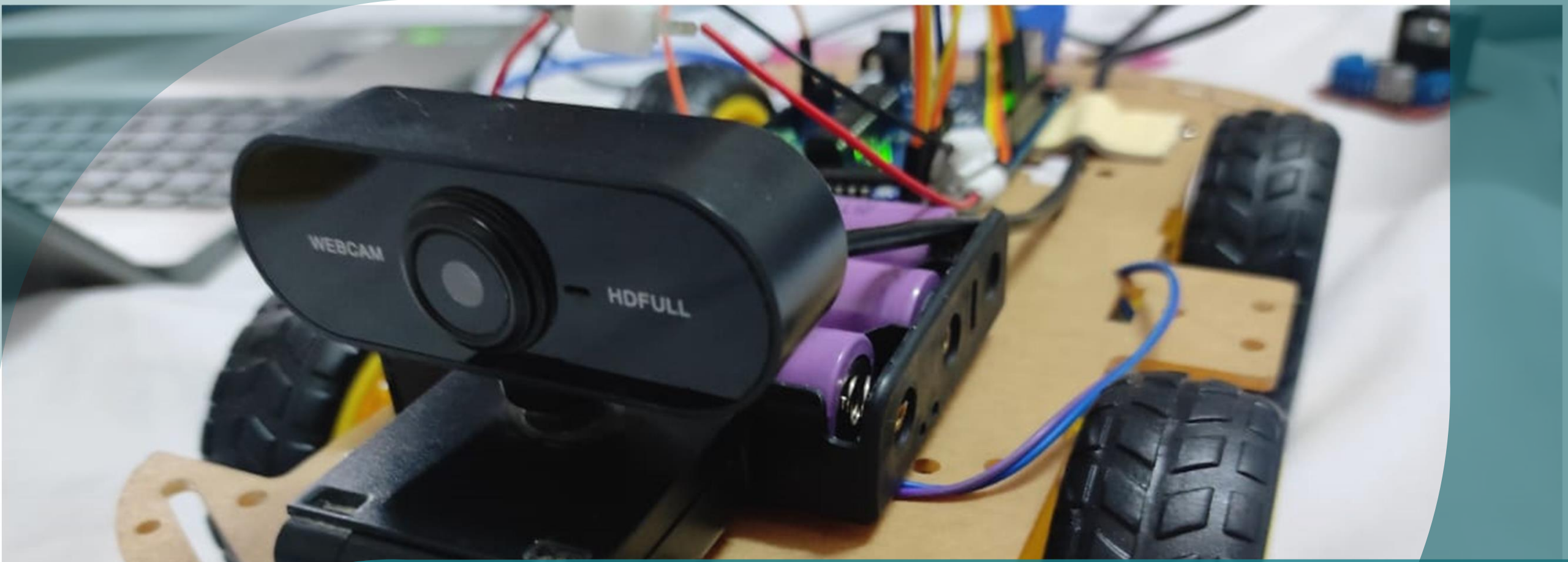
Problem Statement

Farming (IOT):

IoT technologies can help in improving farming techniques which can result in optimized production. There are many IoT devices which analyze various environmental factors such as soil profile, temperature, humidity, etc. This helps in improvements in both the quality and the quantity of the yield.



AGRICULTURAL INSPECTION ROBOT

TEAM NAME: Ingenious

Abstract

In the agriculture field, one of the recent research topics is recognition and classification of diseases from the leaf images of a plant. The recognition of agricultural plant diseases by utilizing the image processing techniques will minimize the reliance on the farmers to protect the agricultural products

