Instructable

Step 1: materials

1. Order the listed items in the bill of materials, the optional price is in case this is your first project with no prior components.

Step 2: Preparing the Power Distribution Board

1. **Create the Power Distribution Point**:

   o Use a copper print plate to create a power distribution point for the 5V output from the L298N.

   o Solder three wire terminals for the 5V line and three for the ground line onto the print plate.

   o Ensure that each terminal is securely soldered to avoid loose connections during operation.

2. **Connecting to the Motor Driver**:

   o Attach the 5V terminals to the 5V output of the L298N module.

   o Connect the ground terminals to the GND pin of the L298N.

Step 3: Wiring the Motors

1. **Solder the Wires to the Motors**:

   o Solder the wires from the L298N module to the DC micro metal gear motors. Attach OUT1 and OUT2 to one motor and OUT3 and OUT4 to the other.

   o Test the motor connections to ensure proper rotation direction and functionality.

2. **Mounting the Motors**:

   o Attach the motor brackets to the robot platform.

   o Drill holes on the left and right sides of the platform for mounting the motor brackets.

   o Secure the motors onto the platform using screws.

Step 4: Mounting the Components on the Platform

1. **Glue the Battery Holders and Switch**:

   o Position the battery holders and the switch on the robot platform where they won't obstruct other components.

   o Use hot glue or epoxy to secure them in place.

2. **Mount the Arduino, L298N, Boost Converter, and HC-05**:

   o Glue the Arduino, L298N motor driver, boost converter, and HC-05 Bluetooth module onto the platform. Make sure they are spaced well for easy wiring.

3. **Install the QTR-8A Sensor Array**:

- o Glue the QTR-8A sensor array at the front of the platform with the sensors pointing down towards the ground.
- o Drill four holes at the front of the platform near the sensor array to attach the ball rollers.

Step 5: Electrical Connections

1. **Power Wiring**:

   - **Switch to Boost Converter**:
     - Solder the positive wire from the battery pack to one terminal of the switch.
     - Solder a wire from the other terminal of the switch to the positive input of the boost converter.

   - **Battery to Boost Converter**:
     - Connect the negative wire from the battery pack to the negative input of the boost converter.

   - **Boost converter calibration:**
     - Measure the output of the converter with a multimeter and turn the potentiometer until you reach 12V.

   - **Boost Converter to L298N**:
     - Connect the positive output of the boost converter to the 12V input of the L298N module.
     - Connect the negative output of the boost converter to the ground terminals.

2. **Arduino and Sensor Connections**:

   - **Grounding**:
     - Connect a wire from the common ground terminal to the GND pin of the L298N.
     - From the common 5V terminal, connect a wire to the Arduino's 5V pin and another to the VCC input of the HC-05 Bluetooth module.

   - **Sensor Power**:
     - From the Arduino, connect the 5V pin to the VCC input on the QTR-8A sensor array.
     - Connect the Arduino's GND pin to the GND pin on the QTR-8A sensor array.

3. **Signal Wiring**:

   - **HC-05 Bluetooth Module**:
     - Solder a voltage divider with 1kΩ and 2kΩ resistors onto a print plate.
     - Connect the RX pin from the HC-05 to the input of the voltage divider.

- The 2kΩ side of the divider goes to GND, and the 1kΩ side goes to the TX port of the Arduino.

- **Motor Driver Control**:

  - Connect Arduino digital pins 4 and 5 to IN1 and IN2 of the L298N, respectively.

  - Connect digital pins 7 and 8 to IN3 and IN4 of the L298N.

  - Connect pins 9 and 10 to ENA and ENB to control motor speed via PWM.

4. **Sensor Array Wiring**:

   - Attach jumper wires from the QTR-8A sensor array to the analog inputs A0 to A5 on the Arduino.

Step 6: Final Assembly and Testing

1. **Check Connections**:

   o Review all connections to ensure proper placement and secure soldering. Verify that no wires are crossing or shorting.

2. **Power On and Test**:

   o Insert batteries into the holders and switch on the power.

   o Use a multimeter to check for correct voltage levels at various points in the circuit.

   o Program the Arduino with a basic code to test motor operation, sensor readings, and Bluetooth communication.

3. **Fine-Tuning**:

   o If the motors are not turning in the desired direction, reverse the wiring on the L298N outputs.

   o Adjust the sensor array position for optimal line detection.

4. **Programming:**
   o With a micro-usb you can connect to the Arduino IDE and program to the Arduino leonardo

Ball rollers

QTR-8 Sensor

ARDUINO

**Voltage divider
1kohm-2kohm**

**Boost converter
module**

HC-05 bluetooth

L298N

**75:1
Gear motors**

**60mm
diameter
Wheels**

2x18650 Li-ion

QTR-8 sensor array (6 IR reflectors)

| 1 | 2 | 3 | 4 | 5 | 6 | Vcc | GND |

Arduino

| A0 | A1 | A2 | A3 | A4 | A5 | Vin | GND | 5V |

| RX | TX | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |

HC-05

| RXD | TXD | GND | VCC |

2Kohm

1Kohm

L298N

| OUT1 | OUT4 |
| OUT2 | OUT3 |

| 12V | GND | 5V | ENA | IN1 | IN2 | IN3 | IN4 | ENB |

Boost module

| OUT+ | OUT- |

| IN+ | IN- |

batteries
2x18650 Li-ion