Computer science and control system department

faculty of engineering Mansoura university

sensor project 2024

project idea: visualization of tech-run road.

❖ ***Supervisors***

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❖ *Team members*

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❖ *Summary: -*

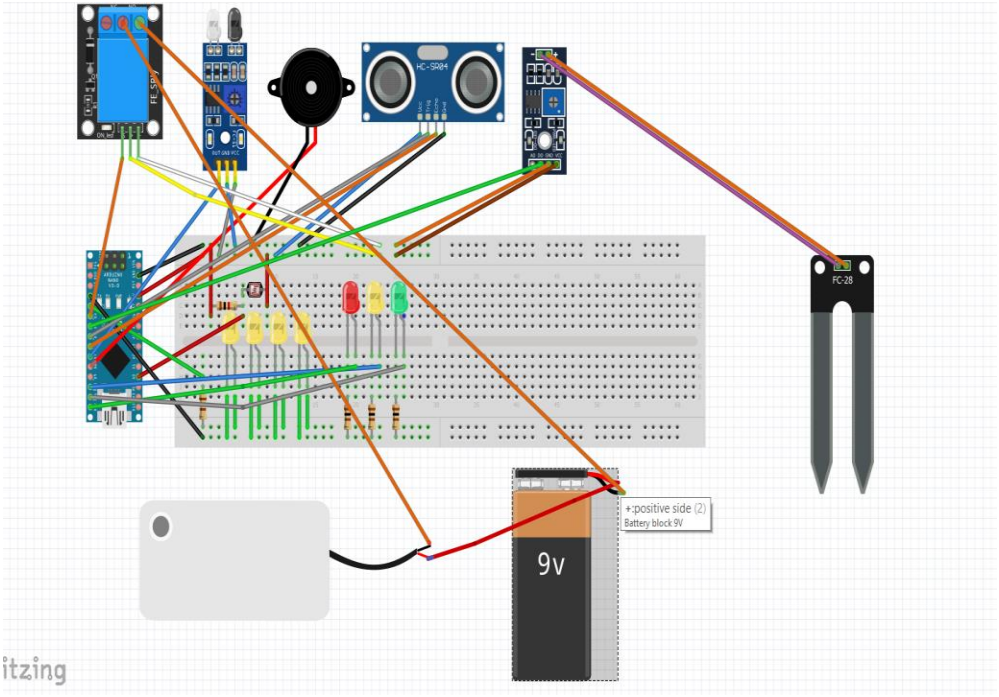
Our project envisions a technologically advanced road system that integrates multiple sensors which we used to create a safer, more comfortable experience for drivers and passengers.