Introduction

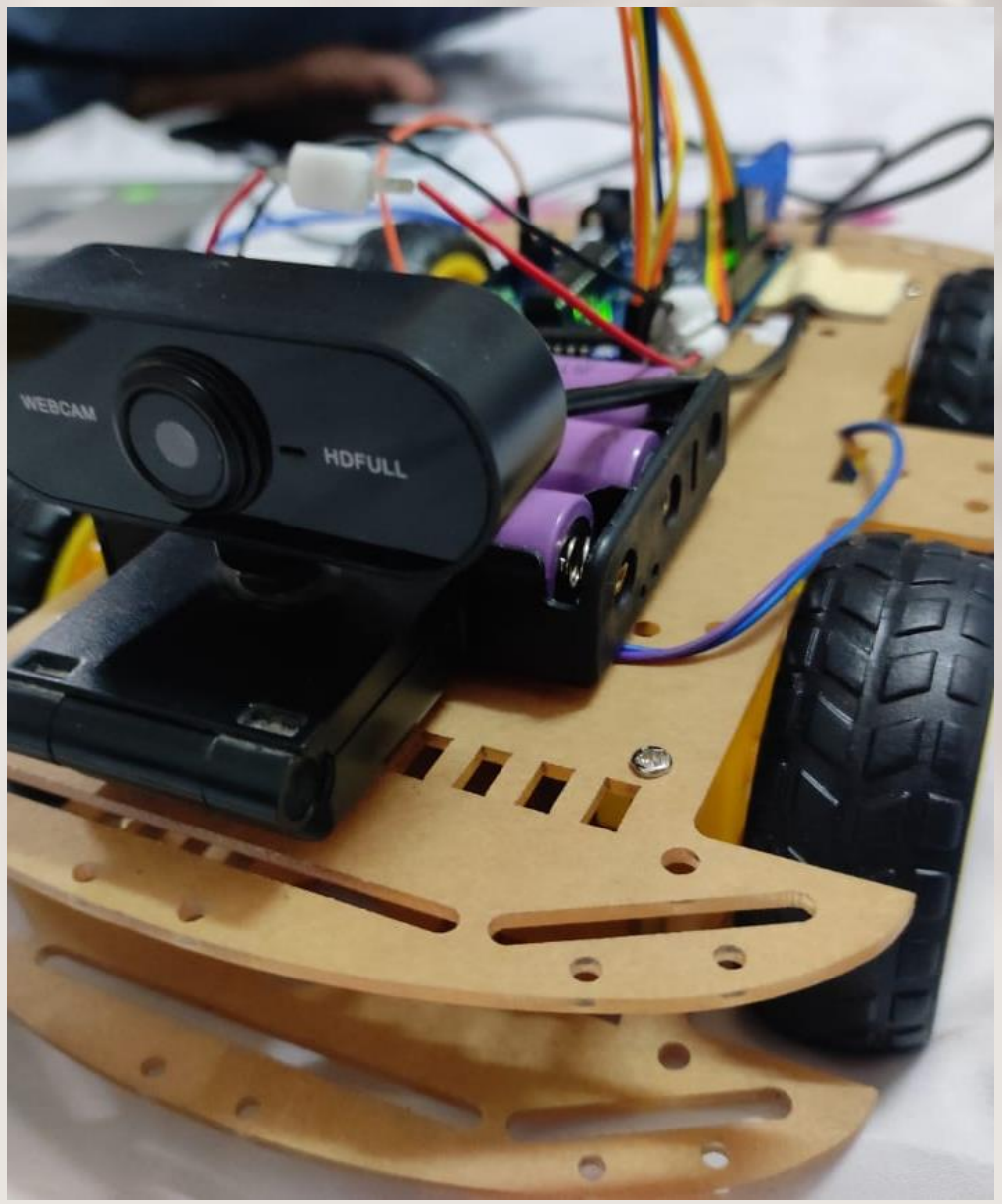
In many countries, for human beings one of the important sources of earning is agriculture. However, the farmers are facing several problems like natural disasters, shortage of water, plant diseases, etc. By providing some technical facilities most of the problems are reduced. Carrying out the on-time prevention from the disease may enhance the productivity of food . In the agriculture domain one of the necessary topics is the recognition of plant disease. Recently, recognition and classification of plant diseases is a demanding task. To avoid the losses in the quantity of agriculture products and in the yield, an important key is the recognition of plant diseases. For the sustainable agriculture, disease recognition and health monitoring on plants is very harmful. The recognition of plant diseases mean that the diseases are the visible patterns observed on the plants. Manually, the plant diseases are more difficult for the monitoring process. For the manual process it needs more processing time, large amount of work and expertise in the diseases of plant. So that for the plant disease recognition, image processing techniques are utilized, Commonly, in most of the plants to detect the plant diseases, leaves are the important source. In rice plants, sheath rot, leaf blast, leaf smut, brown spot and bacterial blight are the most common diseases .

