ADVANCED TRAFFIC REGULATOR WITH ACCIDENT IMMUNE SYSTEM

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Introduction

In our day today life we travel from one place to another for the entire day in these highly populated cities. Eventhough, there are number of flyovers in and around the city to avoid congestion but still traffic is a major issue. Thus regulating the traffic is very necessary and it is also essential to reduce the number of accidents that is happening by violating the traffic rules. This project helps us to control the traffic by means of measuring the density of vehicles with the help of microcontroller and also used to reduce the number of accidents by violating the traffic rules through the number plate tracking done by image processing.

Objectives

•To make the traffic control system more effective by measuring the density of the vehicles in the traffic
•To track the number plate of the vehicles violating traffic rules
•To help the emergency vehicles like ambulance, fire services to move in traffic freely

Implementation

First we need to count the number of vehicles in the traffic through image processing and if there is more number of vehicles than the threshold limit then the green light has to glow for many seconds as it is programmed. The number plate tracking will be done if a vehicle pass through the IR plate during red signal ON condition with the help of image processing technique.

Literature Survey

[1] Ashish, J., Manisha, M., Harish, V. and Amrita R. “Traffic Density Measurement based On-road Traffic Control using Ultrasonic Sensors and GSM Technology”, in proc. AEEE 4th International Conference on Emerging Trends in Engineering and Technology, Kurushetra, Haryana, India, October 25-27, 2013, pp. 778-786

[2] Hashim, N. M., Jaafar, A. S., Ali, N.A., Salahuddin, L., Mohamad, N. R. and Ibrahim, M. A. “Traffic Light Control System for Emergency Vehicles Using Radio Frequency”, ISOR Journal of Engineering, 3(7), pp. 43-52, 2013.

[3] Kavya, P. W. and Joythi, S. “Traffic Light Control System Using Image Processing”, International Journal of Innovative Research in Computer and Communication Engineering, 2(5), pp. 288-292, 2014.

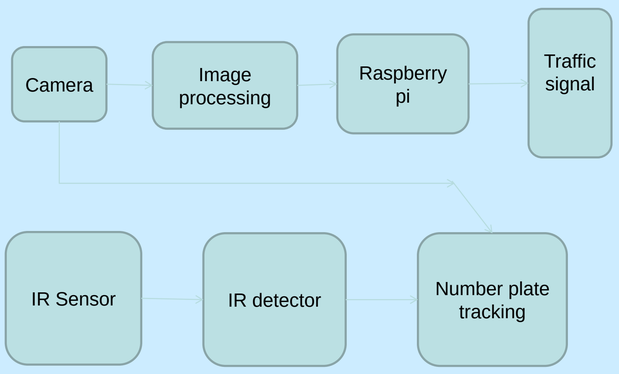
[4] Khalil, Y., Al-Karaki, J. and Ali, S. “Intelligent Traffic Light Control System Using Wireless Sensors Networks”, Journal of Information Science, Engineering and Technology, 26, pp. 753-768, 2010

Proposed Work

This is based on vehicle detection and tracking techniques .In this project we describe a computer vision technique for measuring the density of the vehicles(counting) the number of vehicles in the traffic thereby controlling the green light to glow for many seconds with the help of microcontroller thereby regulating the traffic effectively. Next is the number plate detection. For this we need two cameras, the first one is to view the capture the top of the road and the second is to capture the number of vehicles which will attach to the parallel of the road if a vehicle pass through the IR plate during red signal on condition then camera will get on to capture the number plate. The captured image is in capital RGB format it is then converted into gray scale and into binary image.

