

CMPE 443 PRINCIPLES OF EMBEDDED SYSTEMS DESIGN

Term Project Interim Report #001

“LED and Motor Driver Connection”

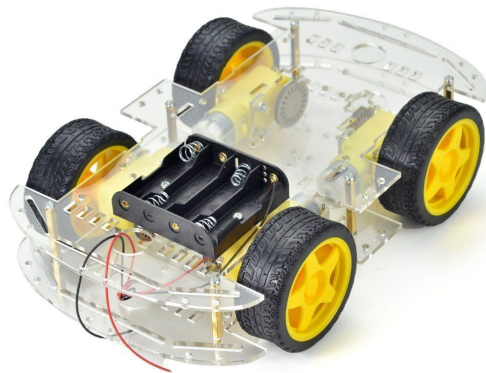
Motivation

In this report, you begin to build your robot platform. This report includes the LED and Motor Controller parts of the robot platform. By doing this report, you will learn:

- to determine the correct pins on a microcontroller board with the desired functionality
- to drive multiple LEDs
- to drive multiple DC motors

1) Problem Description

In Term Project, you will use 4-Wheel Robot Smart Car Chassis via LPC4088 Board and with various sensors and other components. This robot chassis is consist of 4 DC Motors, 4 Wheels and Battery Holder. However, in this report you will add 1 Motor Controller (L298N Dual Motor Controller) and 4 LEDs to the system.



Currently your robot will be controlled via the joystick which is located on the LPC4088 Experimental Base Board. When joystick button is pressed, robot should start to perform the task which are listed below. However, when you release the pressed button, robot should not stop that task, it should do the last task.

- When Joystick Left button is pressed, your robot should start to rotate counter-clockwise direction (Point Turn is not necessary).
- When Joystick Up button is pressed, your robot should start to travel in forward direction.
- When Joystick Down button is pressed, your robot should start to travel in backward direction.
- When Joystick Center button is pressed, your robot should stop.
- When Joystick Right button is pressed, your robot should rotate clockwise direction (Point Turn is not necessary).

Also, your robot should have an ability to change its speed. However, this parameter will be hard-coded which means that we will give you the speed parameter.

Your robot car have 4 LEDs which are located to the Front-Left, Front-Right, Back-Left and Back-Right The state of the LED is changed according the action which robot performs:

- When robot stops, all the LEDs should be turned off.
- When robot travels in forward direction, Front-Left and Front-Right LEDs should be turned on and the other LEDs should be turned off.
- When robot travels in backward direction, Back-Left and Back-Right LEDs should be turned on and the other LEDs should be turned off.
- When robot rotates counter-clockwise direction, Front-Left and Back-Left LEDs should blink (2 times in a second) and the other LEDs should be turned off.
- When robot rotates clockwise direction, Front-Right and Back-Right LEDs should blink (2 times in a second) and the other LEDs should be turned off.

2) Block Diagram

3 pts

Show the inputs and outputs of this system with a System-Level Structural Diagram.

3) Sequence Diagram

5 pts

Draw the Sequence Diagram of this system. Directed edges between the blocks show how HW and SW parts interact with each other. We expect you to write variable and/or port names with their corresponding values on the edges if necessary. Note that direction of the edge is important because it shows the flow between blocks.

Write an explanation below the sequence diagram where you define your variables and values written on the edges.

4) LED Connection

All the components which are controlled via LPC4088 should be connected to the board. Therefore, you should determine the pins and their functionalities.

Draw a table which shows:

_____ 4 pts

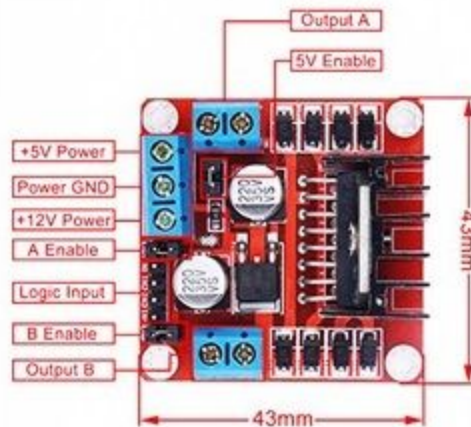
- The LED Name: The name of the LED which connected to pin such as Front-Left.
- LPC4088 Pin: Write the name of the pin which is connected to the LED.
- Pin Functionality: Write the functionality of the pin (used functionality).
- Reason: Write a small description for why you select that pin.

After you determine the all the pins, *draw the circuit schematic for the LED circuits.*

_____ 2 pts

5) Motor - Driver Connection

You will control 4 DC Motor with only 1 Motor Controller. L298N Dual Motor Controller can adjust the speed of the motors and also it can change the rotation direction.



Your robot should travel in forward and backward directions and it should also rotate CW and CCW directions. Describe Motor - Driver connection and draw a basic schematic to show the motor controller pins and DC + and - terminals connection. (Do not connect driver to LPC4088 in this section) _____ 2 pts

6) Driver - Board Connection

Motor Driver should take the commands from the board. On L298N Motor Driver, there are 2 Enable pin and 4 Logic pin.

Your robot should go forward, backward and rotate CW and CCW. Also, it should have an ability to change its speed. Draw a table which shows: _____ 4 pts

- Motor Driver Pin Name: The name of the Pin on the Motor Driver such as IN1.
- LPC4088 Pin: Write the name of the pin which is connected to motor driver pin.
- Pin Functionality: Write the functionality of the pin (used functionality).
- Reason: Write a small description for why you select that pin.