❖ *components:*

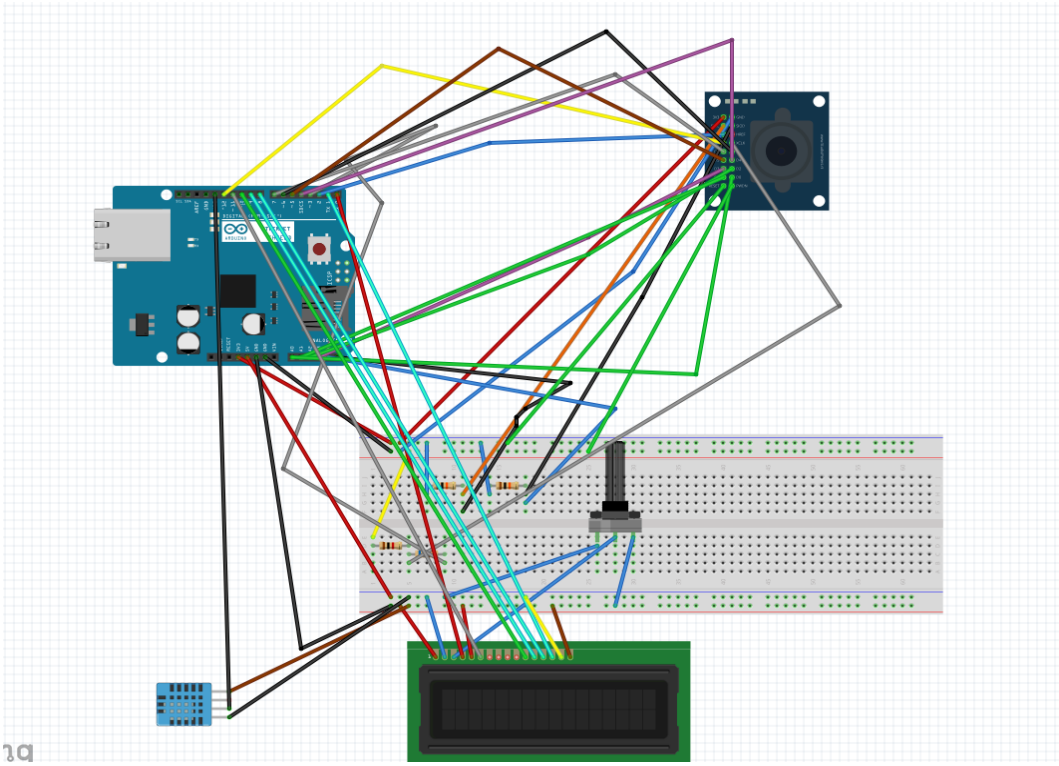
1. ***Soil sensor***
2. ***5v pump***
3. ***Ultrasonic sensor***
4. ***LDR (light dependent resistor)***
5. ***eight LEDs***
6. ***5v IR relay***
7. ***Two DC motor***
8. ***OV7670 camera module***
9. ***Buzzer***
10. ***Arduino uno***
11. ***Arduino nano***
12. ***infrared sensor (IR)***
13. ***DHT sensor***
14. ***LCD***
15. ***DHT11 sensor***
16. ***Connecting wires***