HARDWARE IMPLEMENTATION
•Cameras has been interfaced with the Raspberry pi
•Traffic controller circuit is connected with the Raspberry pi
•Depending upon the density in the particular lane the green light is glowing for many seconds

SOFTWARE IMPLEMENTATION
•Camera’s resolution is adjusted using Luvcview comment
•The video of the traffic is captured using camera
•Background subtraction is done with the images
•The algo.count the number of vehicles on each lane and calculate density
•According to the density it will allocate time for the green signal to glow with the help of Raspberry pi



Raspberry Pi

Applications

•This traffic regulation system implemented in the highly populated cities.
•Number plate tracking can be done in all the places to avoid the number of accidents that are happening because of the violation of traffic rules.
•This can be also used to identify the vehicle which is responsible for the accident

Expected Outcome/ Results

•It helps the public to travel without traffic so that they can reach their destination on time.
•Since everything is being captured by image processing techniques the violation of traffic rules can be greatly minimized.

Hardware setup

Conclusion

•In this project a method for estimating the traffic using image processing is presented.
• By implementing this project the great problem in the cities will come to an end.
• The advantage of this method include some benefits such as low cost, high accuracy and speed, use of image processing sensors and easy setup

AUTOMATED VEGETABLE PROCESSOR(CHOPPING, GRATING & PEELING)

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Introduction

As mankind has evolved over the years, man has found out one resource that is indispensible at any cost: **Time.** Most of the new inventions and innovations have been aimed at reducing the time taken for completing a particular job. Our innovation also has the same objective. Te Automated Vegetable Processor helps man to manage his time efficiently and is controlled by a Bluetooth App. It also ensures minimal human effort and guarantees maximum results.

Objectives

- To improve safety while handling sharp vegetable cutting tools
- To improve the hygiene and enhance the purity of dishes
- To have high precision and accurately cut vegetable pieces
- To reduce the manual labour and make a device that is highly user-friendly
- To reduce the time taken and speed up the process of vegetable cutting in food industries
- To offer a cost efficient alternative for domestic use that would be easy to handle by anyone
- To provide a complete solution for processing the vegetables before cooking in food processing industries

Implementation

The fruit or vegetable is first loaded into a loading platform. The user is notified that the vegetable has been loaded and asks the shape and type of the cut pieces required via wireless transmission(Bluetooth and an Android app). For different types of cuts and shapes various designs of blades are being used. According to the specified user configuration, the suitable types of blades are selected automatically. The vegetables are moved using a conveyor. A microcontroller and motor combination is used to drive the blades accordingly. The user will be notified at the end of the task via the app and is prompted to collect the cut pieces for further processing.

Literature Survey

- Raspberry Pi Cookbook for Python Programmer by Tim Cox
- Hello, Android by Ed Burnette
- Materials Selection in Mechanical Design by Michael F. Ashby

Proposed Work

Hardware:

The Vegetable Processor has a loading platform and a mini-conveyor system followed by knives, which are placed in vertical arrays. The knives can be rotated by 90 degrees so that it becomes horizontal. The rotation can be carried by motor whose action is decided by a controller. The knives are followed by a grater, placed at an angle of 45 degree.

User Interface:

We intend to cut, grate, peel vegetables according to user requirement. First of all the user loads the set of vegetables into the machines. Then we get user's choice if he/she wishes to peel and the user can select the type of cut(e.g. vertical or horizontal or box type)or grating. Spacing can be changed if required other then default pre-programmed value.

Methodology for peeling vegetables:

If peeling option is selected , The vegetables is made to stand on its longest axis and a continuously rotating peeler moves along the surface till end whose completion is automatically detected by suitable sensors . Then it is given to chopping section.

Methodology for chopping vegetables:

So now we have user's input i.e. Type of cut and spacing. The vegetables move on a mini-conveyor system. The user's choice is given as input to a microcontroller. The spacing input got by the microcontroller energizes the blades which moves an inch downward and remaining moves an inch upwards. Then the knives are pressed hard against the vegetable which cuts it into pieces. Then the same procedure is repeated by rotating the blades at required angle.

Methodology for Grating Vegetables:

The grating is carried by grater machine placed at 45 degree. The vegetable is continuously grated against the grater till the vegetable end.

