AgritechGuard

An Integrated Automated Farming and Security System

Team Members: Chitluru Venkata Bhanu Prakash - S20200020255

BTP Code : B23PB01

Project Mentor: Dr. Paul Braineard

OUTLINE

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INTRODUCTION

1. Farmers face challenges like:
   1. More often visits to monitor water pump,
   2. Limited water resources,
   3. Untimely electricity,
   4. Labor shortages,
   5. Crop theft.

- Rural areas often struggle with unreliable internet access.
- AgritechGuard enhances farming efficiency, reduce manual labor, and empower farmers with real-time monitoring and control.
- Secure boundaries using computer vision.

LITERATURE REVIEW

- **Reference-1:** This literature discusses automated irrigation systems that aim to conserve water and how it implemented.
- **Reference-2:** This literature explores the utilization of sensor data transmission via wireless communication in the presence of internet connectivity.
- **Reference-3:** YOLO v8 person detection.
- **Reference-4:** This literature introduces various Energy Harvesting techniques.

OBJECTIVES

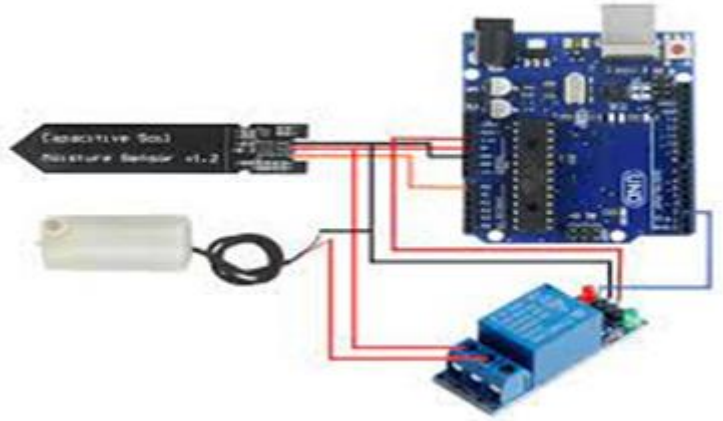
- The primary objective of this project is to reduce the amount of time farmer needed to spend in the field.
- Solar energy harvesting is employed to ensure sustainable power supply.
- Data transmission even if there is no internet connection.
- Secure boundaries using computer vision.

PROPOSED METHODOLOGY

- Create a system that will allow user to operate water pump remotely or leave it to the automated system.
- Energy harvesting technique employed for sustainable power supply.
- Data can be transmitted to long distances using LoRaWAN technology in remote areas.
- Trespasser detection system using YOLO v8 model and COCO dataset to detect various anomalies.

HARDWARE TOOLS USED

1. DHT11
2. Soil moisture sensor
3. Relay module
4. Water Pump
5. Arduino Uno
6. LoRa Tx & Rx
7. Raspberry Pi 3
8. LCD display
9. Camera Module

