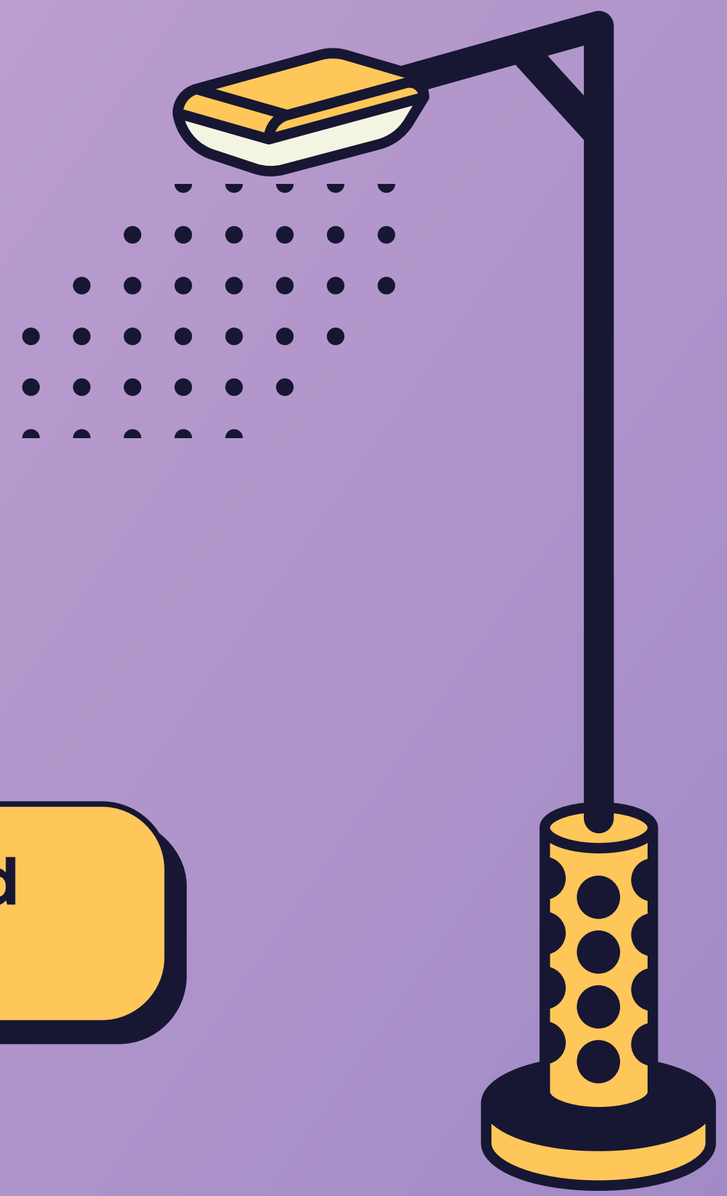
AUTOMATED GATE CONTROL SYSTEM



Integrating IR Sensors, Servo Motor, and Traffic Lights

TODAY'S FOCUS

Automated gate system that detects entry and exit using IR sensors

Using Arduino

FUNCTIONALITY:

Opens the gate when an object (e.g., vehicle) is detected.

Could be used for parking lot control, security barriers, or access control systems.

COMPONENTS USED FOR IT :

