Auto Vehicle Build Instructions

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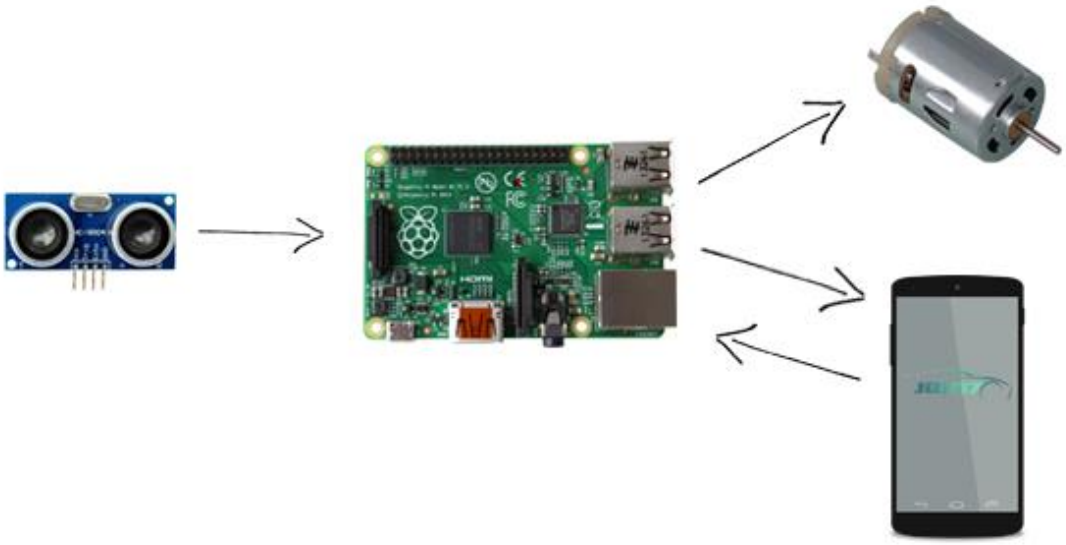
Correct web template usage

The content of this build file are instructions on how to recreate my groups project “Auto Vehicle”. Following them will help make it easier and faster for the induvial that is working on recreating the same project.

System Diagram

This project’s main goals are to first have sensor(s) checking for data which will affect the actuators depending on the results gotten back from the sensor(s), it then sends the data to the app associated with it to display them. Second have the actuators waiting to receive data from the app on which they will react accordingly.



Bill of Materials

Here is the all the required parts to this project the total price is shown as well. Just a note this Total price can be reduced if the parts are purchased online using websites like Amazon, we bought them from local stores in order to start working on the project as soon as we can.

Item	Description	Supplier	Part Number	Quantity	Price	Total(+HST)
Raspberry Pi B+	700MHz Broadcom with 512MB RAM	Sayal Elec.	N/A	1	$35.00	$ 39.55
4WD ROBOT PLATFORM	4-wheel Robot Smart Car Chassis Kits	Creatron inc	ROBOT-311308	1	$38.00	$ 42.94
L298N H bridge	Motor Drive Controller Board Module	Creatron inc	PROMR-025298	1	$14.00	$ 15.82
Mini Bread Board	Bread board	Creatron inc	PCBBA-120480	1	$ 3.25	$ 3.67
Jumper Wires	10pcs Multicolored Dupont Wires	Creatron inc	CONJU-062219	3	$ 2.99	$ 3.38
HC-SR04 ULTRASONIC SENSOR	Distance mesuring sensor	Creatron inc	SPEDE-000004	1	$ 4.99	$ 5.64
Scosche Portable Battery	Portable Back Up Battery	Scosche	IPDBAT2	1	$39.99	$ 45.19
Standoff F/F	22MM HEX STL Stanoff's	Sayal Elec.	237929	2	$ 2.99	$ 3.38
Philips Head Screws	SCREW METAL PHILIPS(100 PCS/PKG)	Sayal Elec.	54-421-100	1	$ 4.99	$ 5.64

Total Price	Price	Total (+HST)
Total Expenses	$155.17	$175.35

Time Commitment

The time given to complete this whole project was 15 weeks which is the whole 5th semester of my 3rd school year. With all the other class's work it actually took that long because I wasn't working on the project the whole 15 week's which means the time commitment could be much faster for an induvial that's only working on project.

