LAB 13 and 14

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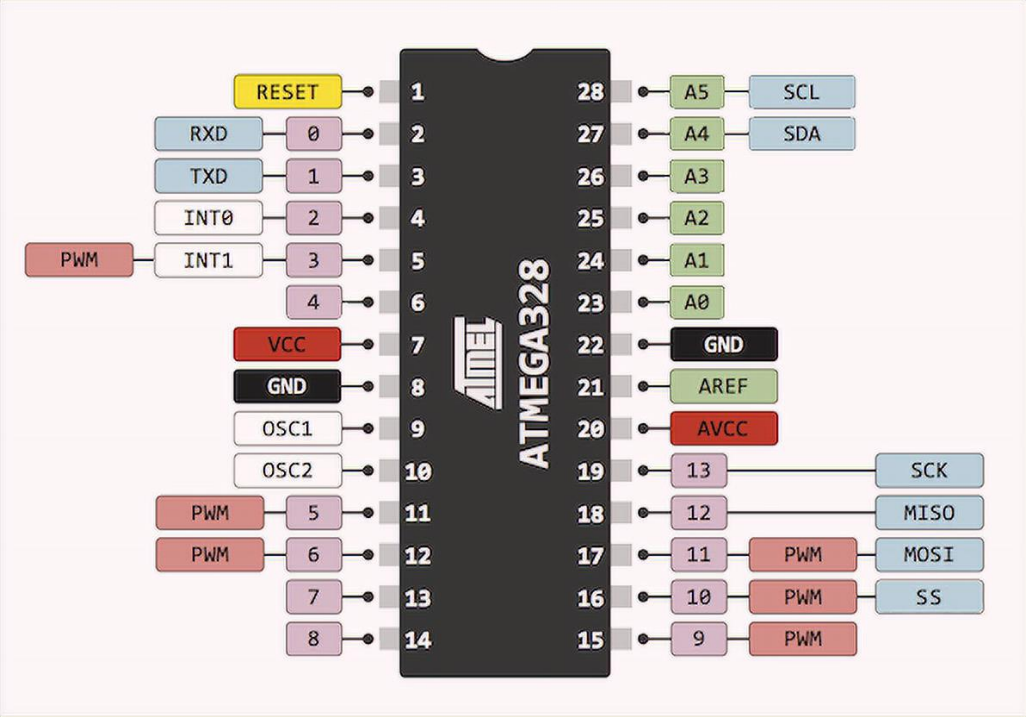
Course: COAL LAB

Hardware Implementation

Atmega328p chip:

The ATMEGA328P is a popular microcontroller due to it being a major component in the Arduino board products. The ATMEGA328P is the 8-bit RISC heart of the Arduino Uno and Nano, with a maximum clock frequency of 20MHz, 32KB program FLASH, and 2KB of RAM.

Atmega328p Pinouts:



Code for 7 segment Display 0-9:

```
.INCLUDE"M328pDEF.INC"
.ORG 0

        LDI R16 , HIGH (RAMEND)
        OUT SPH , R16
        LDI R16 , LOW (RAMEND)
        OUT SPL , R16

        LDI R19 , 0XFF
        OUT DDRB , R19

    START:

        LDI R20 , 0b01000000
        OUT PORTB , R20
        RECALL DELAY
        LDI R20 , 0b11111001
        OUT PORTB , R20
        RECALL DELAY
        LDI R21 , 0b0100100
        OUT PORTB , R21
        RECALL DELAY
        LDI R21 , 0b0110000
        OUT PORTB , R21
        RECALL DELAY
        LDI R21 , 0b0011001
        OUT PORTB , R21
        RECALL DELAY
        LDI R21 , 0b0010010
        OUT PORTB , R21
        RECALL DELAY
        LDI R21 , 0b0000010
```

Burning the code:

Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

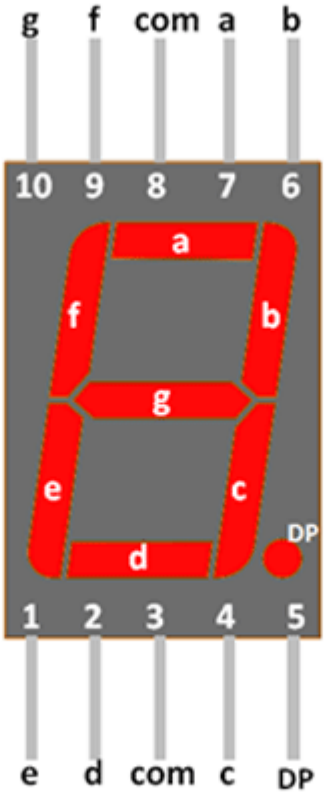
We used the programming board for burning the code into the physical atmega328p chip.