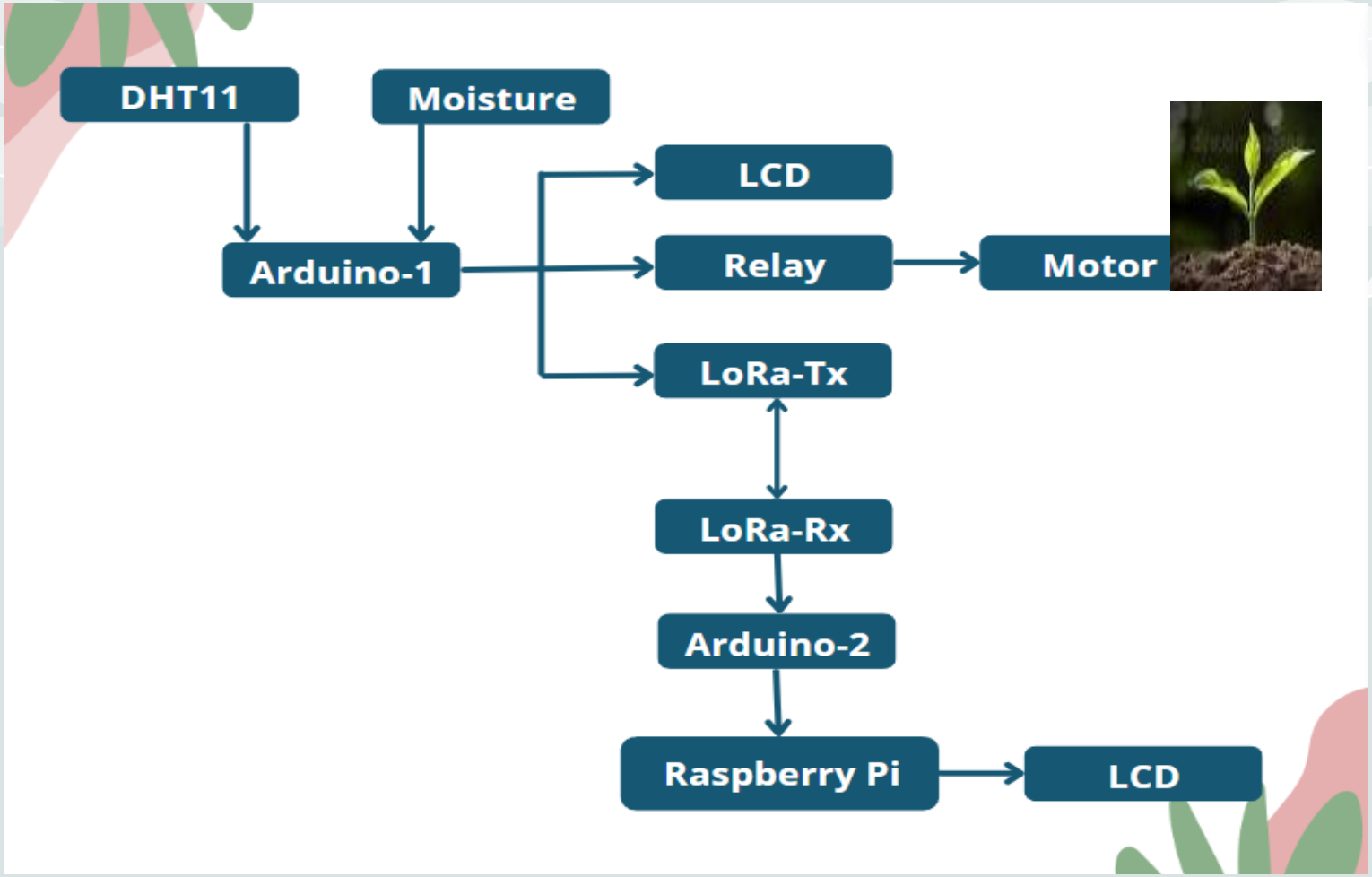


SOFTWARE TOOLS USED

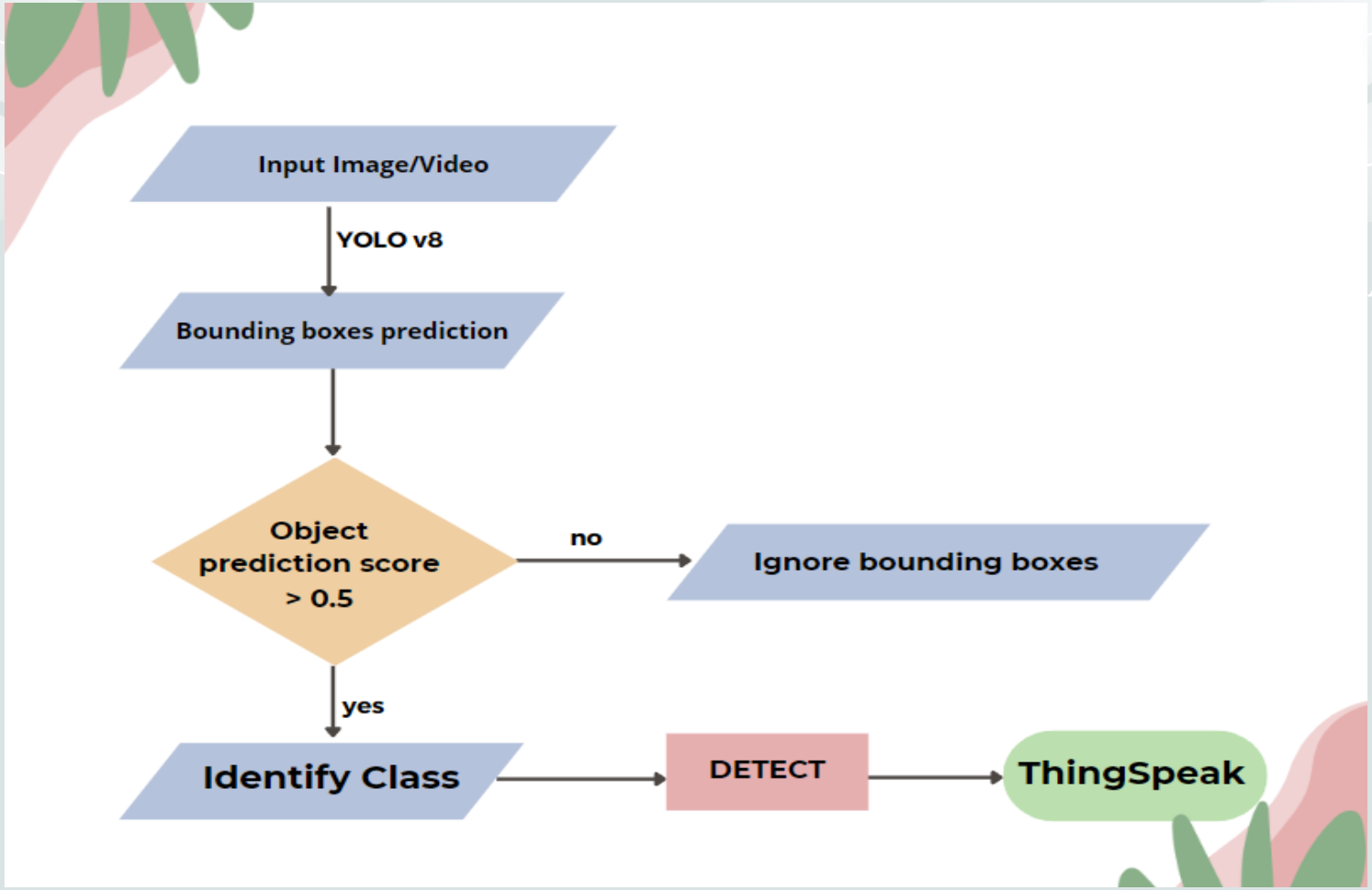
1. **Arduino IDE**
2. **Raspberry Pi Imager**
3. **Putty**
4. **VNC Viewer**
5. **PyCharm**
6. **YOLO v8**
7. **Coco Dataset**
8. **ThingSpeak Database**

