National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	**Intro to Internet of Things**	**Course Code:**	**IO4041**
	Program:	**BS-CS, BS-SE**	**Semester:**	**Spring 2024**
	Section	**8A**	**Total Marks:**	**20**
	Due Date:	**18-2-2024**	**Weight**	**~3.3%**
	Exam Type:	**Assignment 1**	**Page(s):**	**3**

Arduino-based System Design

Task

Your job is to design an Arduino Uno based system for the following problem. Design the circuit in Tinkercad simulator.

Pick one task according to your roll number.

Student with odd roll number

Build a traffic light and pedestrian boom-gate system for a busy road. Due to high vehicular traffic, the signal normally stays green, and the boom-gate remains closed. When any pedestrians arrive to cross the road, a PIR motion sensor detects them, and once at least 60 seconds have passed since signal turned green, the system turns the traffic signal to yellow-then-red, and the boom gate then opens. When the sensor no longer detects pedestrians, or after 30 seconds (whichever is earlier), the traffic light changes to yellow-then-green and boom gate closes.

Note the timing requirements:

- Yellow light duration: 3 seconds
- Minimum time signal stays green: 60 seconds
- Maximum time signal stays red: 30 seconds

Components to be used on Tinkercad: PIR sensor, LEDs (for traffic lights), micro servo (for boom gate)

How to keep track of time: https://docs.arduino.cc/built-in-examples/digital/BlinkWithoutDelay/

Student with even roll number

Build an intruder detector (anti-thief) system for home security. The system must be armed (enabled) using a master switch. If the switch is off, none of the security features will work. For security purposes, first there is an ultrasonic distance sensor installed at the front door. If an intruder comes within 2.5m of the sensor, it will light up a bright lamp. The lamp will turn off if the intruder backs away, but not before 5 seconds. If instead the thief approaches the door and tries to turn the door handle, a force sensor within the handle detects the intrusion attempt. In such a case, a security alarm also starts ringing, and will continue to ring until the thief has moved away from the door (at least 2.5m).

Components to be used on Tinkercad: slider (master on/off switch), ultrasonic distance sensor, flex sensor or force sensor, piezo (buzzer), light bulb.

Deliverables

In Tinkercad, generate a sharing link for your circuit. Do NOT make the design public, or share the link publicly.

You should submit a PDF document containing:

- The design link
- Screenshots of both the circuit and the schematic.
- A copy of Arduino source code.

For assignment evaluation, you will be asked to demonstrate working of the circuit and explain your code/logic.