Laboratory 6: Arduino microcontroller

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Introduction

Ardunio is a programmer friendly microcontroller which has a limitless applications starting from simple glowing LEDs, switching the motors, reading sensors, controlling actuators and many more. In todays laboratory, you will be setting up the software development platform and downloading an already existing code to control LEDs and motors. Again no lab reports needs to be developed for this lab experiments. However you will be asked to demonstrate certain operations while performing experiments and lab reports score will be given accordingly.

Getting started: Software installation

Open the Arduino kit and install the software as suggested in Page 03. Assemble your arduino board and breadboard to the base-board as shown in Page 02. Assemble your circuit as shown in Page 08. Download the code as suggested and upload it to your Arduino board. Check whether your LED is glowing as suggested in the manual.

Measure the voltage coming from arduino pin 13 and current along the LED and resistor when you are applying digital logic "HIGH" and digital logic "LOW". Measure peak-peak voltage across resistor and arduino pin 13 from Oscilloscope.

Change the digitalWrite function call to analogWrite as suggested in the manual and check the waveform in the Oscilloscope. Can you provide a triangular signal to LEDs using arduino board ?

Eight LEDs

Assuming eight LEDs represent one data in the digital data bus. Modify the glowing of LEDs from 00 to FF in the span of 16 seconds. Each data should stay for 1 second.

Driving DC motor

Do the experiment as suggested in the manual. In addition show the following two experiments to the instructor:

- Glow an LED while motor is spining.
- Glow an LED while motor is not spining.

Decoder 74HCT138

Use 74HCT138 (1-of-8) decoder to demonstrate its operation. The datasheet for 74HCT138 is uploaded in the LMS. Depending on three inputs (A0, A1 and A2), one of the output line will be LOW. All other lines are active HIGH. Two of the enable inputs are set to GND (Active LOW) and one is set to 5V. Please check the datasheet of 74HCT138 for providing active LOW and HIGH signals to enable inputs.

Couple of exam questions you could think of is to demonstrate multiplexer using decoder, demonstrate (1-of-16) or (1-of-64) decoders using multiple 74HCT138.