- ✓ **Embedded C**
  - RadioHead-master
  - LiquidCrystal_I2C
  - LiquidCrystal
  - DHT_sensor_library
- ✓ **Python**
  - ✓ OpenCV
  - ✓ Ultralytics
  - ✓ Pytorch
  - ✓ Numpy

BLOCK DIAGRAM



BLOCK DIAGRAM



WORK DONE

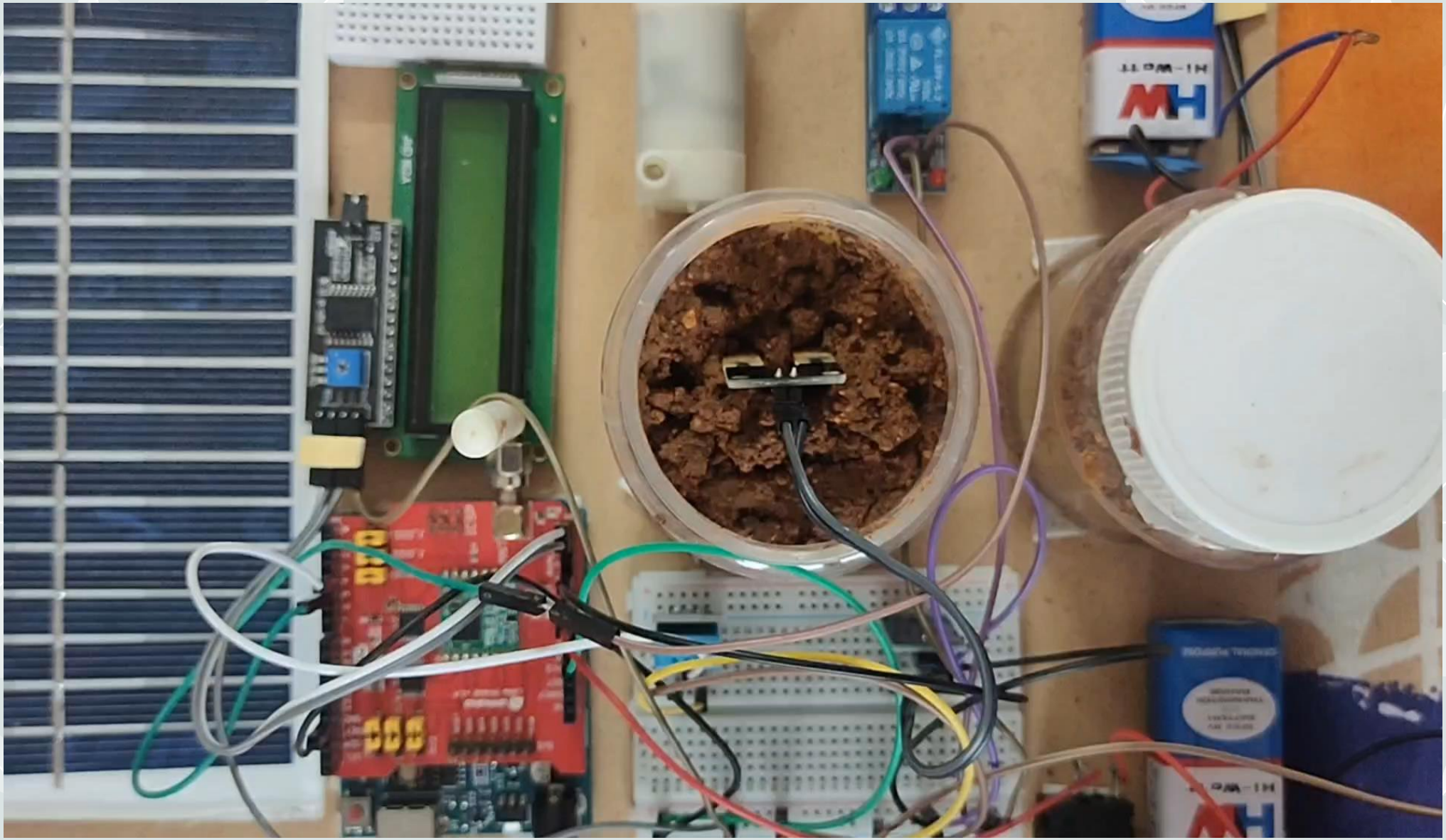
IN 6th semester:

