THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
Department of Electronic and Computer Engineering
ELEC 1100

Laboratory 5: Assembly of Navidroid (4%)

A) Objectives:

- To build the Navidroid following the step-by-step instructions from the Navidroid's Guide.

B) Equipment and necessary documents:

- Edroid Navidroid assembly kit with tools
- Navidroid's Guide – Navidroid robot manual

C) Experimental Procedures:

Experiment 1: Enhancing your PWM and Motor Driver circuit (~1 hour)

Step 1: Add one more comparator 74HC85 as shown in Figure 1 next page.

- Remove the DIP switch part (including the 4 resistors) you used in Lab 03.
- Connect both **LQ** and **RQ** to 5V for now ($Q_3Q_2Q_1Q_0$=1111). We will connect them to Arduino board in next lab.
- **L_PWM** and **R_PWM** signals are generated from pin 7 of the two 74HC85 comparators.

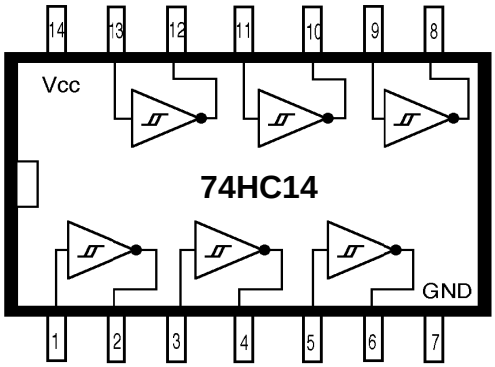
Step 2: Measure **L_PWM** and **R_PWM** using the DSO. Demo to your TA for the signature.

Q1: What is the frequency of the L_PWM and R_PWM signals on DSO?

Step 3: Connect your robot car's second motor to the motor driver (pins 11-14 of L293) as the right motor shown in Figure 1. Determine the pin numbers at 74HC14 to form the inverters associated with your motor circuit.

Step 4: Connect **Ldir** and **Rdir** (motor direction controls) to 0V (ground) for now.

Demo to your TA that: (1) the two motors turn; (2) the two motors can turn in opposite direction by changing Ldir & Rdir signals (Pin 2 & 15 of L293) from 0V to 5V.



Experiment 2: Building the Navidroid (~40 mins)

Build the Navidroid according to the Navidroid robot manual (Canvas → Course ELEC1100 → Files → Labs → Navidroid_robot_manual_ELEC1100_full). Show the Navidroid to your TA.

Remember to clean up your bench! A messy table will cost 3 points!

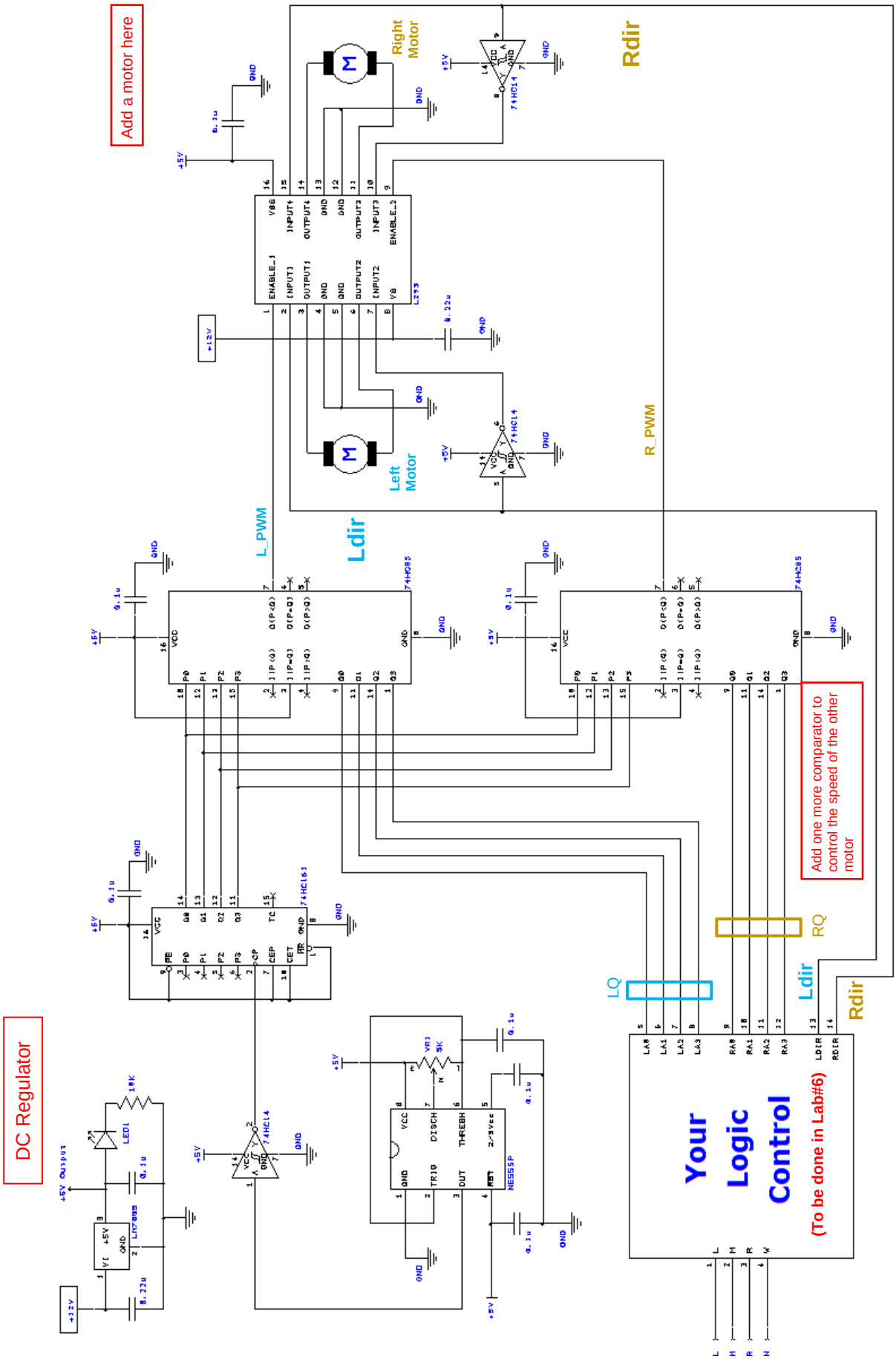


Figure 1: Refined PWM Circuit

ELEC 1100 Laboratory 5: Summary Sheet

Group Number: _____

Name: _____ Lab Partner: _____

Student ID: | | | | | | | | | Student ID: | | | | | | | | |

Experimental Part

Experiment 1: Enhancing your PWM and Motor Driver circuit

TA's signature: _____ (Measure **L_PWM** and **R_PWM** signals using DSO with $Q_3Q_2Q_1Q_0$=1111)

Q1: What is the frequency of the PWM signals on DSO?

L_PWM signal: _____

R_PWM signal: _____

TA's signature: _____ (The two motors are turning and can turn in opposite direction by changing DIR signals)

Experiment 2: Building the Navidroid

TA's signature _____

Mini Debugging Report

During your circuit building (at Labs 2-5), you probably have encountered several bugs in your circuit. Describe one of the bugs you encountered.

Describe clearly: (1) how you discovered it, (2) how you found out the source of the bug, (3) what the bug is, and (4) how you fixed it.

Write your answer on the back of this page (at least 100 words).