Task	Time
Getting the parts	1 week
putting the chassis together	30 minutes
Setting up the sensor circuit	10 minutes
Setting up all the wiring, Connection to GIP0 on the PI	30 minutes
Writing the code for the motors	2 hours
writing the code for the sensors	3 hours

Mechanical Assembly

The main mechanical assembly done on my project was the chassis assembly where all the motors were mounted on the chassis and the tires attached to them.

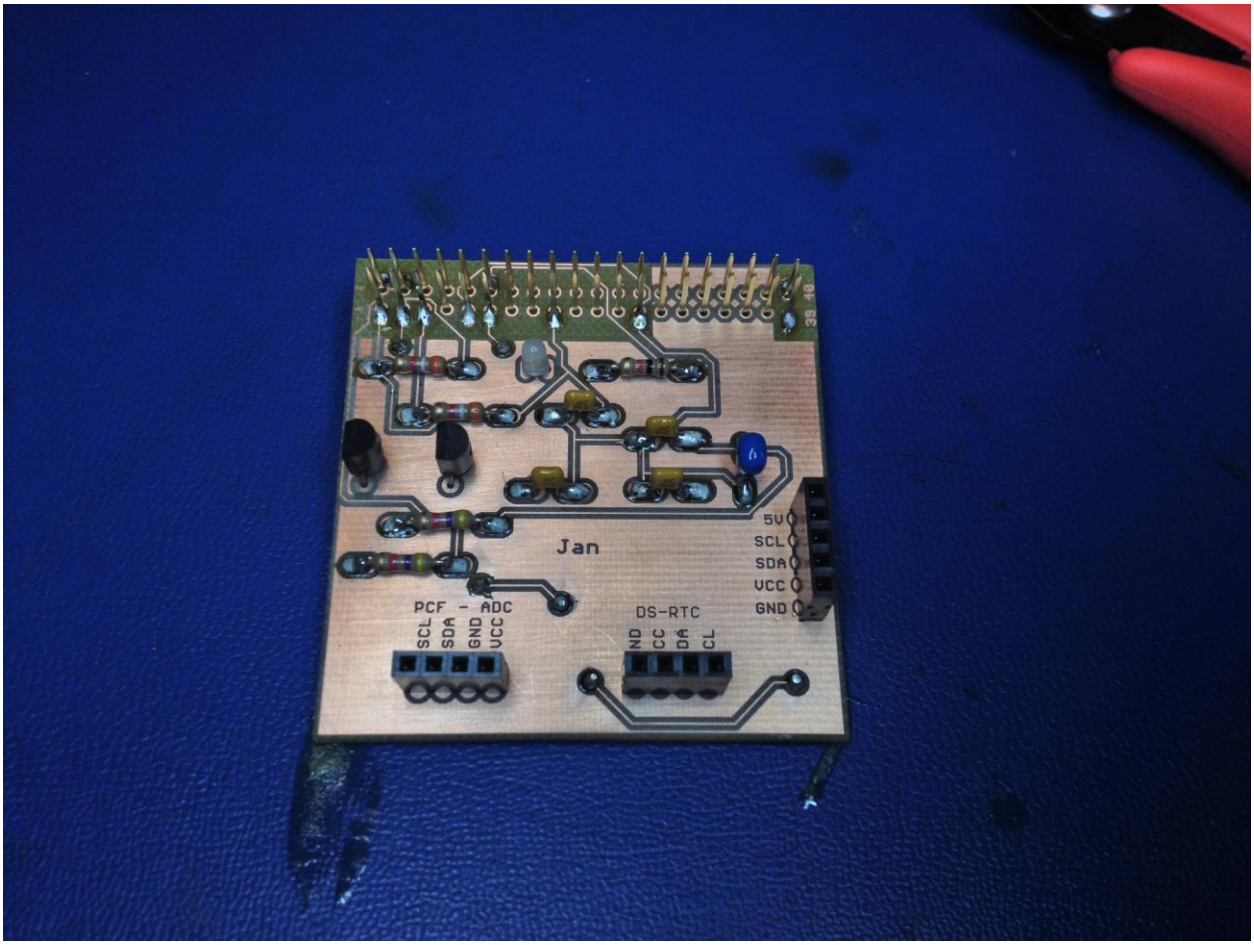
- To start unbox all the parts that come in the 4WD chassis kit then start by:
  - Putting the motor mounts on the chassis
  - Putting the actual motors on to the mounts
  - Putting the standoffs on the bottom chassis layer
  - Then screwing the top layer to the standoffs
  - Finally attach all the tires to the motors
- Then find good spots on the chassis to mount the raspberry pi, sensor circuit which is on a bread board and the H-driver
  - Start by putting the raspberry pi in a position in which all the wires can connect to
  - Then place the H-driver in a position close to the motors
  - And finally place the sensor circuit somewhere on the edge of the chassis so nothing will be interfering with the sensors like the wires.
- You don't have to but it'll be a good idea to solder the wires that are connected to the motors which will ensure that they won't displaced easily