1. Implemented automatic irrigation system with remote monitoring.
2. Crafted LoRaWAN technology to transmit data over long ranges.
3. Solar energy harvesting is employed to ensure sustainable power supply.

IN 7th semester:

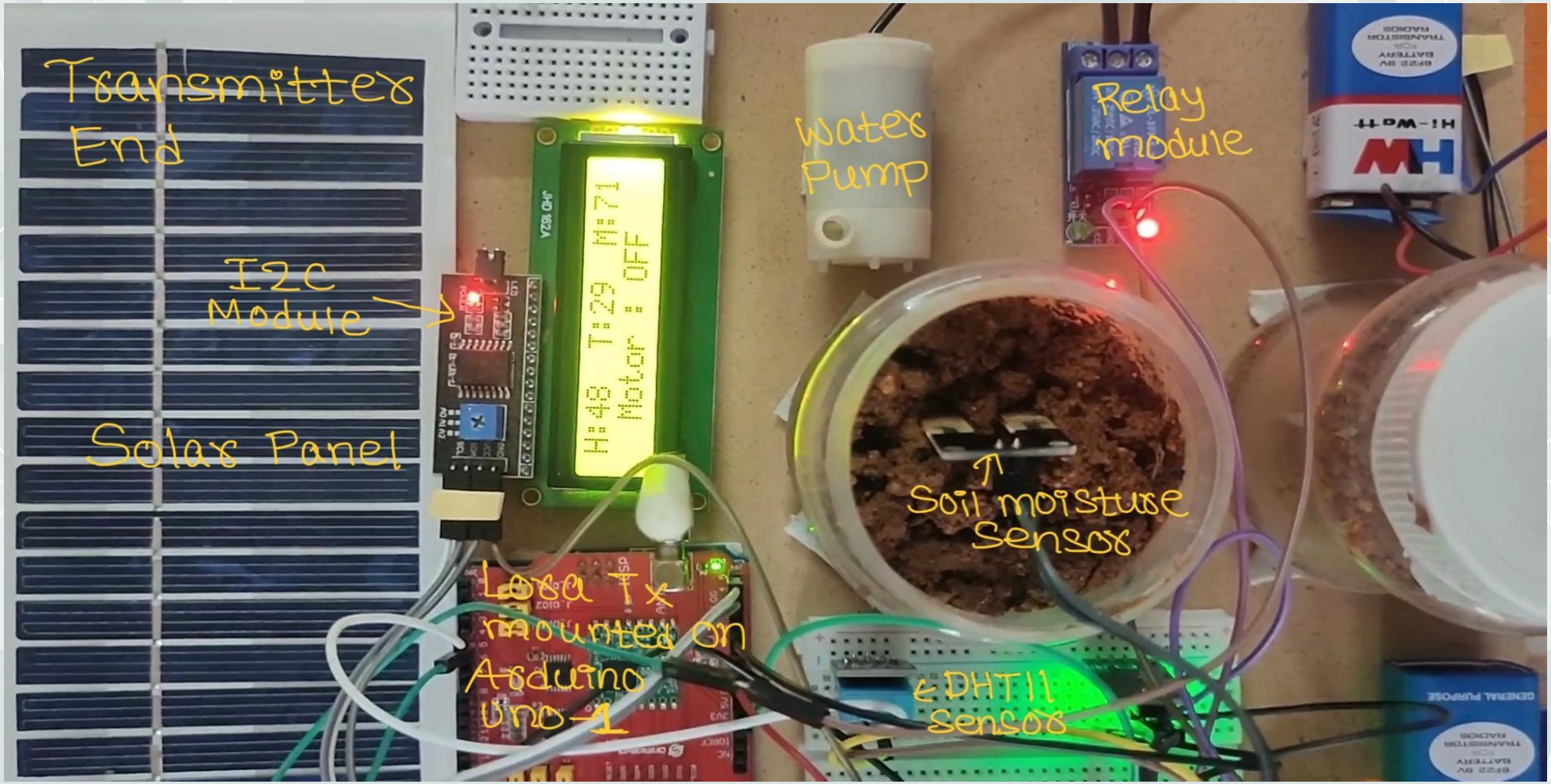
1. Trespasser detection using computer vision and promptly send to ThingSpeak.
2. Implemented with Raspberry Pi 3.