Bread Board:

After the chip was programmed we executed the chip on the bread board by giving inputs to the micro-controller and used a 7 segment anode display and connected with chip by giving the VCC and GND to it.

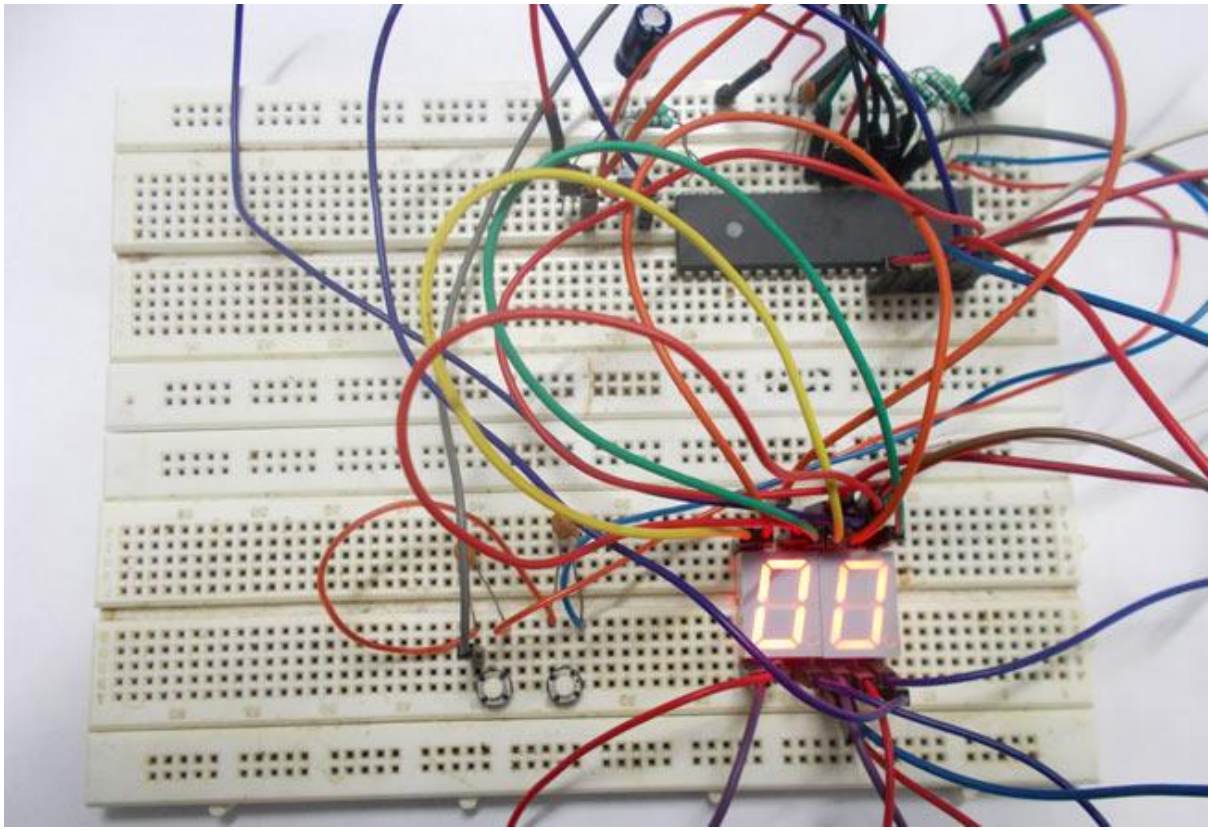
About 7 Segment Display:

A seven-segment display is a form of electronic display device for displaying decimal numerals that is an alternative to the more complex dot matrix displays. Seven-segment displays are widely used in digital clocks, electronic meters, basic calculators, and other electronic devices that display numerical information



Results:

The result looked something like this (Not the actual hardware photo)



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