ARDUINO UNO R3

IR SENSORS

SERVO MOTOR

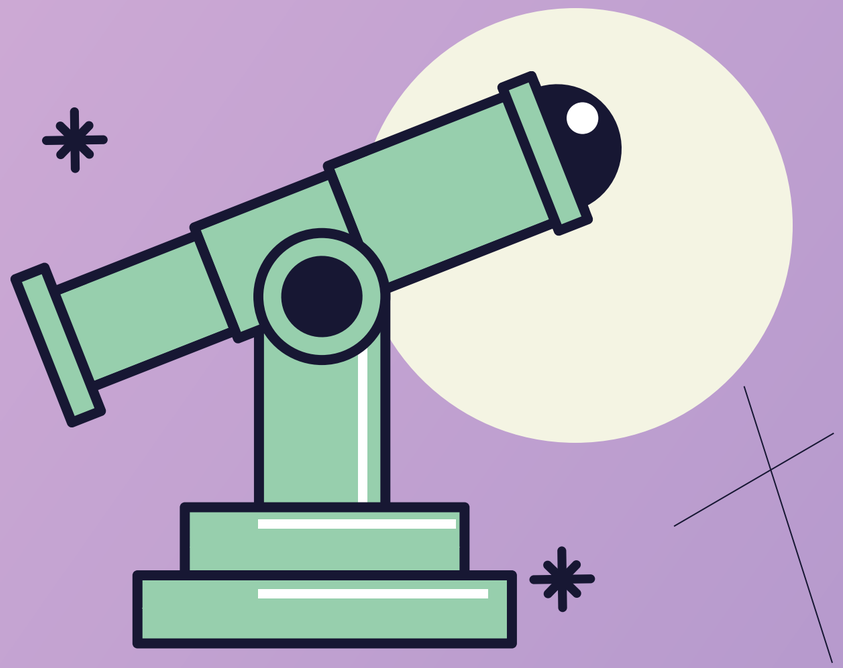
TRAFIC LIGHTS

USB POWER SUPPLY

LAPTOP

WORKING OF COMPONENTS

COMPONENTS USES

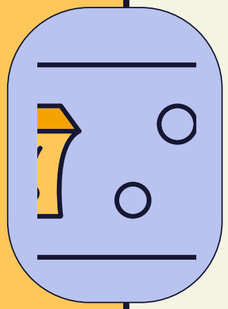


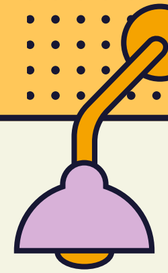
Arduino Uno R3:
Main microcontroller board to run the program.
Breadboard:
Used to connect and power all the components.
IR Sensors:
Two sensors: one for entry detection (digital pin 2) and one for exit detection

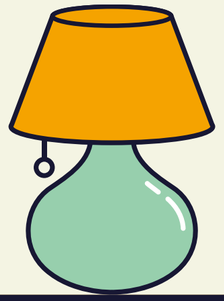
Servo Motor:
Controls the gate movement (attached to digital pin 4).
LEDs (Traffic Lights):
Red LED: Connected to digital pin 5 (indicates closed gate).
Yellow LED: Connected to digital pin 6 (indicates warning before closing).
Green LED: Connected to digital pin 7 (indicates open gate).
Power Supply:
Voltage supplied directly from the laptop's USB to the Arduino, which then powers the components via the breadboard.

WIRING AND CONNECTIONS

Arduino Uno R3 Connections:
IR Sensors:
Entry IR sensor → Digital Pin 2
Exit IR sensor → Digital Pin 3
Servo Motor:
Connected to Digital Pin 4.
LEDs:
Red LED → Digital Pin 5
Yellow LED → Digital Pin 6
Green LED → Digital Pin 7
Breadboard:
Used as the central hub to distribute power and connect the components.
Common ground and voltage rails are established to ensure proper operation.
Power Distribution:
The Arduino receives power via the USB from the laptop.
This power is then distributed to the connected sensors, servo, and LEDs through the breadboard.
Slide 5: Code Walkthrough – Main Functions
IR Sensor Readings:
Entry detection: If the entry IR sensor reads LOW, the system initiates gate opening.
Exit detection: If the exit IR sensor reads LOW, a warning is issued before closing the gate.
Servo Control:
openGate(): Sets the servo to 90° (gate open) and turns on the green LED.
closeGate(): Resets the servo to 0° (gate closed) and turns on the red LED.
Traffic Light Control:
setTrafficLight(): Controls which LED is on based on the state (RED, YELLOW, GREEN).
Cooldown & Warning:
showWarningAndCloseGate(): Activates the yellow LED as a warning, then calls closeGate() after a delay.
coolDownDelay(): Prevents immediate retriggering by adding a delay.