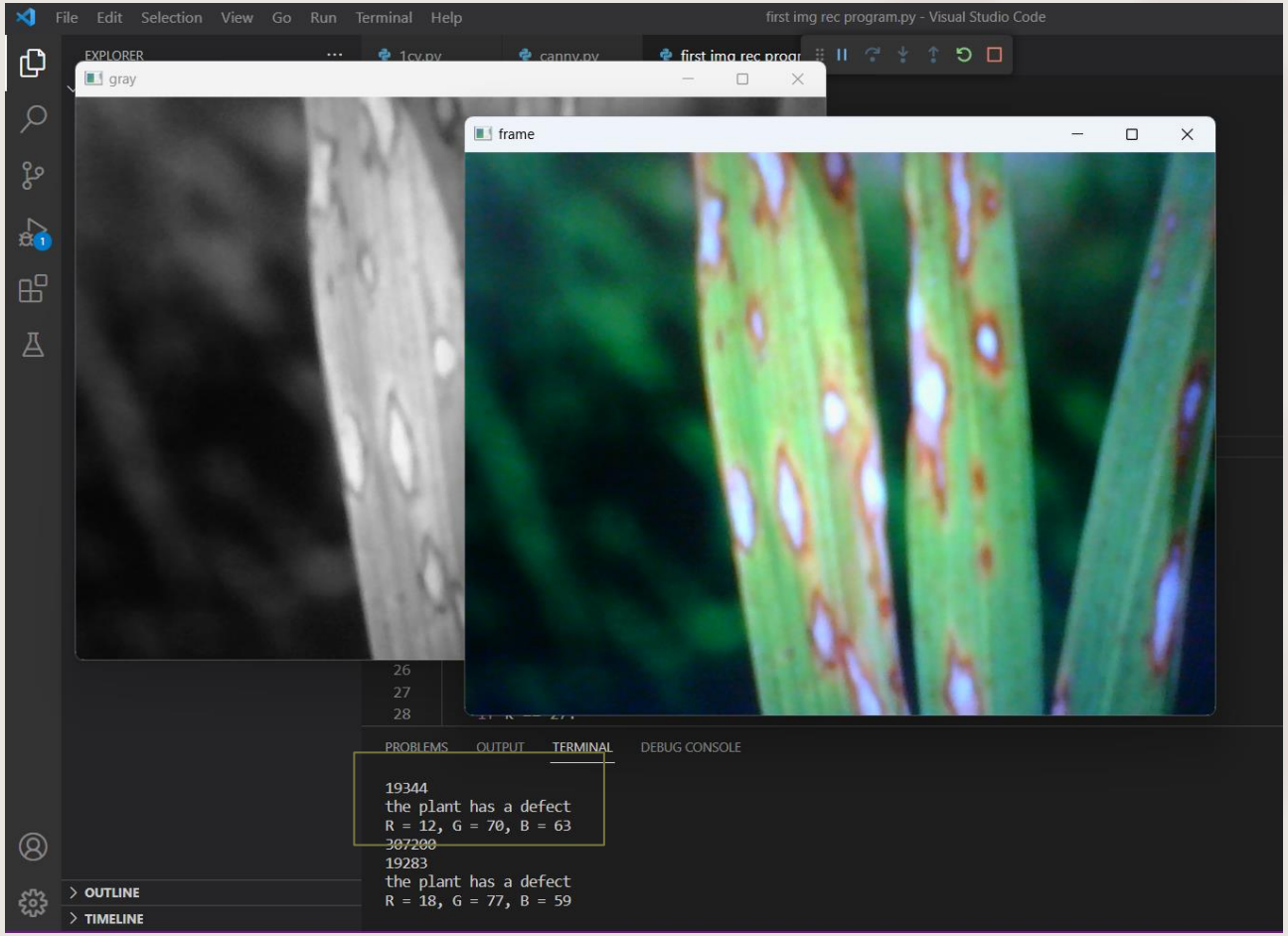
Problem Definition : For detecting the leaf diseases, the conventional methods are human vision-based approaches. In these cases, seeking the expert advice is time consuming and very expensive. The human vision-based methods suffer many drawbacks. The accuracy and precision of human vision approach is dependent on the eyesight of the person or expert hired, Image recognition method enables to identify the types of diseases, make the right decision and to select proper treatment. One of the advantages of using image recognition-based method is that it performs tasks more consistently than human experts. Therefore, to overcome the drawbacks of conventional methods their image recognition-based classification approach.

METHODOLOGY:

Farming is basic to the proceeded presence of human life as they straightforwardly rely upon it for the creation of sustenance. The exponential ascent in populace requires a fast increment in sustenance with the utilization of innovation to lessen the work and augment creation. Accuracy Farming is believed to be arrangement required to accomplish the creation rate required. There has been a critical change in the region of picture preparing and information handling which has been a noteworthy test already in the act of exactness Farming. A database of pictures is gathered through camera. The agricultural robot will be utilizing a chassis as a base to associate and assemble entirety on it will be consisting of four motors. If any obstacle is exposed by an Ultrasonic Sensor, it will terminate the DC motor. Field of View Process Using the basic camera is embedded in the robot to capture the sight of field. Acquired view will be passed through various processing methods like noise, removed contrast enhancement edge detection, filtrating the unnecessary components and obstacle detection. The processed image will be used for extracting the important image parameter matrix. Parameter matrix will be the quantifiers for the robot for assisting and aiding for taking the appropriate steps about navigation and ploughing. The image processing can be utilizing in agricultural relevance for following objectives:

1. To disclose diseased leaf, stem, fruit
2. To quantify affected area by disease.
3. To determine shape of altered area.
4. To determine color of altered area
5. To determine size & format of Fruits





white color on leaves is an indication of blast disease in rice plants . So, if we can detect the number of white pixels in an image of a crop and compare it with total number of pixels, we can find out whether the plant is infected or not. This technique can also be applied for detection of various other diseases ,pests and other features through color detection . In this way we can get data on each plant across the field and make decisions with the enormous amount of data obtained by the robot to optimize the resources for the field and ensure maximum yield.

G: > codes > first img rec program.py > ...

```python
import cv2
import numpy as np
import pyfirmata
cap = cv2.VideoCapture(0)

while(1):
    _, frame = cap.read()
    h,w=frame.shape[:2]
    nop=h*w
    print(nop)
    image=cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
    soilpx=np.sum(image>200)
    percent= (soilpx/nop)*100
    print(soilpx)
    cv2.imshow('gray',image)
    if percent > 3 :
        print('the plant has a defect')

    (B , G, R)= frame[100, 100]
    print("R = {}, G = {}, B = {}".format(R, G, B))
    if (R < 25 & G<25 & B<25) :
        print("hi")



    cv2.imshow('frame',frame)
    k = cv2.waitKey(5) & 0xFF
    if k == 27:
        break

cv2.destroyAllWindows()
cap.release()
```

“By making use of these following sensors we can increase the productivity of crop in agriculture
sector in a better way”

SOIL MOISTURE SENSOR : Farmers does not the proper moisture content in the soil ,lack sufficient moisture content leads to improper plant growth , this issue can be overcome by making use of soil moisture sensor. Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free-soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

RAIN DROP SENSOR :By detecting the rain fall in real time, the amount of water needed for the field can be planned. A system is developed based on ARM micro controller combined with GSM module to inform the rain fall level to the farmer and as well as automatically regulates the water irrigation. Raindrop sensor is basically a board on which nickel is coated in the form of lines. It works on the principal of resistance. Rain Sensor module allows to measure moisture via analog output pins, and it provides a digital output when a threshold of moisture exceeds. The module is based on the LM393 op amp. It includes the electronics module and a printed circuit board that “collects” the rain drops. As raindrops are collected on the circuit board, they create paths of parallel resistance that are measured via the op amp.

DTH 11 SENSOR: Farmer does not contain any info about working temperature and humidity conditions in the field ,This sensor is used in various applications such as measuring humidity and temperature values in heating, ventilation and air conditioning systems. Weather stations also use these sensors to predict weather conditions. The humidity sensor is used as a preventive measure in homes where people are affected by humidity. The KY-015 / DHT11 temperature and humidity sensor module comprises a DHT11 digital humidity and temperature sensor with an integrated 1k ohm resistor. The onboard DHT11 uses an internal capacitive humidity sensor and thermistor to determine environment conditions, and digital I/O integrated circuit for creating the serialized digital output. Due to its small size, the combination sensor is great for many projects, however it does come with one fairly serious drawback for use in some applications. It offers a sampling rate of a painfully slow 2 seconds. Applications that need more timely measurements should use a separate thermistor that can be sampled on a faster refresh interval.

PIR SENSOR: Farmers does not know what is happening on the field . Farmers cannot sense sudden animal/human motion in the field for this purpose we use PIR sensor, PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. Pyroelectricity Infrared Sensor is a kind of sensor that can convert the infrared ray signal emitted by human or animal into electrical signal. And HC-SR501 is an automatic control module based on infrared technology which has high sensitivity and security and works under the extra low voltage mode. It is a common sight that the module is applied in a range of automatic sensing electronic equipment, especially in automatic control products powered by dry battery.