❖ *Circuit simulation*

For Arduino nano: -

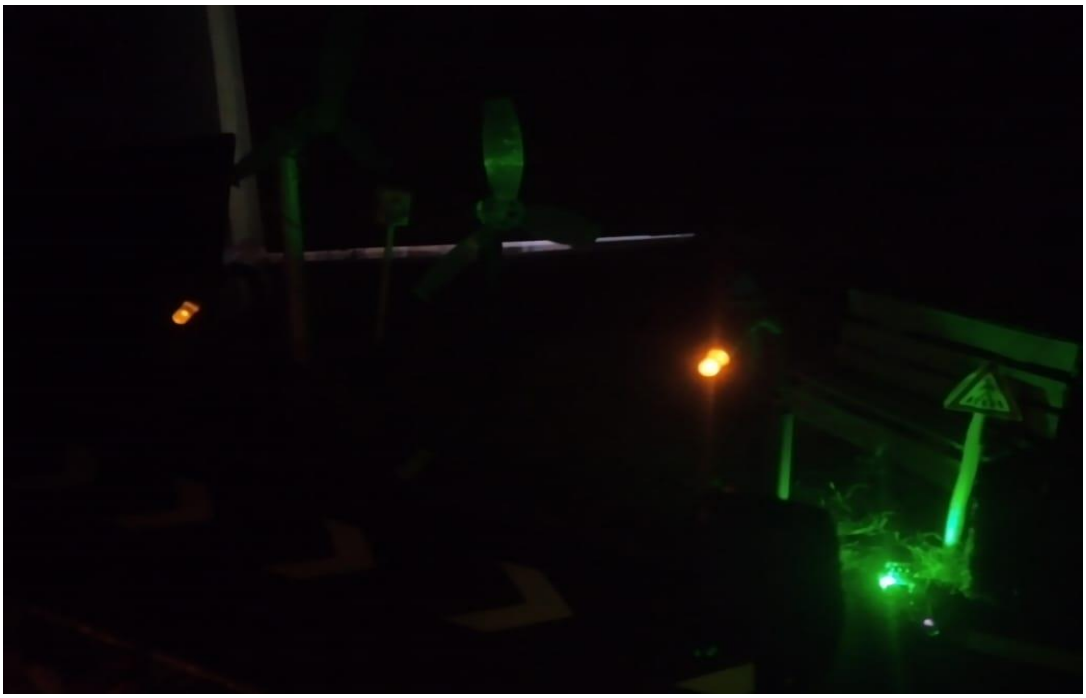


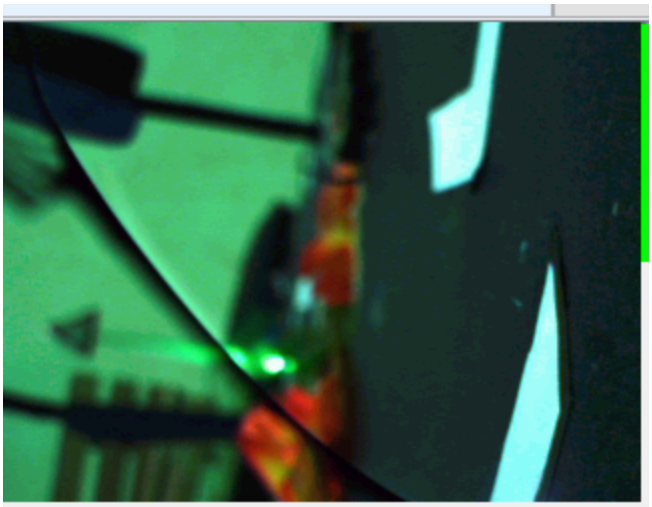
For Arduino uno: -



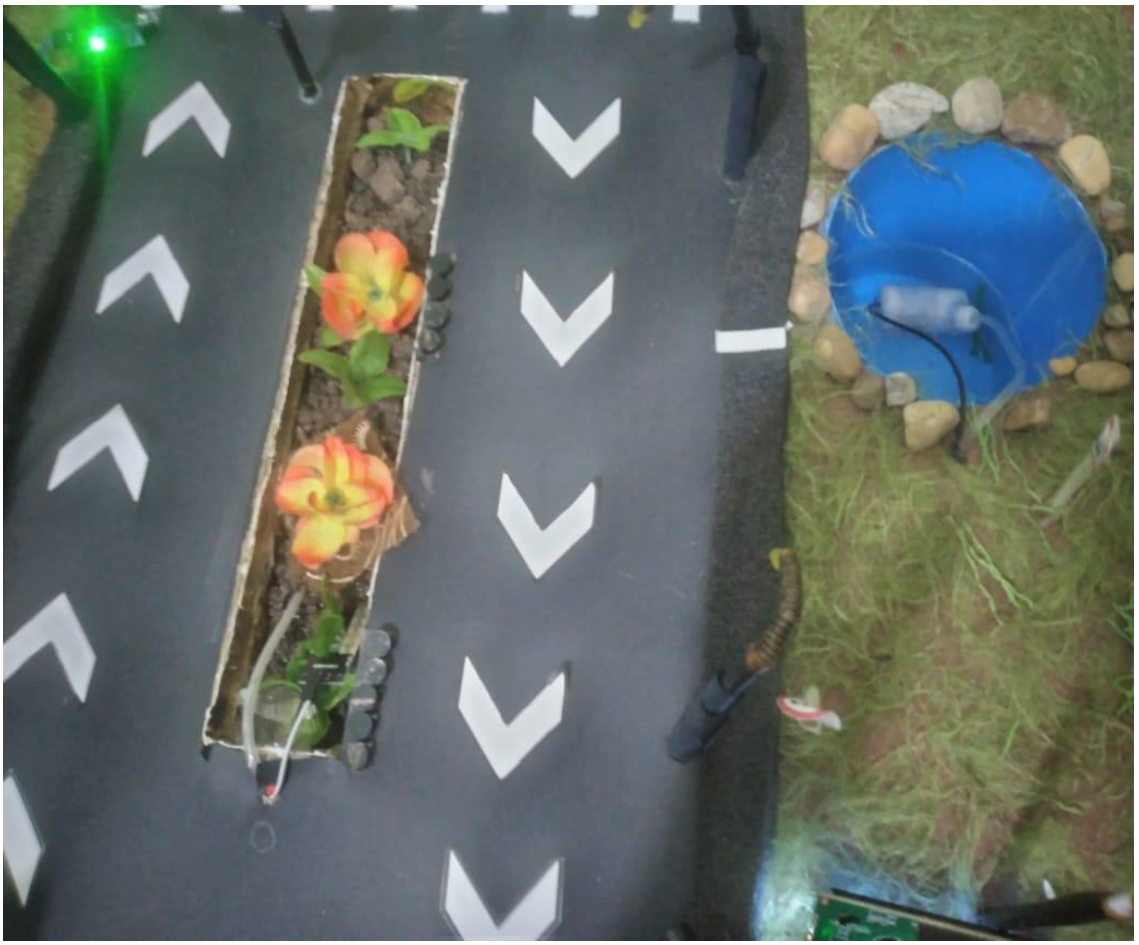
❖ ***Project pictures:***

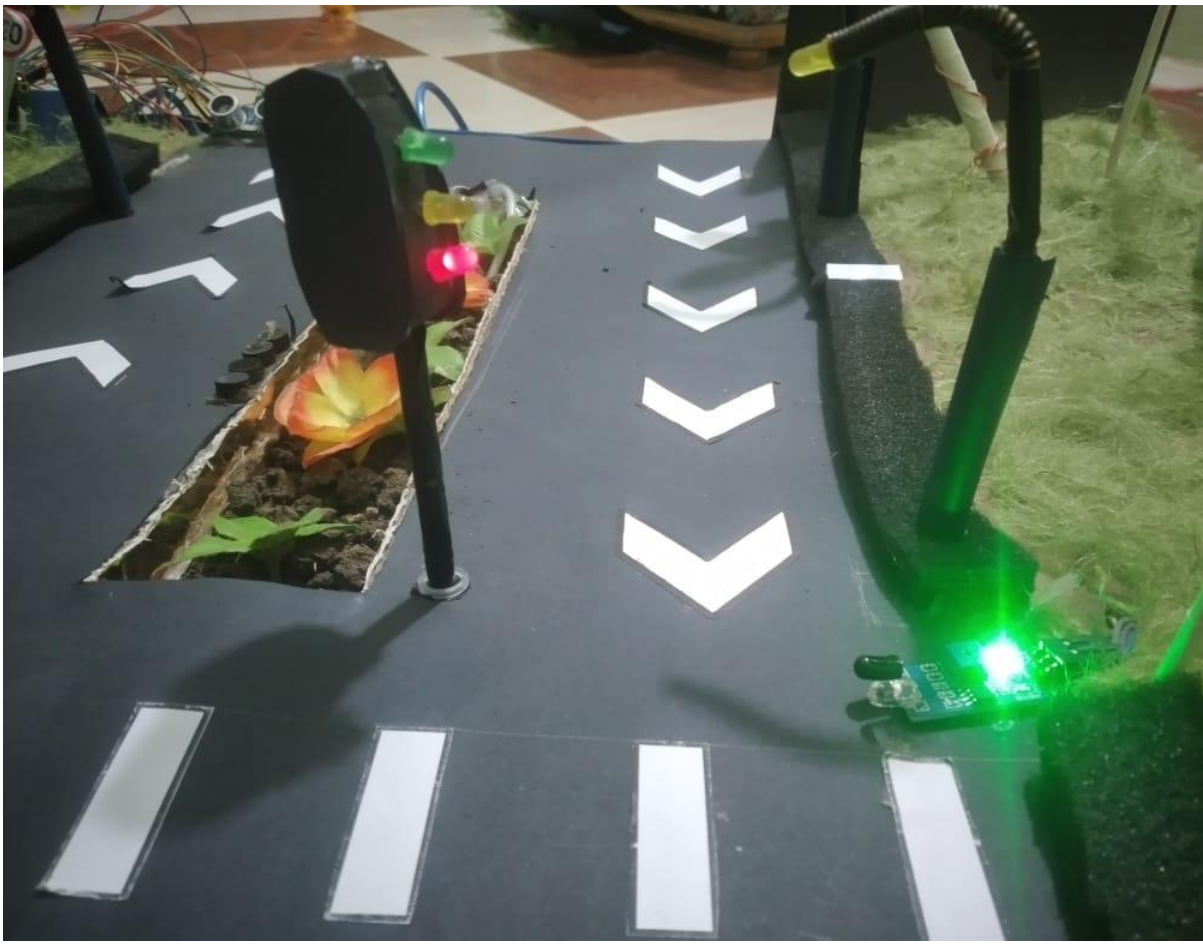

Temperature: 30.
Avoid the sun





```
Vsync
Frame 71
Vsync
Frame 72
Vsync
Frame 73
Vsync
AFrame 74
Vsync
```





➢ *Detailed functionality:*

For Arduino nano: -

- ***Lamp posts lighting system:***
  An LDR sensor is used to detect light levels. When it detects darkness, the LDR-controlled-LEDs turn on automatically, and when light is detected, the LEDs turns off.

  The setup includes connecting 4 LEDs in parallel to each other and to pin 2 of the Arduino. The LDR sensor is connected to analog pin "A0".

- ***Soil sensor:***
  We used a capacitive soil sensor to measure the moisture in the soil, the soil was placed l in the middle of the road so it would be able to reduce as much as possible of the automobile exhaust.
  The sensor output is connected to the digital pin 4.
