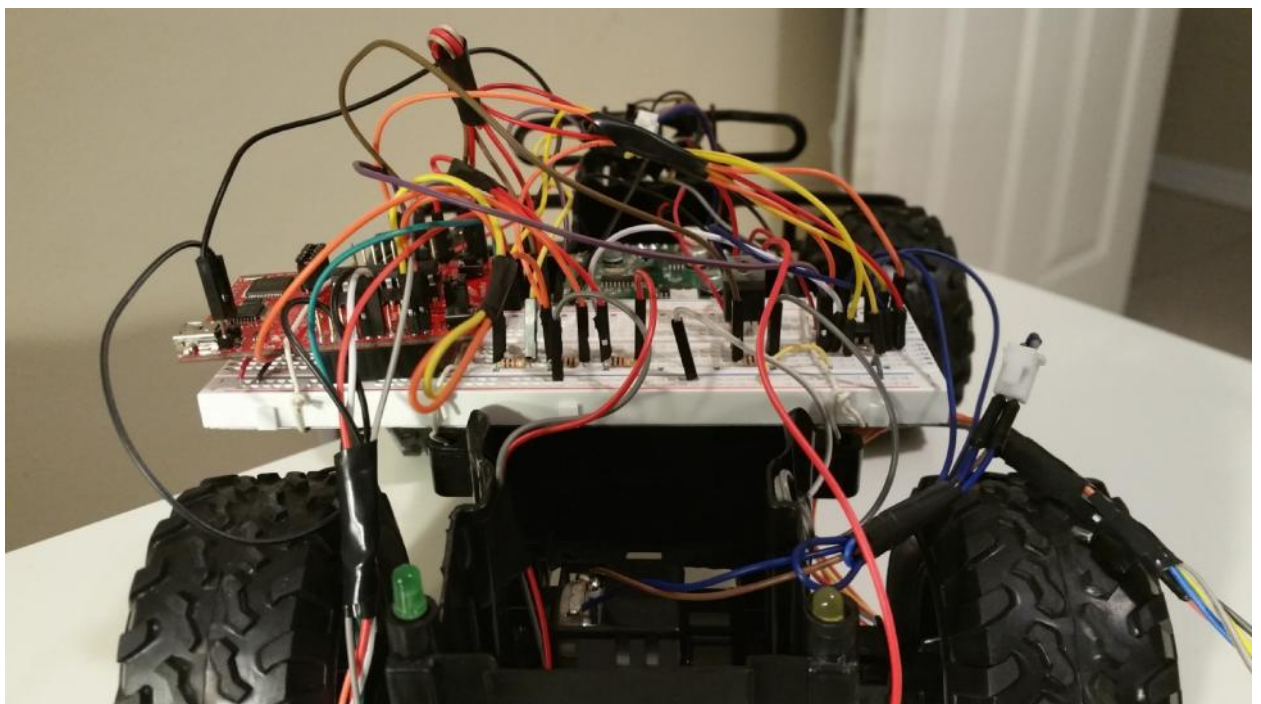
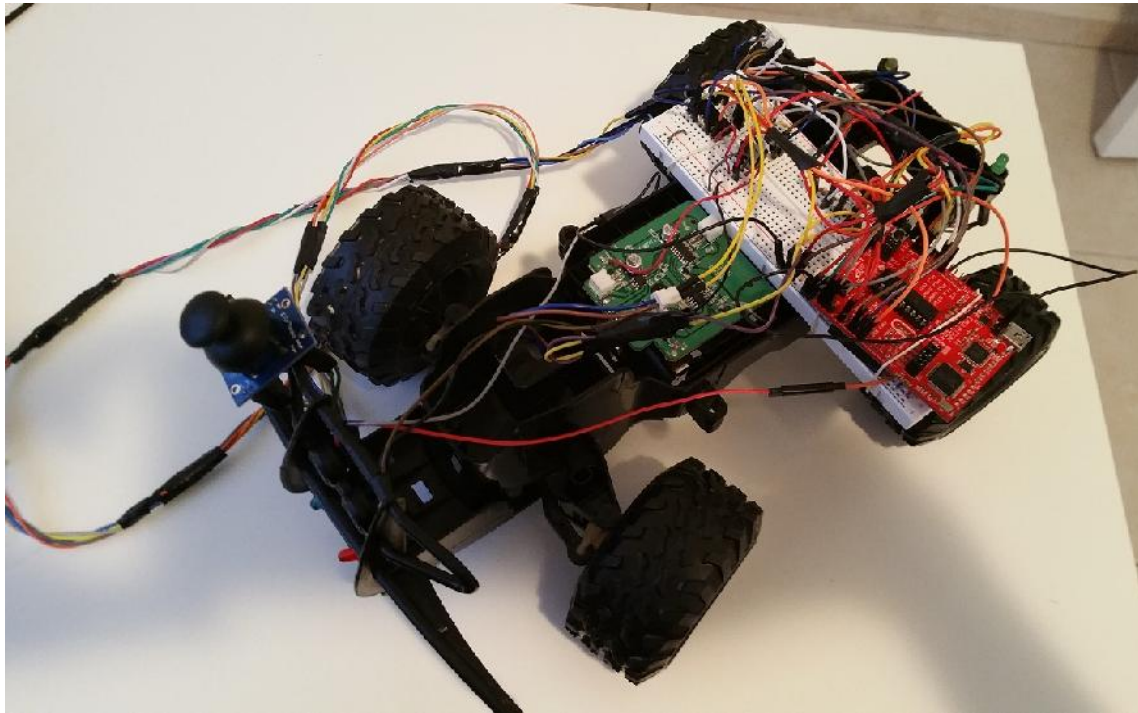
### VI. Block Diagram



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### VII. Completed Project Photos





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