Other planned works (if possible within the given time and cost)

•Auto-Cleaning feature

•Auto-checking blades quality

Raspberry Pi

Applications

•Food processing industries

•Domestic uses (at homes)

•Commercial kitchens (Eg: Restaurants, Eateries, Fast-food stalls)

•Non-profit food service centres

•Cooking for a huge mass of people (Eg: Marriage and other functions)

Expected Outcome/ Results

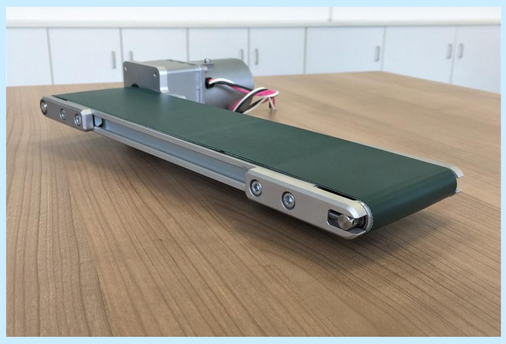
•Affordable and portable device, that is highly user-friendly

•Energy-efficient and smart device

•Minimum effort, maximum productivity

•Auto-cleaning and self-maintaining device

•High speed and high accurate utility



Conveyor Belt

Conclusion

Thus if we work on this project we will be able to develop a user friendly multi-purpose vegetable cutter which is 100% safe. This machine will be of utmost use to people of all walks of life (Low cost can be made by compromising certain features and app-interface)

SENSE OF TOUCH IN AUGMENTED REALITY

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Abstract

This Project is aimed to enable the visually challenged people to perceive the shape and texture of objects through virtual sense of touch. The sense of touch is added to the existing Augmented Reality(AR) devices to provide users with a wholesome experience of handling virtual objects. Augmented reality is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data. This is possible with the help of hardware components such as processor, display, sensors and input devices. Modern mobile computing devices like smartphones and tablet computers contain these elements which often include a camera and MEMS sensors such as accelerometer, GPS, and solid state compass, making them suitable AR platforms. Augmented reality was used for military, industrial, and medical applications initially, and currently it has also been applied to commercial and entertainment areas.

Objective

An aid for enabling the visually challenged persons to perceive the shape and feel of objects through virtual sense of touch. To add a sense of touch, to existing augmented reality devices to provide users with a experience of handling virtual objects

Introduction

With the advent of advanced computing devices, their processing capability has gone to unimaginable scales. The introduction of Graphics Processing Unit(GPU) into portable devices has enabled graphic-intensive applications to be run seamlessly. One such area of interest is the Augmented Reality(AR) systems, that prove to be the future of computing. These systems have already been tested in several fields such as Flight Simulators for Pilot, Virtual Shopping Zones and Pokémon Go. This project aims at improving such AR systems and making them feasible to be used by the visually challenged people. The AR systems can be effectively used for EDUCATION and LEARNING

Methodology

- To simulate the sense of touch with haptic actuators
- The final product will enable the users interact with the virtual objects just as the do with the physical ones, (i.e.) touch, push, pull, and play with them
- Also, the users may add things around to the virtual environment (designed in Unreal engine) with simple scanning techniques
- The system consists of an Arduino Mega board, sensors to detect motion and actuators.
- Arduino Mega will be the heart of the system.
- The orientation sensor will be used to detect the orientation of hand. It will give the x, y, z orientation of the wrist in the real plane.
- This data is fed to the unreal engine which will control a bot based on the orientation values.
- The flex sensors will detect the motion of fingers by variation in resistance. The calibration is done for processing needs. The flex sensors values are fed to the system which will control the fingers.

