

# **Utilizing Color Sensors and Urinary Collection Bags as a Warning System for Hematuria**

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# Purpose

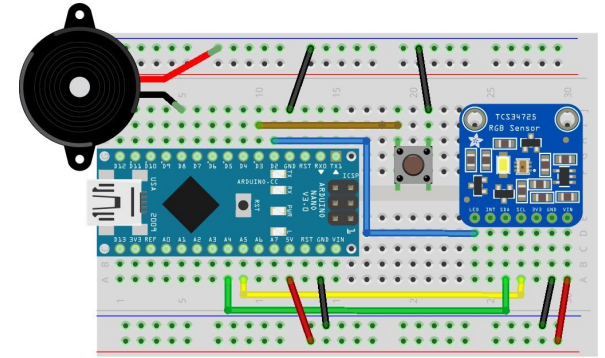
- To design a urinary collection bag that incorporates a color sensor to detect when urine begins to contain traces of blood and sends out an alert, in the form of buzzing, immediately to notify doctors
- To act as a warning system for gross hematuria, a condition when parts of the urinary tract allow red blood cells to leak into urine, producing a pink/red color

# Materials

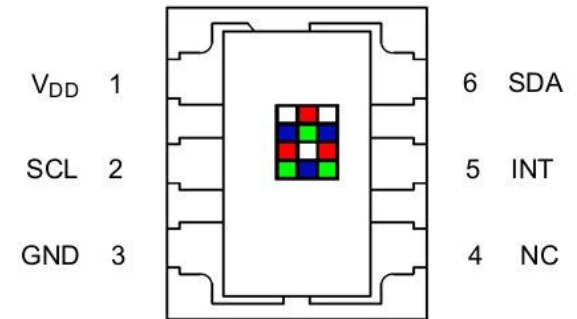
- Urinary Leg Bag with Anti-Reflux Valve 600mL (20 Ounce)
- TCS34725 Color Sensor
- Piezo Buzzer
- Arduino Nano
- Breakout Board
- Personal Computer

# Procedure

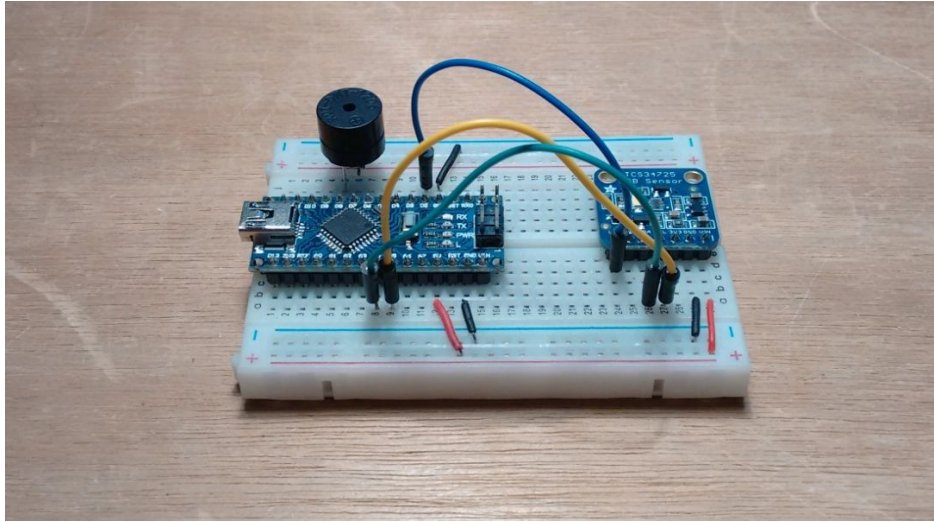
1. Gather materials
2. Installing the Arduino Development System
3. Attach a TCS34725 Color Sensor and piezo buzzer to a small breakout board
4. Use wires to connect the digital output pin to the pin on the color sensor and the buzzer to the pin on the Arduino Nano
5. Enter the basic Python code found online for laptop communication with the Arduino Nano into personal computer
6. Test (trial and error) by pouring clear and red/pink colored water into the urine bag to evaluate its detection of the red color. The successful detection of the blood-resembling color should cause the buzzer to sound with 262 Hz for any set length of time



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# Engineering Results



# Analysis

- My project did not end up successfully detecting a color change when a clear or yellow liquid turns to a pink or red color
- I believe the issue lies in my code, as well as in the wiring on the breakout board. Despite the numerous trials and errors that lead to me improve/alter wiring and tweak the Arduino Nano, there are still some more flaws that need to be fixed before my project becomes successful.
- I believe that, with some more time, work, and investigation on the code and wiring, my project will work. I have narrowed down what needs to be fixed, and I am confident I can fix it to make this project successful.

# Summary

- The purpose of this project was to create a urine bag that acted as a warning system for hematuria
  - The results of my project show that it was not a success. The color sensor accurately identified the color change, but an issue within the alert system remains. In simpler terms, only half of the objective in this project was achieved (sensing a color change). I will continue to work to achieve the other half of the objective and perfect the code and communication system to the Arduino Nano. Once this is done, I am confident that my project will be fully-functional.