Title:

Familiarization with a microcontroller, the study of blink test and implementation of a traffic control system using microcontrollers.

Theory and Methodology:

Arduino refers to an open-source electronics platform or board and the software used to program it. Arduino is designed to make electronics more accessible to artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. An Arduino board can be purchased pre-assembled or because the hardware design is open source, built by hand. Either way, users can adapt the boards to their needs, as well as update and distribute their own versions.

A pre-assembled Arduino board includes a microcontroller, which is programmed using Arduino programming language and the Arduino development environment. In essence, this platform provides a way to build and program electronic components. Arduino programming language is a simplified from of C/C++ programming language based on what Arduino calls “sketches,” which use basic programming structures, variables and functions. These are then converted into a C++ program. Other open-source electronics prototyping projects, such as Wiring and Processing, provide the underpinnings for Arduino technology. Google Android Open Accessory Development Kit is also based on Arduino.

Overview of Arduino Board:

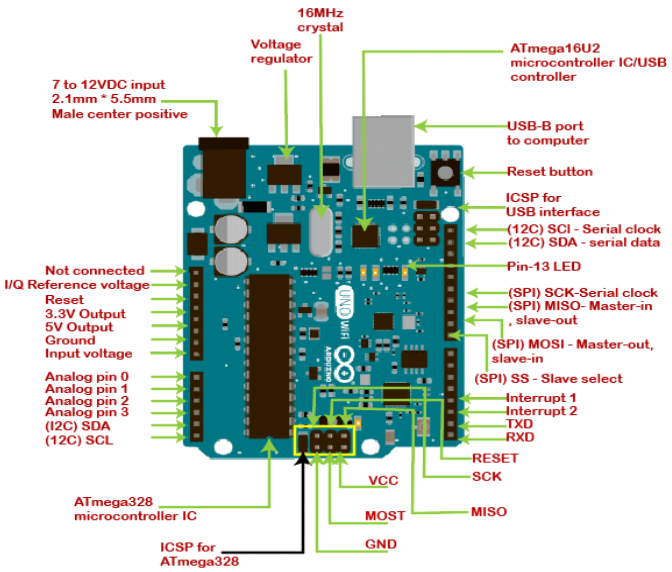


Figure 1: Pinout diagram of a Arduino Uno Board

Apparatus:

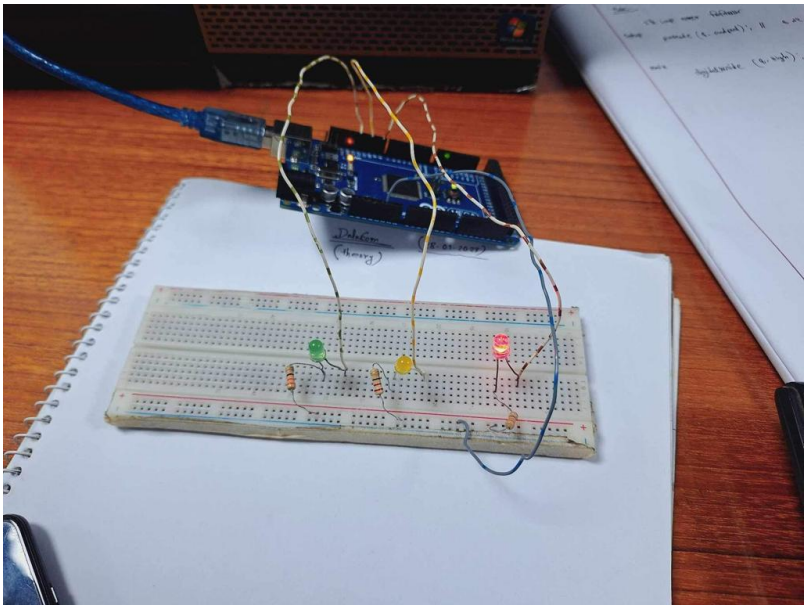
1) Arduino IDE
2) Arduino mega 2560 board
3) LED lights (RED, GREEN, and YELLOW)
4) Three 200 ohms resistors
5) Jumper wires

Experimental Procedure:

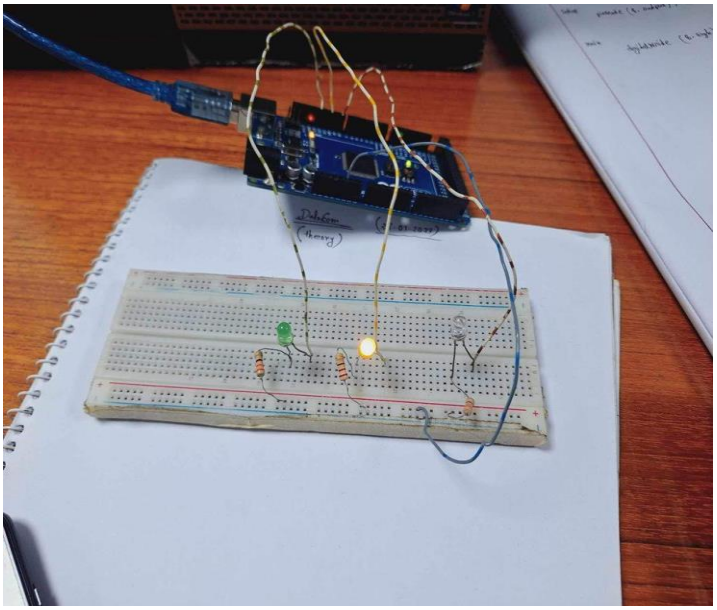
First of all, we understood the theory and methodology of a Arduino Uno board. Then we collected a Arduino Uno with some LED's, resistors and jumper wires. The experiment was divided into two parts. The first part was LED light blinking. So, we took a Red Led and built the circuit according to the lab manual. Then we connected the Arduino board with the computer and burned the code for LED blinking into the board with the help of the IDE. We did the same thing for the Traffic Control System. We built the circuit according to the lab manual. Then we wrote the code for the Traffic Control System in in the Arduino IDE. Then we burned the code into the Arduino Board.

Hardware Pictures

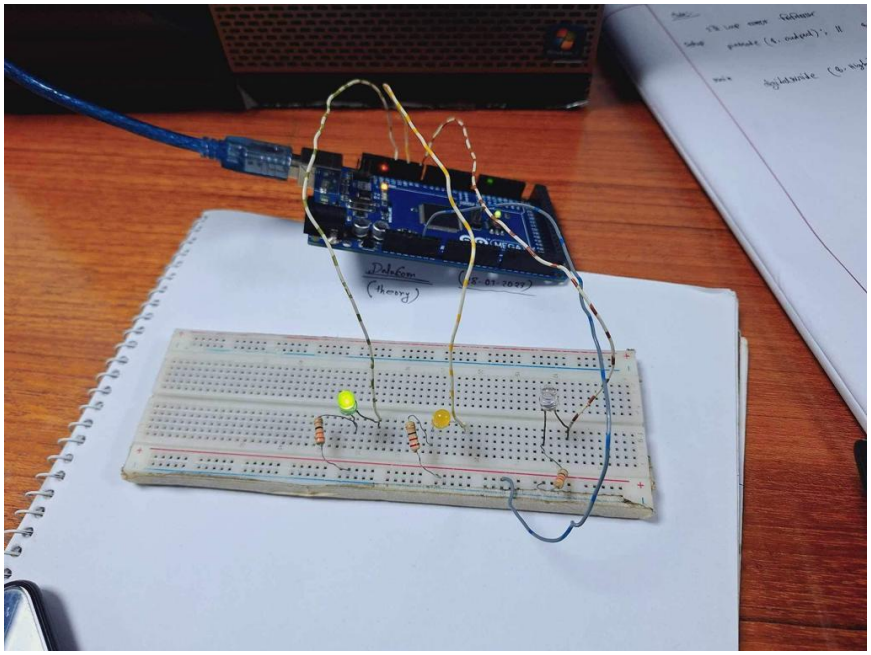
Traffic Control System



Red LED ON



Yellow LED ON



Green LED ON

Discussion:

In this experiment, we delved into the basics of microcontroller programming using Arduino Uno and its integrated development environment (IDE). The experiment involved LED blinking and creating a traffic light system using Arduino Uno.

LED blinking serves as an introductory exercise to understand the fundamental principles of microcontroller programming. By controlling the on and off states of an LED through software manipulation, we gain insight into how to interact with hardware using code. Through this experiment, we familiarized ourselves with the Arduino IDE, wrote simple code to blink an LED at a specified interval, and uploaded it to the Arduino Uno board. This experiment laid the foundation for more complex projects by providing hands-on experience in coding and interfacing with external components.

The second part of the experiment involved designing a traffic light system using Arduino Uno. This part of the experiment is built upon the concepts learned in the LED blinking experiment, extending them to simulate a real-world scenario. By incorporating multiple LEDs and timing constraints, we created a basic traffic light sequence comprising red, yellow, and green lights. Through this exercise, we learned about the importance of timing and sequencing in microcontroller programming, as well as how to implement decision-making logic to control the flow of traffic.

Conclusion:

Overall, this experiment provided valuable insights into microcontroller programming and embedded systems design. By working with Arduino Uno and the Arduino IDE, we gained practical experience in writing and uploading code, as well as interfacing with external hardware components. These fundamental skills form the basis for more advanced projects in the field of microprocessors and embedded systems.