Go-Baby-Go
Senior Capstone Project

Assembly Manual

Team 22C

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Table of Contents

1. Introduction

The assembly manual instructs on how to implement modifications and operate a child's electric vehicle. Section 2 discusses to manufacturing procedures and is broken up into 2 sub-sections: Electric circuit and Safety hardware. Section 3 discusses how to operate the modified vehicle.

2. Manufacturing

The manufacturing process to implement the modifications was designed to allow any parent to build the car with little prior knowledge of the system components.

2.1 Electrical Circuit

This section explains how to set up the electrical components of the vehicle and implement the modifications.

2.1.1   Power Wires Preparation

1. Cut 16 total 16 gauge wires with wire cutters to specified lengths:4" (x14) and 2ft (x2)
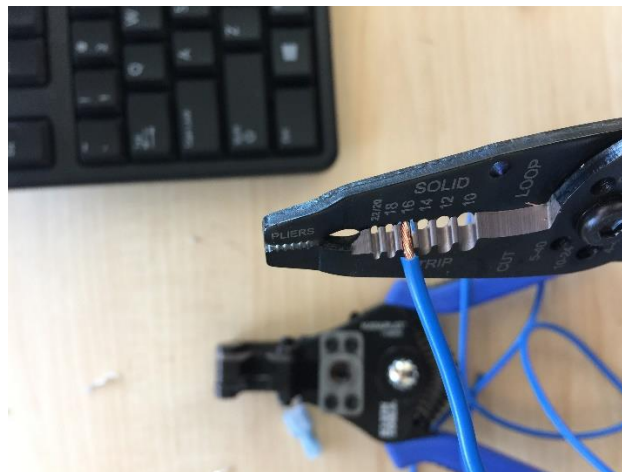2. Strip each end of the wires ½" with wire strippers

Figure 1: Wire Stripping

3. Crimp a male connector to one end of 10 – 4" wires
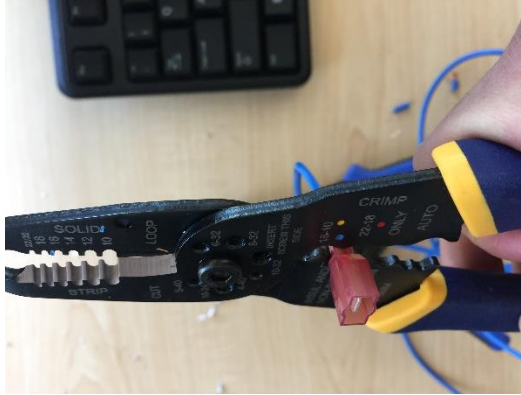4. Crimp a female connector to one end of 6 – 4" wires

Figure 2: Crimping a Female Connector

5. Wrap red tape to 3 of the wires with a female connector and to 8 of the wires with a male connector
6. Crimp the wires with female connectors in groups of 3 with a male connector
7. Cut, strip and crimp a female connector to the following wires:
    a. DC Motors for acceleration that are connected to the rear wheels
    b. DC Motor for steering that is connected to the steering wheel
    c. 12 V battery
    d. Black box power cables

2.1.2 Arduino and Breadboard Set-Up

1. Attach the provided wire pins and 10k ohm resistors from the Arduino kit to the Arduino and bread board seen in figure 3 and figure 4 below:
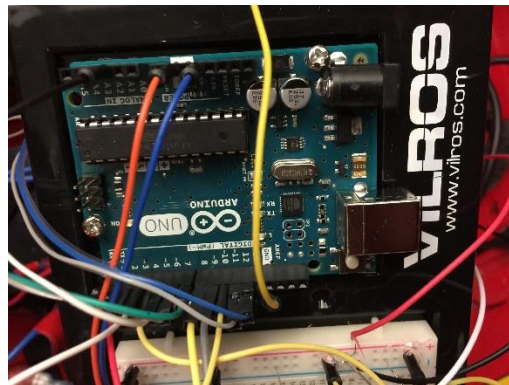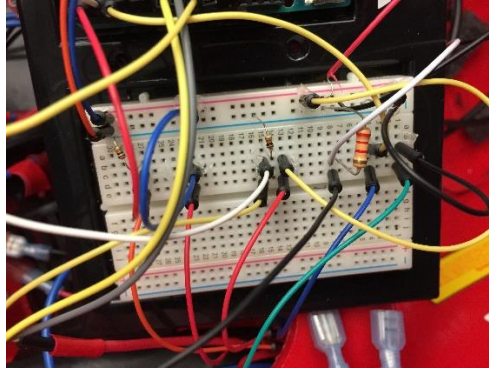

Figure 3: Arduino Set-Up

Figure 4: Breadboard Set-Up

2.1.3 Motor Drivers Set-Up

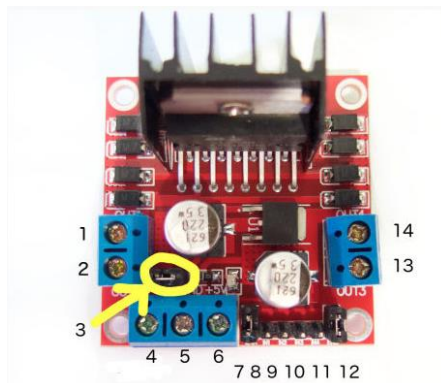1. Designate which L298N motor driver is the steering and the accelerator

