

MEE210 ELECTRICAL MACHINES – Experiment #7

**LABORATORY CONTENT:** Driving a DC motor using H-bridge

**EQUIPMENT REQUIRED:** (students should bring electronic components)

**Qty Description**

- 1 Voltage supply (will be ready at lab.)
- 1 Oscilloscope (will be ready at lab.)
- 1 DC motor
- 2 \*IR2101 MOSFET driver
- 4 \*IRFZ24 n-type MOSFET (these components may fail during application, advised to bring extra for backup)
- 2 \*1N5819 Schottky diode
- 4 10  $\Omega$  resistor
- 2 500  $\Omega$  resistor
- 2 1 $\mu$ F capacitor
- 1 LM555 timer
- 1 100k  $\Omega$  potentiometer
- 2 2k  $\Omega$  resistor
- 1 \*1N4004 diode
- 1 0.1 $\mu$ F capacitor
- Wiring equipments (jumper cables, crocodiles, etc.)

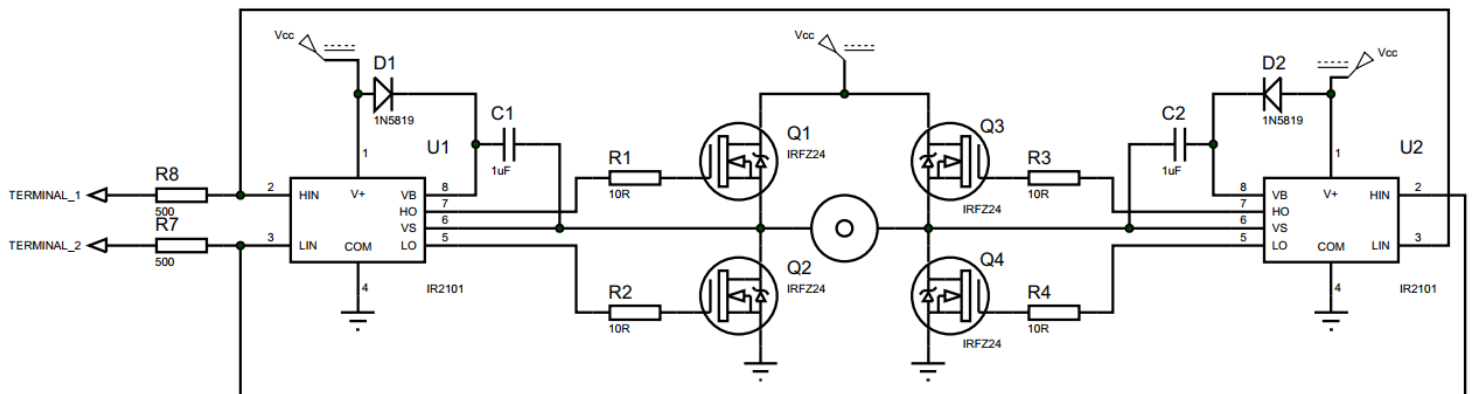
**\* You may use equivalent components as well, just look up the datasheet for the component specifications**

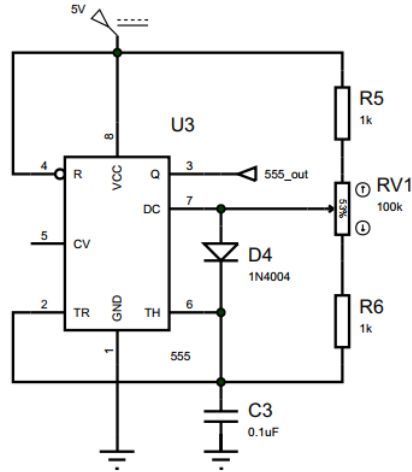
**PRELIMINARY QUESTIONS: !!! (no preliminary report is required, but the steps should be followed before the session)**

1) Build up a H-bridge circuit for driving a DC motor. H-bridge circuit should be built with MOSFETs. You may use MOSFET drivers. The motor should be controlled with an adjustable PWM signal input (not by a function generator, but with 555 timer circuit). Both circuits are given below. You may use them **(do not bring L298N-like ready-to-use H-bridge circuit, you should build your own driver)**.

**EXERCISE STEPS:**

1) Apply the circuits below. Show rotary motion in both directions and change the motor speed by changing PWM duty cycle. If you are using the circuit below, for one direction motion you should apply 555\_out to **TERMINAL\_1** and **GND** to **TERMINAL\_2**, and for the other direction, vice versa.





**POSTLIMINARY QUESTIONS:**

- 1) Research about Power MOSFETs (P-MOSFET).
- 2) What is the purpose of MOSFET drivers? Briefly explain.
- 3) Compare MOSFETs with BJTs as in H-bridge circuit applications.

**IMPORTANT NOTE:** For the next experiment, you need to build up some contents. So, the ones who are not prepared for the experiment will not be allowed to participate.