# Phase 3 Development part 1

## SMART PUBLIC RESTROOM

**DESCRIPTION:**

This document is describing the process of developing the project with the mentioned components in phase 2 innovation segment. For our project we are going to use ammonia sensor and occupancy sensor

**COMPONENTS REQUIRED:**

- Ammonia sensor
- Occupancy sensor.
- Arduino IDE.
- Power Supply.
- Basic components like Bread board, Wires ,led's, buzzer.

**WORKING DESCRIPTION:**

A smart public restroom equipped with an ammonia sensor and occupancy sensor offers an enhanced and efficient restroom experience.

**Ammonia sensor :**

Ammonia sensor detects and monitors the air quality within the restroom. This sensor can swiftly identify the presence of ammonia, a common component in human waste, and trigger automated ventilation and odor control systems to maintain fresh and pleasant air quality. This not only ensures a more comfortable environment for users but also conserves energy by operating the ventilation system only when necessary.

**occupancy sensor :**

occupancy sensor plays a crucial role in optimizing resource utilization. It detects when the restroom is occupied and unoccupied, allowing for several advantages. When unoccupied, it can dim or turn off lights to save energy. On the other hand, when someone enters, it can activate the lighting and ventilation, creating a more welcoming and functional space.

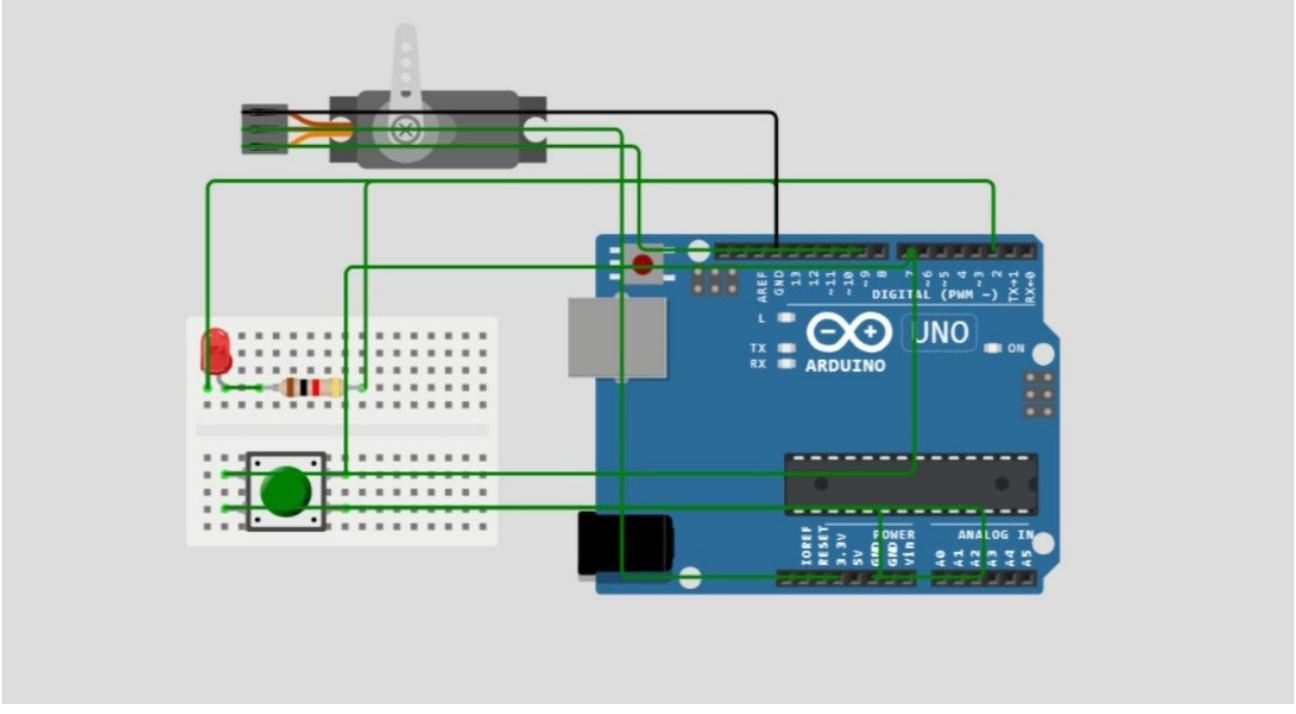
**Arduino microcontroller:**

Arduino serves as the brain of the system, controlling sensor readings and data processing.

**LED 'S:**

Led's used to view the occupancy in restroom

**CIRCUIT DIAGRAM:**




# Programm:

```
#include <stdio.h>
#include <stdint.h>
#include "sensor_lib.h" // Include sensor libraries
#include "actuator_lib.h" // Include actuator libraries

// Define sensor and actuator pins
#define AMMONIA_SENSOR_PIN 1
#define OCCUPANCY_SENSOR_PIN 2
#define LED_PIN 3
#define BUZZER_PIN 4
```

```
// Function to initialize sensors and actuators
void initializeHardware() {
    ammoniaSensorInit(AMMONIA_SENSOR_PIN);
    occupancySensorInit(OCCUPANCY_SENSOR_PIN);
    ledInit(LED_PIN);
    buzzerInit(BUZZER_PIN);
}

int main() {
    // Initialize the system
    initializeHardware();

    while (1) {
        // Read data from ammonia sensor
        float ammoniaLevel = readAmmoniaSensor(AMMONIA_SENSOR_PIN);

        // Read occupancy status
        int occupancyStatus = readOccupancySensor(OCCUPANCY_SENSOR_PIN);

        // Check if ammonia levels are high
        if (ammoniaLevel > AMMONIA_THRESHOLD) {
            // Activate the buzzer and send an alert
            activateBuzzer(BUZZER_PIN);
            sendAlert("Ammonia levels are high! Please clean the restroom.");
        }

        // Check occupancy status
        if (occupancyStatus == OCCUPIED) {
```

```
        // Turn on the restroom's LED indicator
        turnOnLED(LED_PIN);
    } else {
        // Turn off the LED indicator
        turnOffLED(LED_PIN);
    }

    // Implement other logic as needed, such as user feedback, data storage, etc.

    // Add a delay to avoid excessive sensor readings
    delay(SENSOR_READ_INTERVAL_MS);
  }

  return 0;
}
```

**Conclusion:**

Together, these sensors create a restroom that is not only more comfortable and hygienic but also environmentally friendly and cost-effective. Users benefit from a cleaner and fresher restroom experience, while businesses and facilities save on operational costs and reduce their carbon footprint.