Experiment 7: Controlling a DC Motor

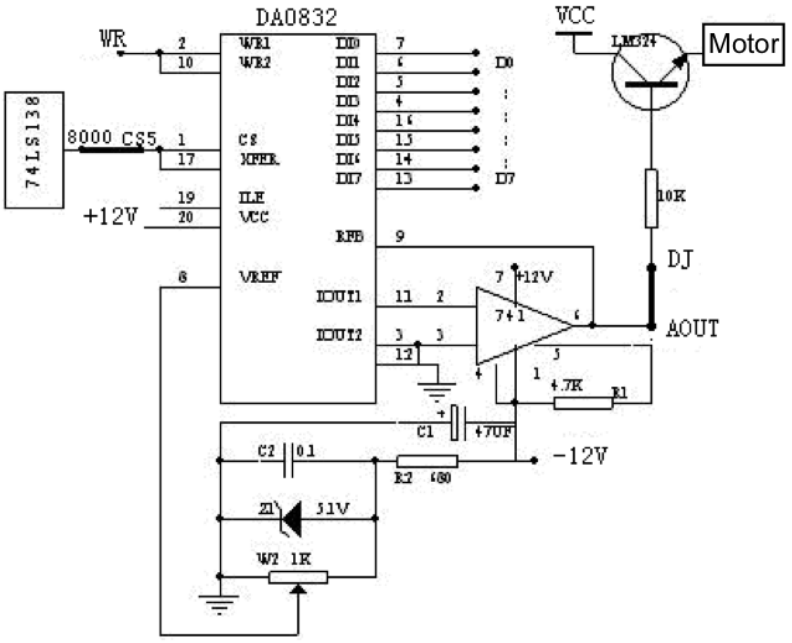
Objectives

- Master the driving principle of a DC motor
- Understand the method of DC motor speed regulation
- Use a touch sensor to control the operation of a DC motor

Introduction

The purpose of this experiment is to examine the operation a DC motor to learn its basic wiring connections and how to control its speed by using DAC.

The wiring diagram of the DC motor driving circuit on MML8086K3 is shown in the figure below. The output of the 0832D/A conversion circuit is amplified to drive the DC motor. The DAC receives a code between 0-255 from the microprocessor to control the speed of the DC motor.



Experimental Connection of the DC motor

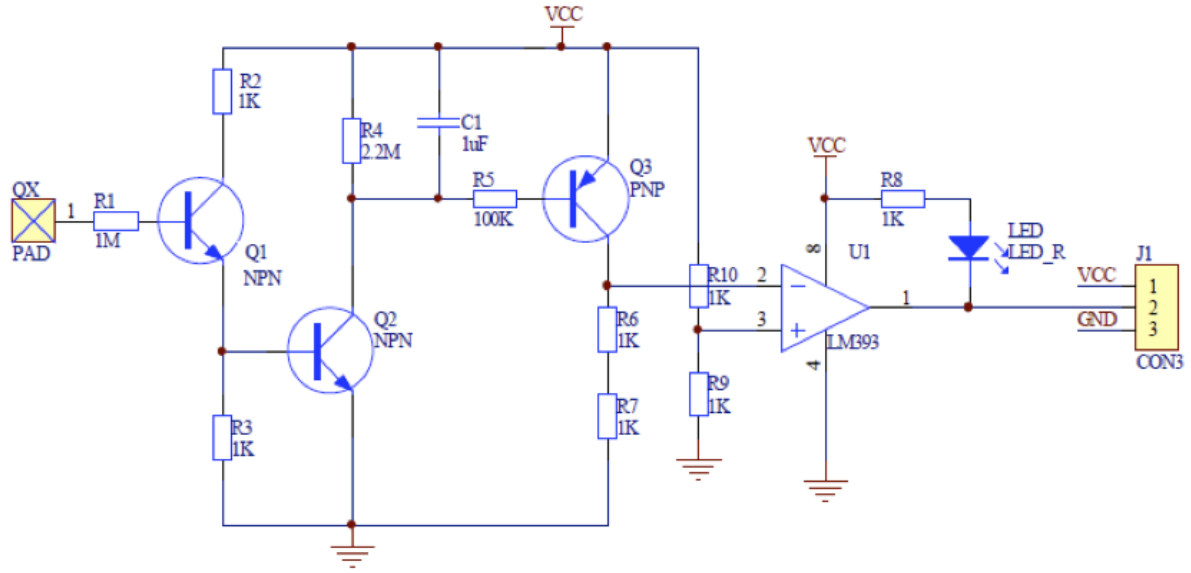
- The dc motor is connected to DAC at address 8000H
- 8255/IO interface is used to: a touch sensor (a0), INC push button (a1) and DEC button (a2).

DAC0832 Experiment module (C3 area)	**System signal area (D2 area)**	**A3**
CS5	8000H	
WR	IOWR	
AOUT		DJ
JX2（D0~D7)	JX17（D0~D7）	

Touch Sensor

The human body can be seen as a conductor, such as electromagnetic induction can be formed in the wire around the induced voltage in the human body. In this experiment, we will use a touch sensor (schematic shown below) which transforms a human touch to a TTL-level output voltage through the use of an amplifying circuit, a signal shaping circuit and a comparator. The output signal is active low and can be read by a microprocessor as a digital signal.

三、 **Schematic diagram of touch sensor module**



Experiment Task

You are required to write a code to control the operation of a DC motor by using a touch sensor and two push buttons according to the following logic:

- The motor is initially turned off.
- The touch sensor is used to control the operation of the motor (turn ON/OFF). Any touch on the sensor should **toggle** the status of the motor.
- Once the motor is on, its speed is controlled by two push.
    - **INC push button** increases the speed of the DC motor by 10%. Once the motor reaches its maximum speed, this button becomes useless.
    - **DEC push button** decreases the speed of the DC motor by 10%. Once the motor reaches its minimum speed, this button becomes useless.

- Check the correctness of the dc motor speed by using an **oscilloscope**

Note: all read signals from sensor and buttons are active-low