PCB / Soldering

For my project I didn't have to solder anything although it's possible to create a PCB for the sensor(s) which means mainly less wires and no bread board needed. But I just choose to go with the bread board

A PCB was made as part of the class which is a sensor hat for the raspberry pi, it was a good way to help understand how to design a PCB of your own for the project. It was a good way to learn how to solder as well as we had to solder all the electronic components onto the PCB after it was printed.

Here is a picture of the PCB after I was done soldering it



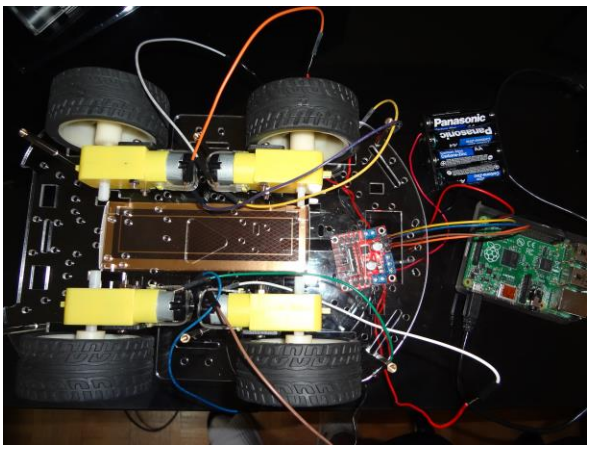
Unit Testing & Power Up

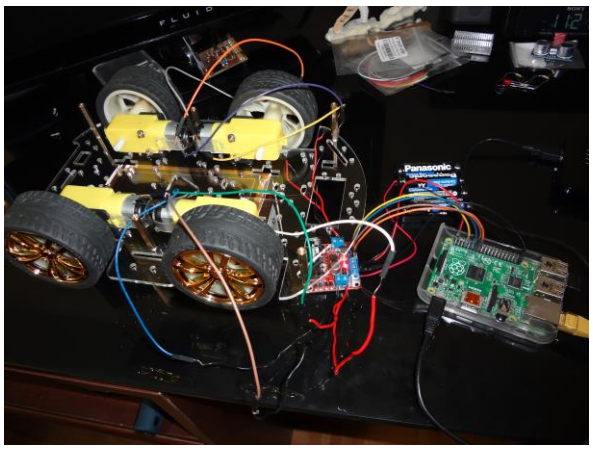
For my project I did many test before the power up those tests included:

- Motors test
  - After writing the code for the motors to just simply move the vehicle I tested that it was working by just running the program on the raspberry pi
- Sensor test
  - After writing the code for the sensor I started by testing the sensor measurement first just to see if I was getting the right data back, then I put it the main code to make the actuators react to the data gotten back from the sensor

For power up after finishing the test I had the vehicle programmed to preform random movements for a certain amount of time while also receiving data from the sensor and reacting to it.

Here are some pictures taken while I was doing the unit testing





Production Testing

For production testing after managing to get the code on the raspberry pi that sets up a server to be able to connect the app to it to have the RC feature working I started by doing the following tests:

- Test the code using the command line by using the telnet command to connect to the server
    - I was able to type in a command for example up or down to move the vehicle up or down
- Then for the my main test after finishing the part where I can control the car on the android app, I connected to the server program and took control of the vehicle moving it in any direction that I wanted

Conclusion

Is the project reproducible by following your instructions?

I believe following the instructions that I provided, it will be helpful to reproduce my project and also help the reduce the time to finish it as I have explain in detail what I have done to complete each part of the project