Hardware Design

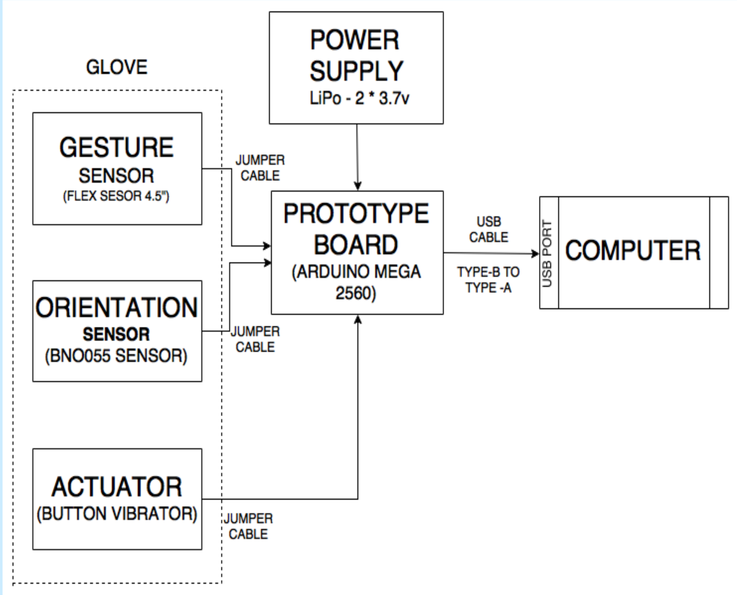

Figure 1 Block diagram of hardware design

Product Design

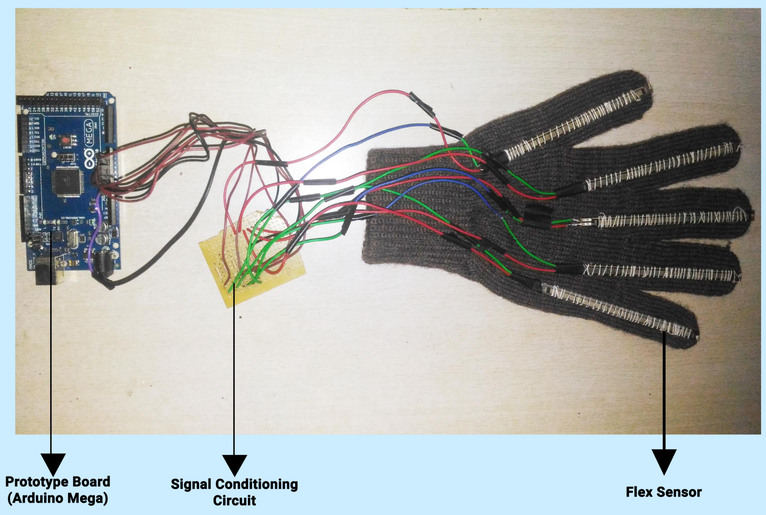

Figure 2: Flex Sensor wiring to protyping Board

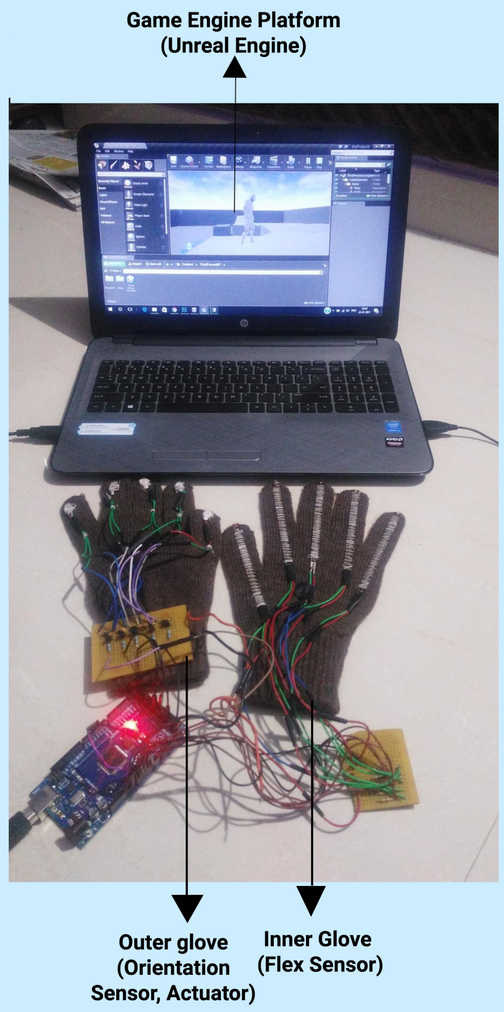

Figure 3: Glove setup with the Virtual environment

Performance Evaluation

Type of Object	Effect on Object	Time Lag (in s)	No. of Erroneous Sensing (out of 5)	Performance
Rigid Rock	Recoiling	<1	1	Satisfactory
Elastic Membrane	Stretching	>2	4	Unsatisfactory
Bouncy Ball	Disturbed	<2	3	Satisfactory
Moving Rock	Stopped	<1	2	Satisfactory
Hollow Cylinder	Disturbed	<1	2	Satisfactory

Conclusion

The objectives of the project were to build a practical system that provides a user-friendly system to interact with the virtual objects. The choice of the components and tools used in the project played a significant role in the completion of the project. The use of a simpler prototyping board made the system design very compact, while it also forced a compromise on its performance. The game engine proved to be helpful in rendering a clean environment for testing the project. The main objective of interacting with the virtual objects was accomplished, while the secondary objectives of feeling the texture and nature of the object could not be completed due to mechanical design constraints. The system performs good under circumstances where single objects are interacted with. When multiple objects interfere, the user-experience may be at times glitchy due to the presence of only five actuators. Also, the sensing part is satisfactory with the motion at normal rates. Rapid movements can cause disruption of cables and also faulty sensing.

Future Scope

Improvement in the performance index of the system could be possible with the use of more sophisticated and robust controllers. Also with increased actuators the experience could be made more realistic. Linear actuators that tend to provide a pressing effect which will be more realistic. This could be integrated with existing state-of-the-art virtual reality technologies like Microsoft Holo Lens. Gloves can be even tuned to give the feel according to person's weight. Virtual reality enabled futuristic classrooms. With increased user network, sharing virtual objects with the community will become very easy and advantageous.

Useful Resources

