Checking Out the Tri-Wheel Car (Tri-Car)

1. The Tri-Car will be kept in MGL 1310. Go there to check it out or reserve it during off-hours.

2. To prepare to operate the car, first, turn off two switches.

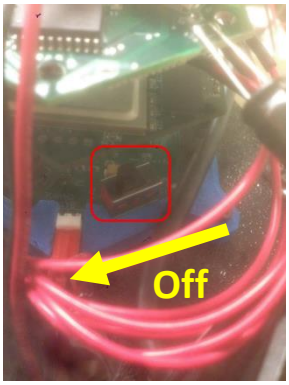

Figure 1

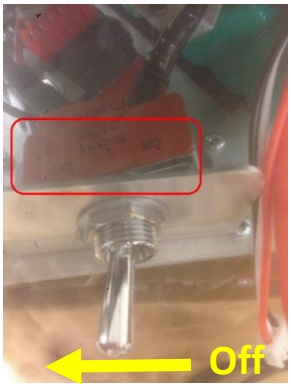

Figure 2

   a. Turn off the CPU's switch (Figure 1) and the motors' switch (Figure 2).

3. Connecting the batteries.

Figure 3

Figure 4

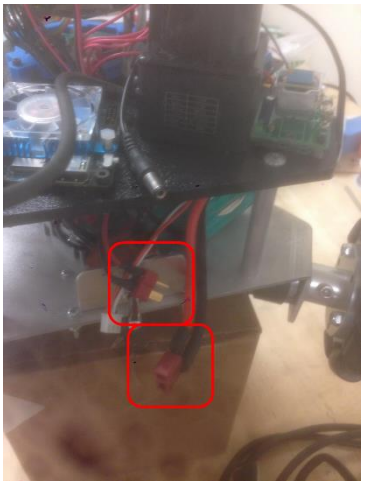

Figure 5

   a. In Figure 3, there are two batteries. "Dirty power" (that driving the spikey, inductive loads of the motors) is separate from clean "logic power" for the CPUs and sensors. Be careful with the thick wires and try to avoid pulling on the wires directly when plugging and unplugging the batteries. Never use a metal tool to pry the connectors apart! This can cause a short and start a fire.
   b. Figure 4 and 5 illustrate the two ports. The first port (dirty power) is about 15 volts and the second port (logic power) is about 6 volts. **Don't short the wires** if you have to measure the voltage because the batteries are very dangerous. It might catch **fire**.
   c. Connect both batteries. The two power supplies have different connectors to prevent mis-plugging.

Figure 6

Figure 7

d. If the voltage drops too low when you are using the car, you may need to change the battery. When you want to swap batteries, come to the MGL1310 and **fill out** an extra line in the form.
e. If you have any question, contact with MGL1310 or call Dohyenug Kim or send an e-mail.
    i. Name: Dohyeung Kim
    ii. E-mail: kim1774@purdue.edu
    iii. Phone: 765-237-1068

4. Put on the car on a box and turn on the CPU switch when ready to operate.

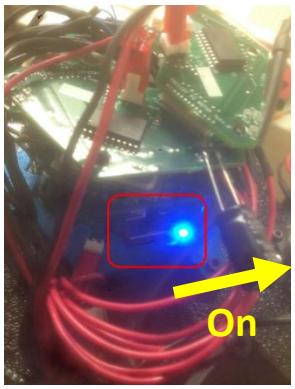

Figure 8: CPU

Figure 9: Motor, only when testing

a. First, turn on the CPU, as shown in Figure 8. The blue LED should glow.
b. KEEP THE MOTOR POWER OFF UNTIL THE CAR IS ON THE GROUND AND YOU ARE READY TO DRIVE! The motor power switch is the EPO (Emergency Power Off). Only turn on the motor power when the car is attended and someone is carefully watching for improper motions caused by software bugs. Turn "Off" the motor power switch to stop motor activity and preserve the diagnostic data on the CPU.
c. NEVER LEAVE THE TRI-CAR UNATTENDED WITH THE MOTOR POWER SWITCH IN THE "ON" POSITION. (Figure 9) Also, never switch motor power "ON" while the car is on a table or other surface that it might fall off.
d. If you plan to test the car on the workbench or table, place the car on a box to keep all three wheels out of contact with the surface. This allows you to test operation without risk of harm to the car or labmates.