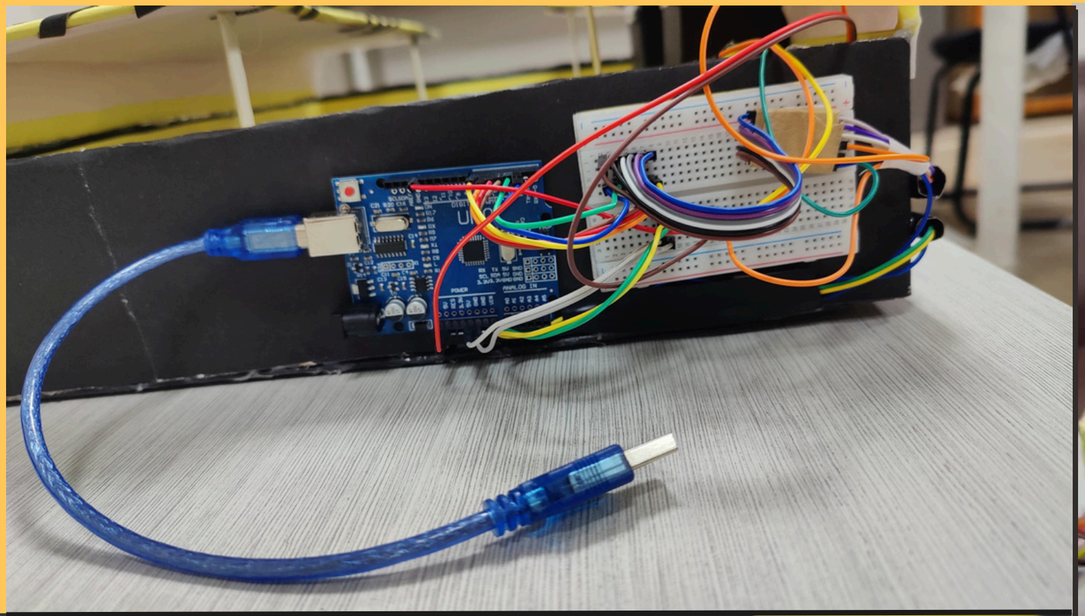
OPERATING SYSTEM FLOW

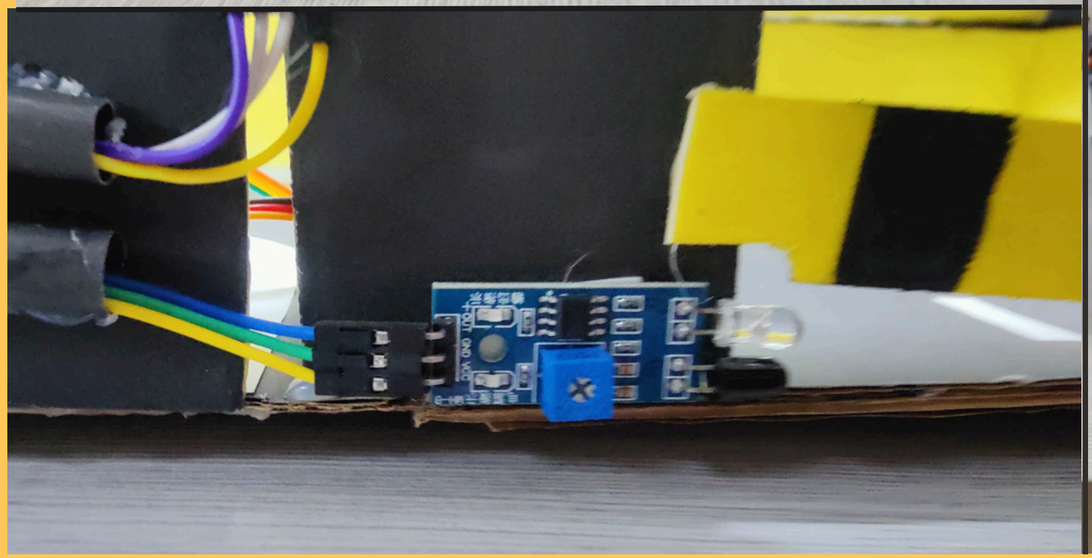
Initial State:
Gate is closed (servo at 0°).
Red LED is ON.
When an Object Approaches (Entry):
Entry IR sensor is triggered.
Gate opens (servo moves to 90°).
Green LED turns ON.
When Object Leaves (Exit):
Exit IR sensor is triggered.
Yellow LED provides a warning before the gate closes.
After a brief delay, the gate closes and the red LED is reactivated.
Cooldown:
A delay is implemented to prevent rapid retriggering.

