

TED UNIVERSITY

2023 Fall

CMPE 453 Embedded Systems

LAB REPORT # 4

Lab Name: Basic Color Sensor Using Atmega328p
Analog to Digital Converter

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Section: 02

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I. Tasks

The goal of this lab is to design a basic color sensor capable of distinguishing between Red, Yellow, and Blue colored LEDs using an Atmega328p Analog to Digital Converter.

II. Hardware Implementation

The color sensor circuit was assembled on a breadboard using the following components:

- Arduino Uno Board
- Groove Base Shield
- Color LEDs (Red, Yellow, Blue): Connected to distinct GPIO pins on the Arduino Uno, these LEDs served as color emitters, providing illumination to the sensor.
- Groove Light Sensor: Connected to Analog Input 0 (Pin PC0) of the Arduino Uno, this sensor functioned as the detector, capturing the intensity of light emitted by the LEDs.
- Resistors (220 ohms x 3)

To ensure precise readings, the Groove Light Sensor was covered with black tape.

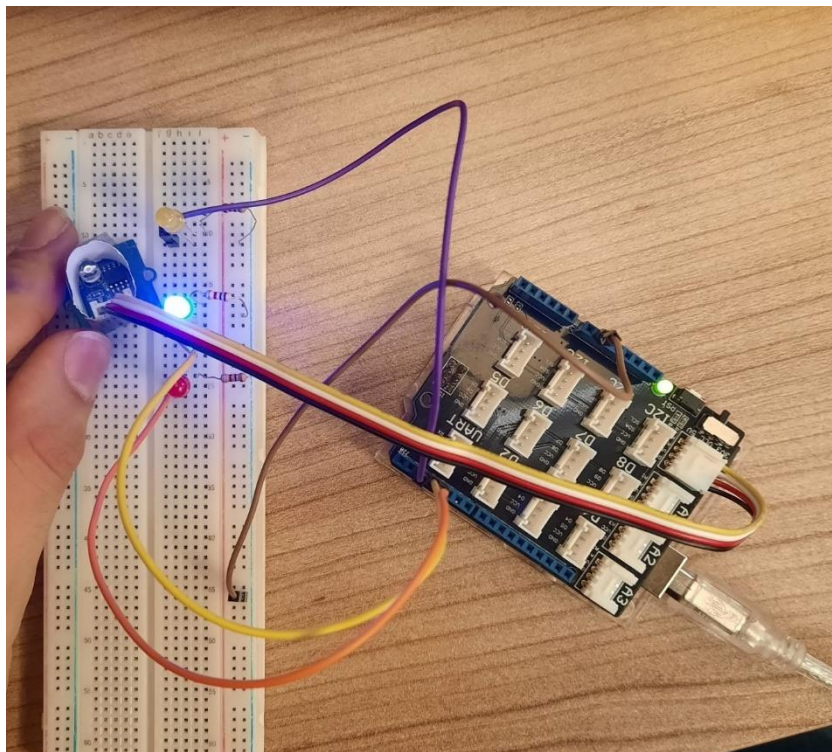


Figure 1 – Arduino, Arduino base shield, Groove Light Sensor and Color LEDs with the necessary connections provided and working as desired. (October 27, 2023 Lab-4)

III. Code

1.) Setup Function

- Initializes the setup process when the Arduino starts.
- Sets the pinMode for three LEDs (connected to pins 2, 3, and 4) as OUTPUT.
- Sets the pinMode for the Light Sensor (connected to A0) as INPUT.
- Initiates Serial communication with a baud rate of 9600.

2.) Loop Function

- Runs repeatedly after the setup is complete.
- For each color (Blue, Yellow, Red):
- Turns on the respective LED.
- Waits for 2 seconds to stabilize the measurement.
- Reads the analog value from the Light Sensor and stores it in variables (blue_val, yellow_val, red_val).
- Turns off the LED.
- Compares the intensity values to determine the dominant color.
- Prints the result to the Serial Monitor.

IV. Critical Analysis / Conclusion

In conclusion, the implemented basic color sensor successfully demonstrated the detection of Red, Yellow, and Blue colors. While achieving the primary goal, there are opportunities for refinement, especially in handling environmental factors and enhancing the system's adaptability.

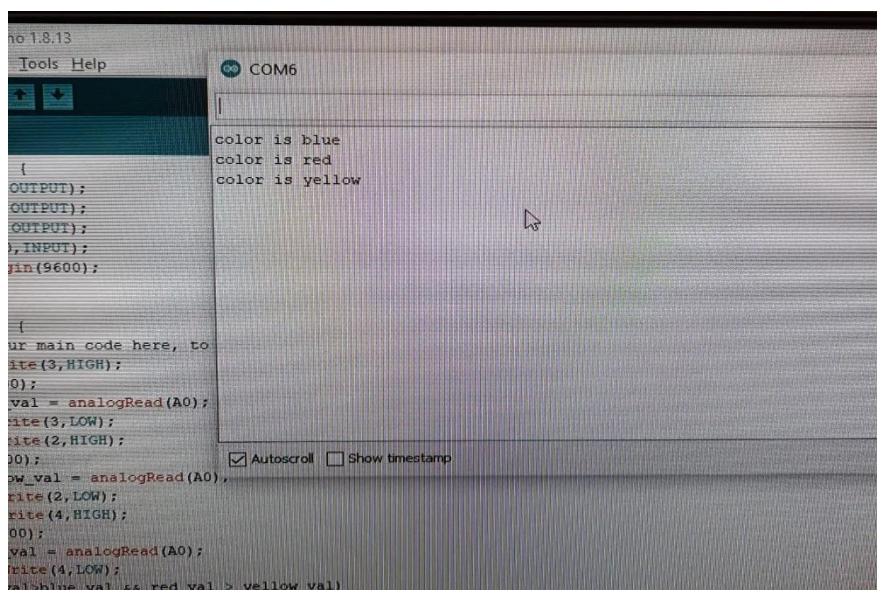


Figure 2 – Arduino IDE Serial Monitor. (October 27, 2023 Lab-4)