

Race Day

Today, you will be experiencing life on the racetrack firsthand as you customize your car, build your remote controller, and troubleshoot problems along the way.

Your pit crews are as follows:

Alex	Allison	Amirah	Andres
Anthony	Evan	Kalen	Idan
Kerri	Gavin	Natalie	Joey
Oliver D	Oliver T	Noah	Kabir
		Rishi	Marina

Step one: Choose your specialization

As a member of the pit crew, there are two specializations you may pick from, hardware and software engineers. The descriptions are as follows:

Hardware Engineers: You will be in charge of preparing the car for race day. This includes disassembling the current system and re-connecting the motors.

Software Engineers: You will be in charge of programming the steering wheel. This will include programming and calibrating a sensor.

There should be at least two hardware engineers and two software engineers on each team.

Name: _____ Specialization: _____

Step Two: Name your racing team

Team Name: _____

Hardware Engineers

Phase one: Disassemble the car

Remove the three screws from the bottom of the car. Carefully lift the plastic car body from the chassis.

Phase Two: Cut communication wires

Cut 4 wires from a spool. These should be very long, approximately the height of your shortest pit crew member. Be careful not to get these tangled

Phase Three: Disconnect the motor wires

Use your wire cutters to cut the red and black wires from the car. Try to cut them as close to the board as you can so they're as long as possible.



Phase Four: Reconnect motor wires

Use the soldering iron to connect the long wires you cut to the four motor wires. Remember to twist them around each other to make a good connection. You may need a hand from your pit crew. Use electrical tape to make sure the connection points don't touch each other.



Software Engineers

Phase one: Pick your steering

Your steering wheel will be your breadboard with the LIS3DH accelerometer on it. Decide how you want to move it to control your steering.

To turn right _____

To turn left _____

To speed up _____

To slow down _____

Phase Two: Plan the motor movement

For each of the four conditions, describe how each of the two motors should behave.

To turn right:	To turn left:	To speed up:	To slow down:
Right motor _____	Right motor _____	Right motor _____	Right motor _____
Left motor _____	Left motor _____	Left motor _____	Left motor _____

Phase Three: Connect your circuit

Connect the LIS3DH to your circuit using the I₂C communication protocol. Use 3.3k pull-up resistors on the SDA and SCL lines.

Phase Four: Program your remote

Use the example code on Schoology to code the behavior you outlined above. Your motors should each connect to an analog pin.

Hint: Decide whether you are going to use position or acceleration data. Play around with your sensor and note how the values change. Map this to the desired behavior. (analog pins send out values between 0 and 255)

All Engineers

Phase one: Connect your car

Connect your car to the circuit. Test it to see if it works. Change any code you want to optimize its performance.

Phase Two: Determine your racing order

We will race in order of height starting with the shortest and ending with the tallest. If two pit crew members are the same height, play “rock, paper, scissors” to determine order. After the race, write down what place you finished in.

Racer 1: _____ Place: _____

Racer 2: _____ Place: _____

Racer 3: _____ Place: _____

Racer 4: _____ Place: _____

Racer 5: _____ Place: _____