Figure 5: L298N Schematic

2. For the steering motor driver, attach 4 male connected wires to ports 4,5,13 and 14 with the stripped ends (reference figure 5)
3. For the accelerator motor driver, attach 6 male connected wires to ports 1,2,4,5,13 and 14 with the stripped ends
4. Connect the wires from the Arduino set-up in figure 3 to the steering motor driver with the following configuration (reference figure 3 to figure 5):
    a. Pin 10 (figure 3) to position 12 (figure 5)
    b. Pin 9 to position 10
    c. Pin 8 to position 11
5. Attach the wires in 13 and 14 with the steering motor connectors
6. Connect the wires from the Arduino set-up in figure 3 to the accelerator motor driver with the following configuration (reference figure 3 to figure 5):
    a. Pin 13 to position 7
    b. Pin 12 to position 8
    c. Pin 11 to position 9
    d. Pin 7 to position 12
    e. Pin 6 to position 10
    f. Pin 5 to position 11

7. Attach the wires in 1 and 2 with the left accelerator motor
8. Attach the wires in 13 and 14 with the right accelerator motor

2.1.4 Joystick

1. Cut a hole out of the dashboard on the left side with plastic cutters
2. Insert the joystick into the hole and fasten with 2 screws
3. Attach the wires from the breadboard for steering to the joy stick, note the ends for positive and negative
4. Reference figure 6 for joystick layout

Figure 6: Joystick layout

2.2 Safety Hardware

1. Place the PVC foam over the PVC for the exact length of the side of the vehicle (x2)
2. Attach the 2 padded PVC with a screw at each end of the PVC
3. Attach the elbow joints to the end of the PVC to create the back frame
4. Attach the 5 point safety harness onto the PVC back frame with the straps provided
5. Drill 2 screws into the seat for security
6. Reference figure 6 for structure

Figure 7: PVC Safety Frame

3. Operation

This section will explain how to safely operate the vehicle.

3.1 Powering the Vehicle

1. Attach the wires in 4 and 5 (figure 5) to the 12 V battery with 4 going to positive and 5 going to negative for both motor drivers
2. Attach the DC connector to the 9V battery and insert into the Arduino
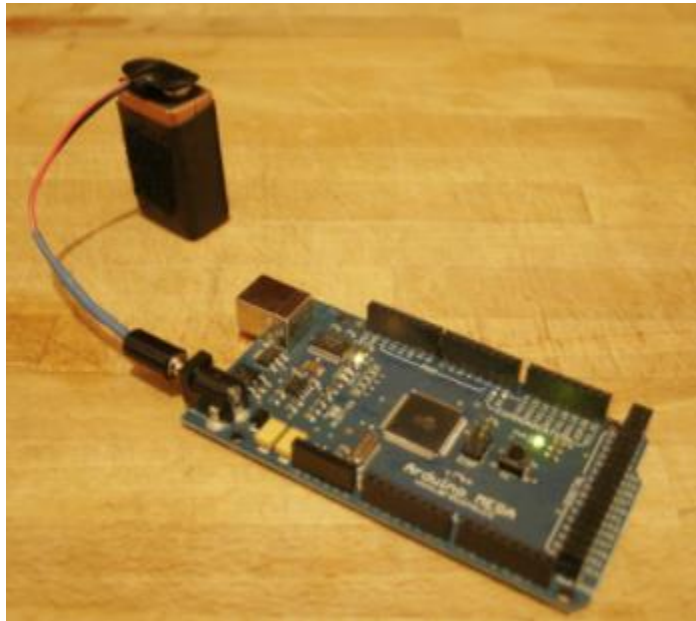3. Reference figure 8

Figure 8: Arduino 9V Battery Powering

4. Upload the Arduino sketch by attaching the USB cable to the Arduino from the computer

3.2 Vehicle Control

1. Accelerate the vehicle forward by pressing the red button on the joystick
2. Steer left by holding the red button and moving the joystick left simultaneously
3. Steer right by holding the red button and moving the joystick right simultaneously
4. Stop by taking hand off of the button
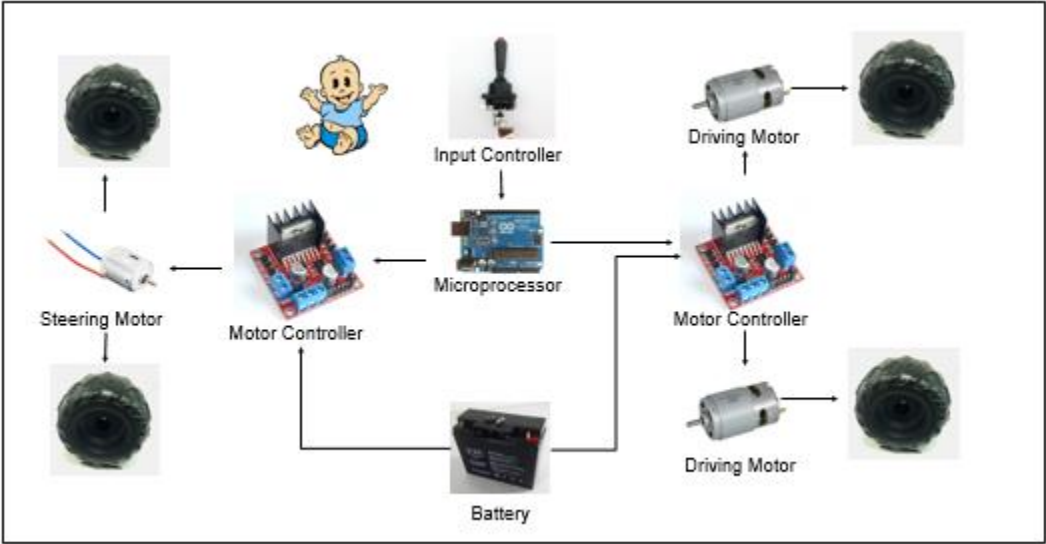
Appendix A: Final Design

Figure A1: Final Design

Appendix B: System Schematic

Figure B1: System Schematic