5. Check the tri-wheel car's wheel motion before you put it on the ground.

6. Connect the XBee board to your computer's USB port to start and stop the car remotely (figure 10). You must use a terminal emulator program such as 'SSCOM32.exe'. Run it and select the BaudRate as 56000, as shown in Figure 11. You must select the proper COM port to connect via the USB. This will NOT be ports 1-4. (You can determine which port by right-clicking "Computer" and clicking "Manage" then selecting "Device Manager" and "Ports".) When properly connected, you should see the "TRICAR Test vX.XX" when the CPU is started. Then you can see the "Stop" signals. That means the car motors will not move.

Figure 10

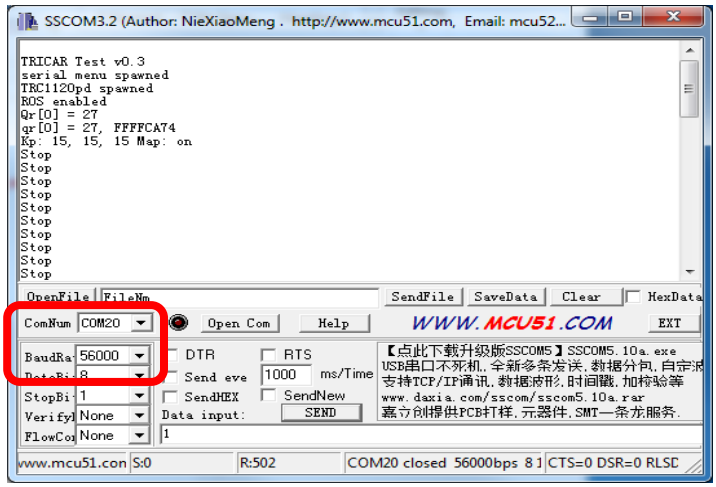

Figure 11

7. If you want to run the tri car, you have to push the 'A' key. See figure12. That's the output of the signals. **If you want to stop the car again**, you have to **push the 'S' key**. It's an emergency command to stop the car.

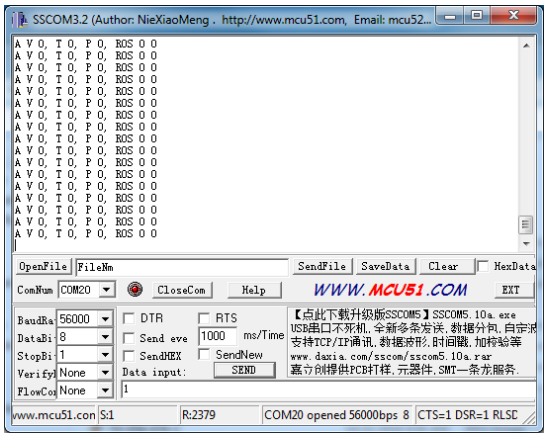

Figure12

8. Turn on the switch for the XU-4 Linux CPU and check the light in figure 13.

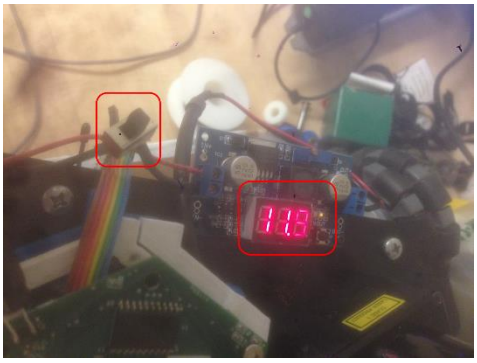

Figure 13

9. Next, check the connection to the USB hub with a keyboard and a mouse in figure 14. In figure 15, verify your thumb drive, the monitor cable (HDMI), power cable, USB serial port cable and Ethernet cable are connected. And then follow the 'HW5 Problem1' file procedure which is placed in the XU4 board's desktop screen. When you finished the software procedure, disconnect your thrum drive and the connection between the keyboard and mouse and XU4 board.

Figure 14

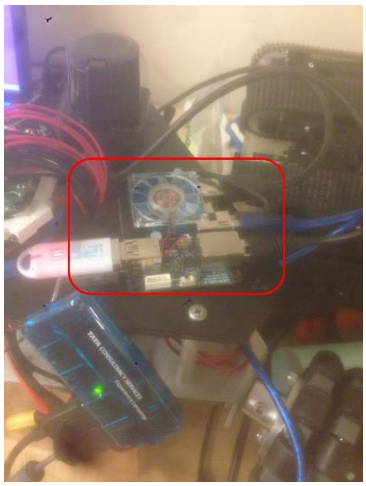

Figure 15

10. Always turn off the motor power switch when not testing the car. When finished using the car, please **turn off** the two CPU switches and **unplug** the two battery ports. Return the battery and the car to the MGL1310 and log out on the battery form.