ARUINO UNO: Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

ULTRASONIC SENSOR: An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e., the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

Conclusion

A good understanding of dynamics involved in food production is critical for the improvement of food security. It has been demonstrated that an increase in crop yields significantly reduces poverty in Yield. The images of paddy leaves are directly captured from the farm field for normal and the diseases like bacterial blight, brown spot, sheath rot and blast are identified. The current work is to increase the yield by providing solutions for environmental and biological factors affecting it .This platform is suggested to avoid the crop destruction due to floods. the climatic changes like rainfall, atmospheric temperature and humidity are measured by making use of approximate sensors to predict the amount rainfall and chances for rainfall.it helps in taking the preventing measures to reduce the factors affecting the yield. Apart from this a motion detection sensor as been installed within the field to sense the movement of any object like animals, pets, birds, insects wild animals.it helps in protecting the field from animal destruction. The proposed idea facilitating the achievements of crop production in safe environment, and this helps in sustainable agriculture with increase in yield.

Thank you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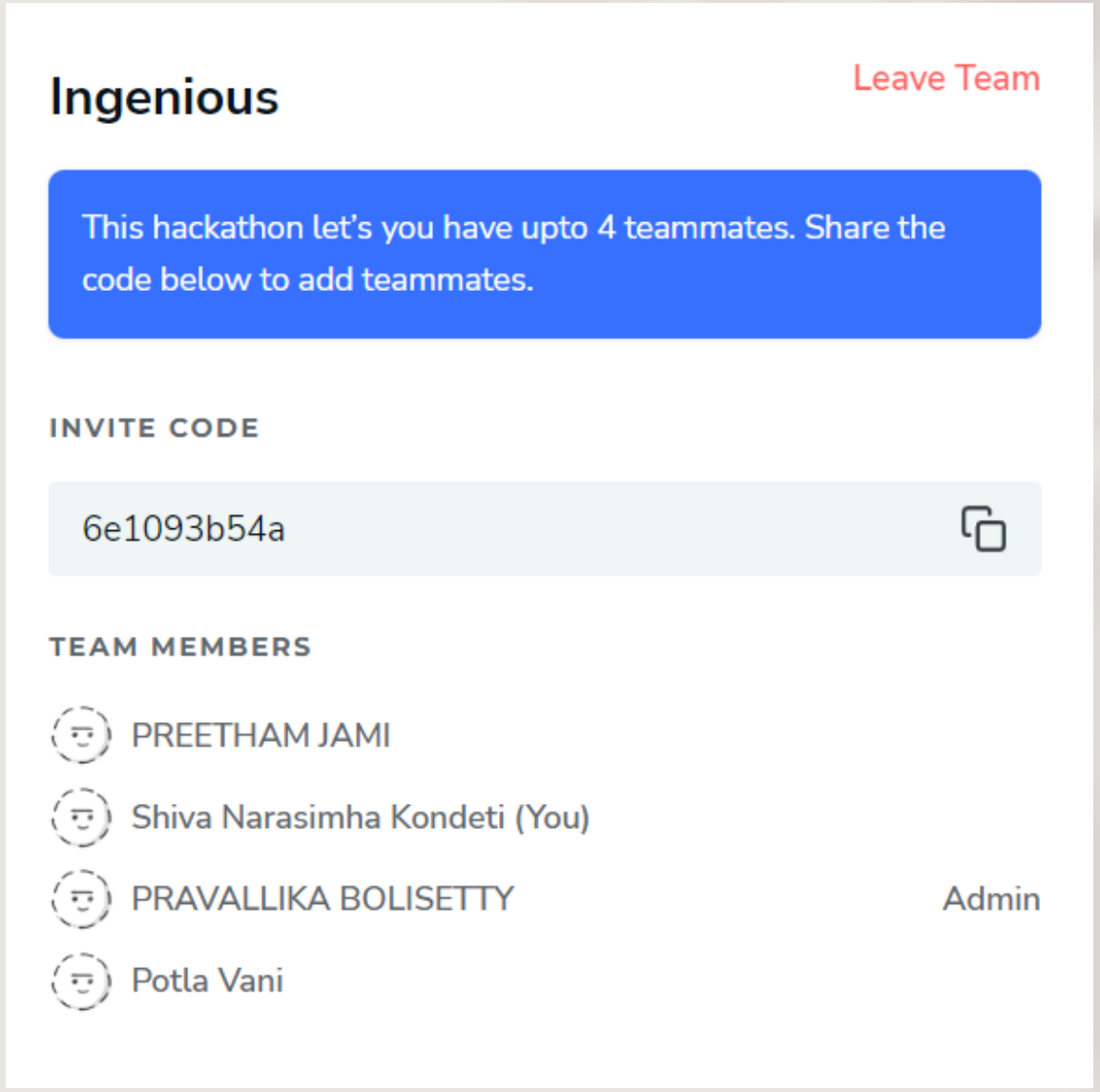
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Shiva Narasimha Kondeti (You)
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Potla Vani