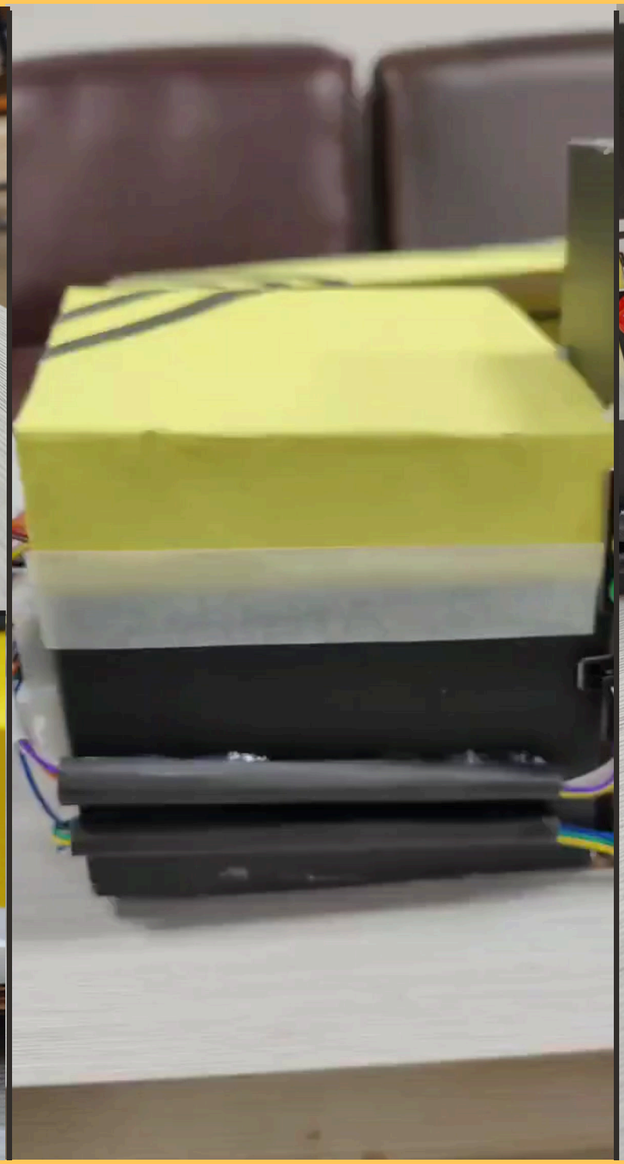
WHY WE CREATED THIS

We created this automated gate control system because we believe in harnessing technology to solve everyday problems and enhance safety. Manual gate systems can often be unreliable and inefficient, leading to security risks and operational delays. By integrating Arduino, IR sensors, a servo motor, and traffic lights, our goal was to design a system that not only automates the gate operation but also provides clear, real-time visual feedback. This project represents our shared passion for innovative electronics and programming, aiming to create smarter, more connected infrastructures for environments like parking lots, residential areas, and office complexes.

We were particularly inspired by the potential to transform traditional, manual processes into streamlined, automated systems that improve safety and efficiency. This hands-on approach allowed us to combine creativity with practical engineering, demonstrating that even simple components can be the foundation for impactful solutions. Working together, we were able to pool our skills and ideas, resulting in a collaborative effort that reflects our collective commitment to innovation and problem-solving.








Car parking
Entry List
Car → 100
Motor cycle → 50
cycle → 20
WAQAS TOY

THANKS