RESULTS



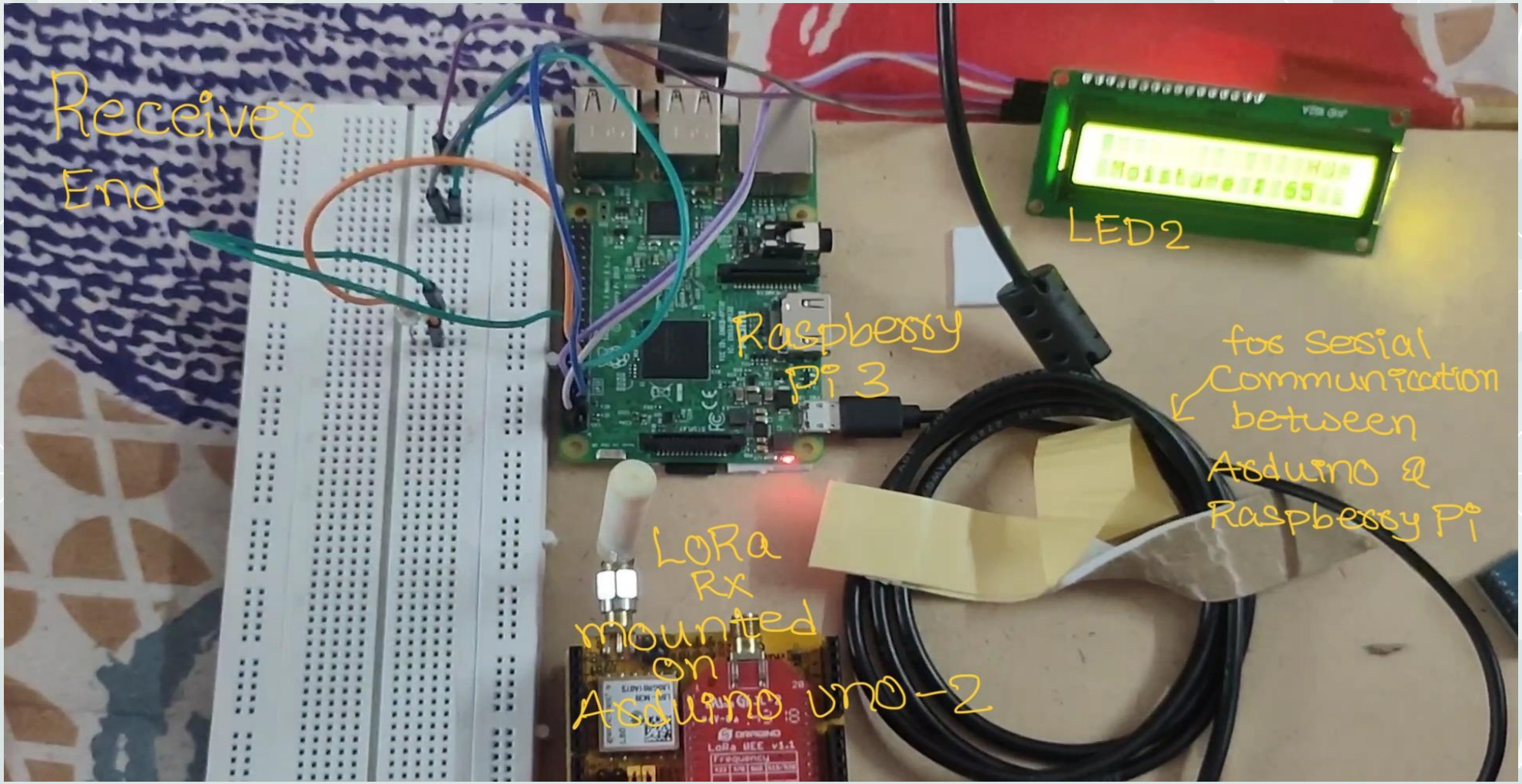
RESULTS

System at Transmitter end:



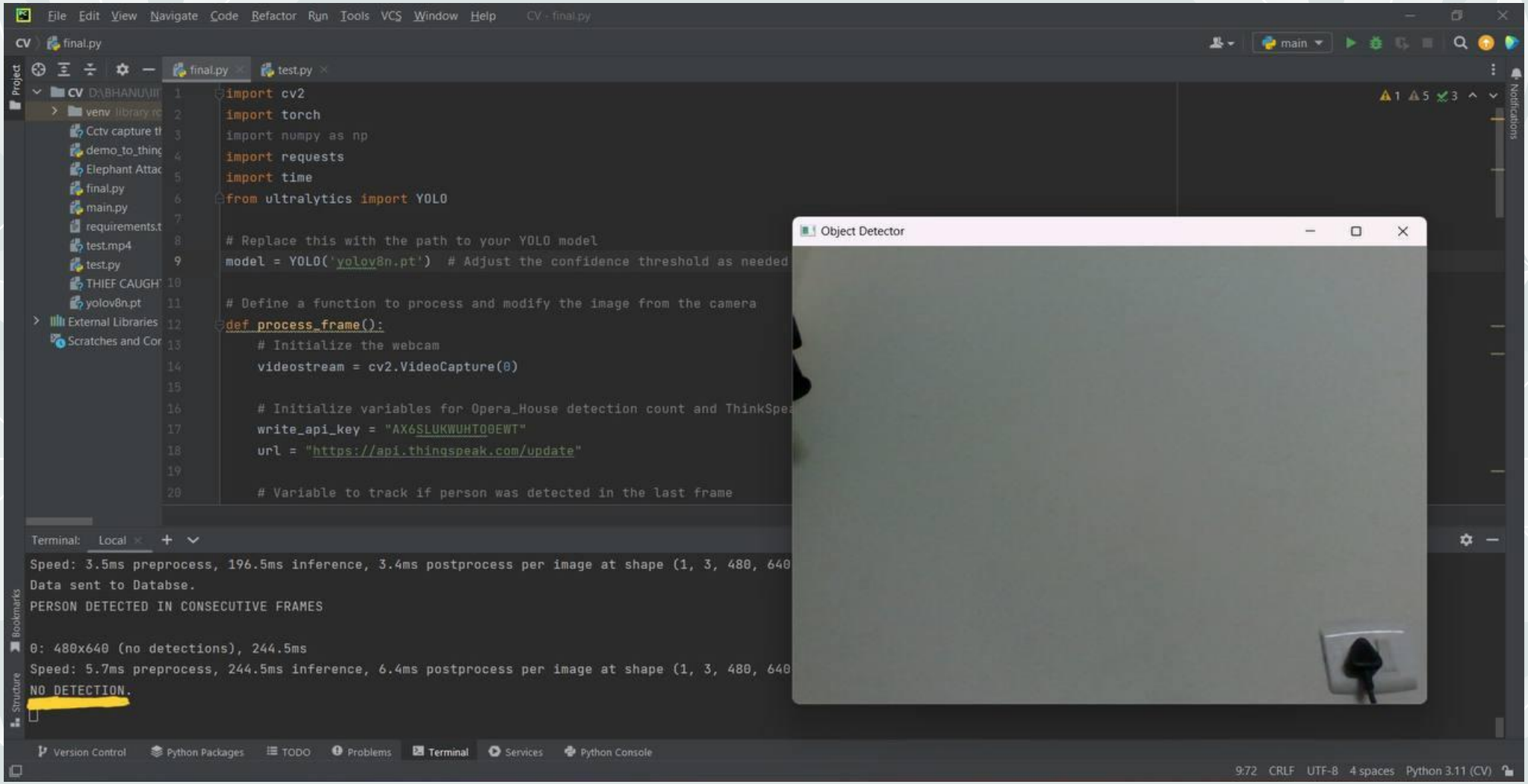
RESULTS

System at Receiver end:



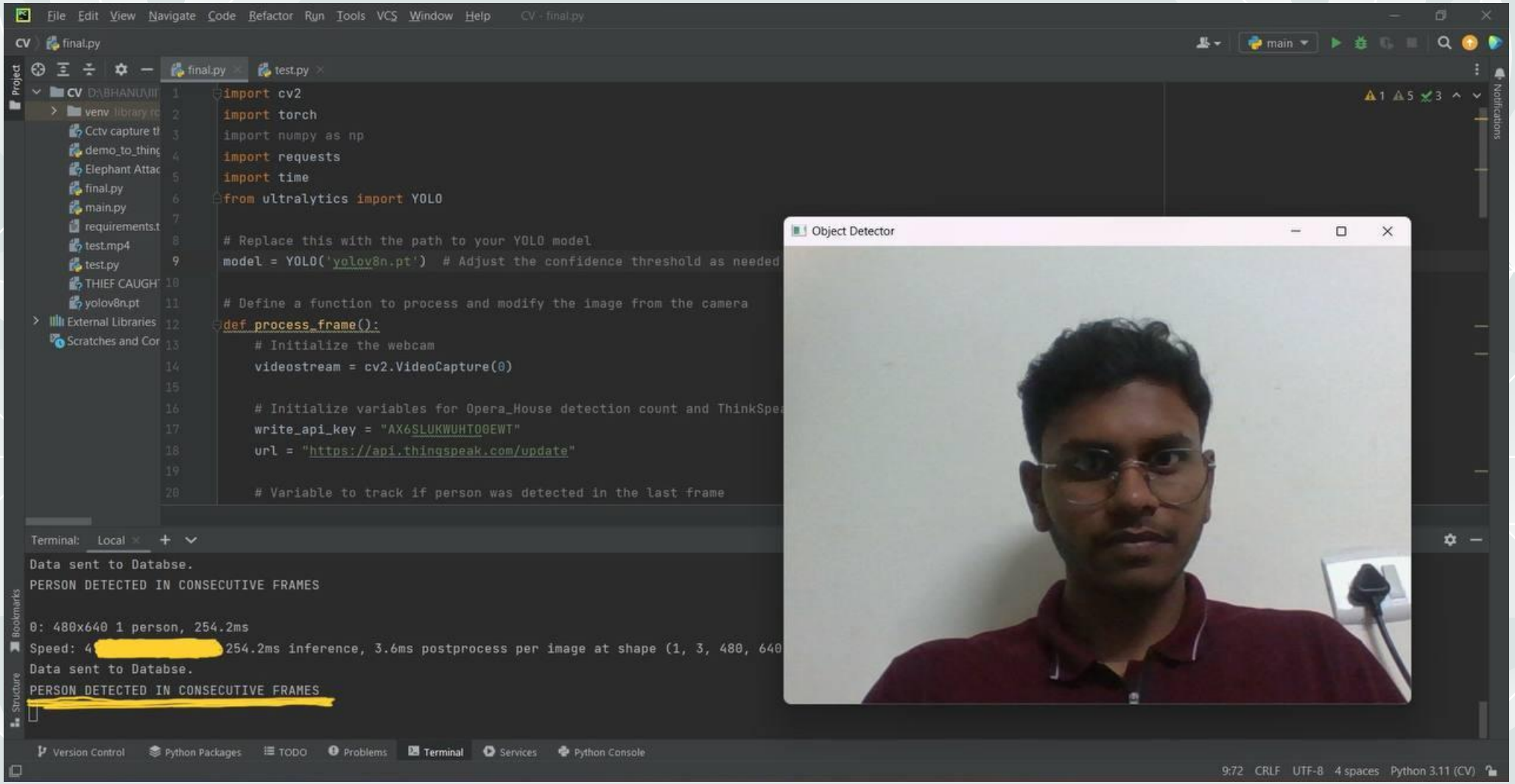
RESULTS

When no anomaly detected:



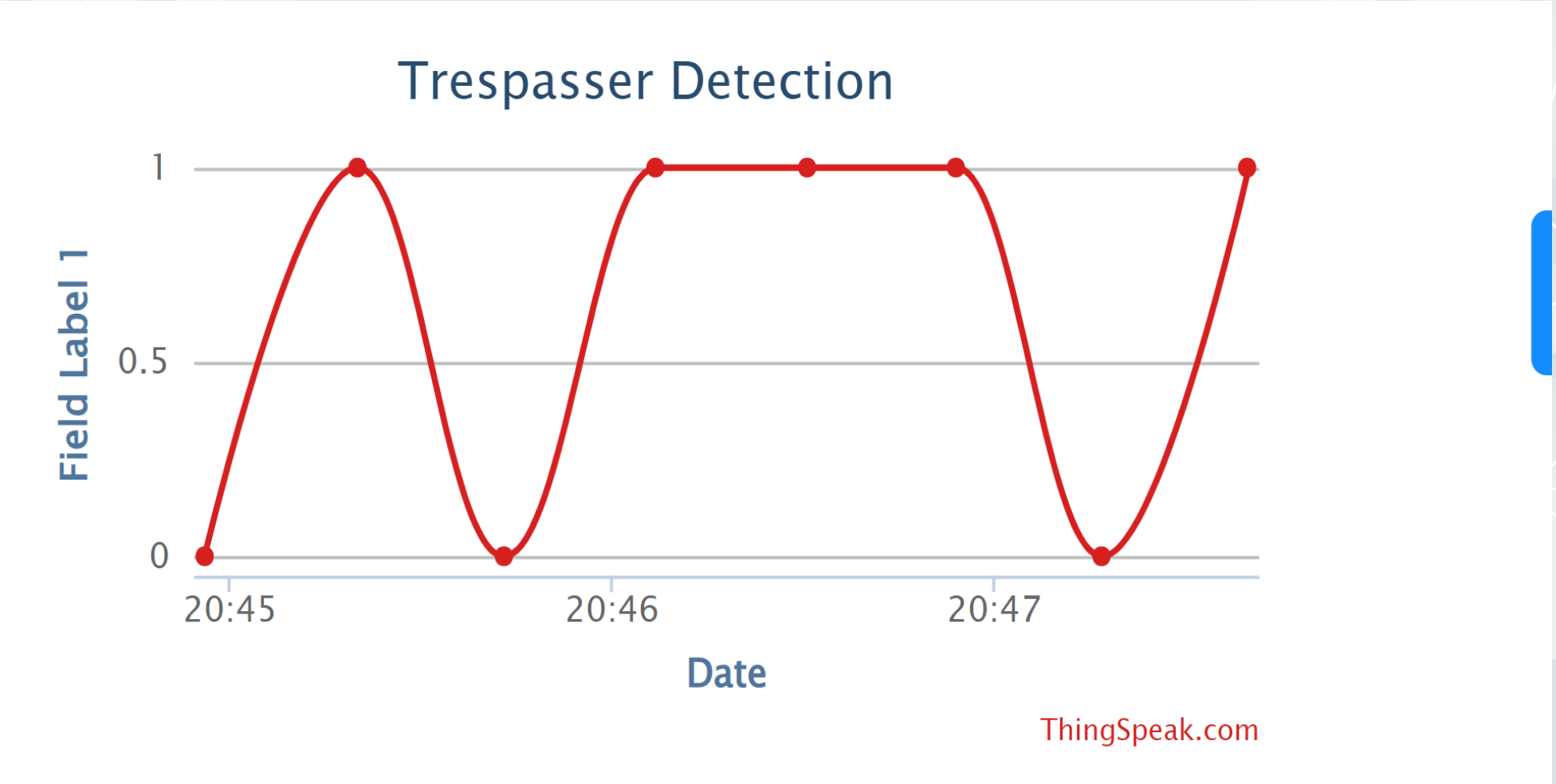
RESULTS

When anomaly detected:



RESULTS

Data being sent to ThingSpeak database and updating in Real-Time:



CHALLENGES FACED

- Establishing a Wi Fi connection with Raspberry Pi 3.
- The hardware connections proved to be challenging especially with i2C module.
- LoRaWAN won’t work as specified.
- Ensuring accurate differentiate person, animals, and potential intruders, with a focus on minimizing false alarms.

CONCLUSION

- Irrigation is initiated based on soil moisture levels, with the Arduino **autonomously controlling** the pump's operation.
- The farmer can conveniently monitor the farm **remotely** from their home.
- The system employs **solar energy** harvesting techniques for power efficiency.
- Additionally, it incorporates **computer vision** for detecting trespassers and issuing **alert messages** when unauthorized individuals are detected.

REFERENCES

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2. S.Parthiban & V.P.Santhi & M.S.Snehapriya & K.Indumathi & P. Masilamani. "Recent Advances in Enhancing the Productivity of Mango through Hi-tech Practices." (2020).
3. J. -H. Kim, N. Kim and C. S. Won, "High-Speed Drone Detection Based On Yolo-V8," ICASSP 2023 - 2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Rhodes Island, Greece, 2023, pp. 1-2, doi: 10.1109/ICASSP49357.2023.10095516.
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Thank you!

Questions?