  A relay module was used to control the water pump based on the output of the moisture sensor. When the soil moisture is below a certain level, the relay is activated to turn on the water pump, ensuring the soil remains hydrated.
  There was a battery connected to the relay module and the water pump.
  And for the code of the soil sensor, we used:

- ***As for the ultrasonic:***
  An ultrasonic sensor was used to measure the velocity of the cars passing by on the road. This sensor detects the distance to a moving car at different time intervals. it displays a warning on the serial monitor. The Trigger pin was connected to digital pin 5 and for the echo pin, it was connected to pin 6 on the Arduino.

- ***traffic signal:***
  A traffic signal was implemented to manage and control the flow of vehicles and to protect people crossing the road. The system used three LEDs (red, yellow, green). The sequence and timing of the lights were controlled by the Arduino.
  The red, yellow, green LEDs were connected to the digital pins 12,10,11 respectively.

- ***IR sensor and a buzzer:***
  An IR sensor was used to detect the presence of vehicles when the red light of the traffic signal was on. If a vehicle was detected during this time, a buzzer was activated to provide an audible alert, indicating that it is unsafe for passengers to cross. The IR sensor was connected to digital pin 7, and the buzzer was connected to digital pin 8 on the Arduino.

  Additionally, ***power generated from wind was used to light up an LED. For this purpose, two DC motors were connected in series to act as generators. The rotational energy from the wind was converted into electrical energy by the DC motors, which was then used to power the LED.***

For Arduino uno: -

- ***OV7670 camera module:***
  The camera module was used to capture images of vehicles passing by the road.it was connected to 7 digital pins and the 6 analog pins on the Arduino. The images were displayed on ArdulmageCapture.

- ***DHT11 temperature sensor and an LCD:***
  In this project, a temperature sensor is utilized to measure ambient temperature and display it on an LCD screen. If the temperature exceeds 27°C, a warning message is shown; otherwise, a message wishing for a good day is displayed.