•M. Sage, "Creating Augmented Reality Experiences for Enterprise: Good practices, lessons learned, and technological insights," in *IEEE Consumer Electronics Magazine*, vol. 6, no. 1, pp. 42-44, Jan. 2017. doi: 10.1109/MCE.2016.2614651

•S. Papetti; H. Järveläinen; B. L. Giordano; S. Schiesser; M. Fröhlich, "Vibrotactile sensitivity in active touch: effect of pressing force," in *IEEE Transactions on Haptics* , vol.PP, no.99, pp.1-1 doi: 10.1109/TOH.2016.2582485

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EARLY PEST DETECTION USING QUADCOPTER AND DIGITAL IMAGE PROCESSING

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Supervisor: Dr.K.Latha (Associate Professor)

Introduction

The existing system for pest detection for large fields in INDIA is manual survey.In developed countries like USA,Germany quadcopters equipped with cameras are used to monitor the health of the plants. The existing method involves the use of two cameras. The proposed method involves the use of single camera to monitor the health of the plant The camera which is being used is Raspberry pi's NoIR camera and the unique feature of this camera is that it has no IR filter, hence the need for separate IR camera is eliminated. A quadcopter is used to take aerial pictures in order to do the survey of Plant health in large fields.

Objectives

Reduction of pesticides in Agriculture is necessary to stop the decline in biodiversity and to ensure a more resource efficient approach. This reduction can be achieved by a combination of the introduction of

- Advanced technology in conventional agriculture
- Spraying-free zones, for instance along rivers and streams
- More organic farms

Implementation

The normalized difference vegetation index (NDVI) is a simple graphical indicator that can be used to analyze remote sensing measurements, typically but not necessarily from a space platform, and assess whether the target being observed contains live green vegetation or not. It is possible to detect plant health from these images because plants reflect different amounts of visible green and NIR light, depending on how healthy they are. By measuring the changes in visible and NIR light reflected from a crop, we can spot potential health issues. To monitor changes in plant health over time, drone images are processed to calculate a tracking index called NDVI (normalized difference vegetation index), which is a measure in the difference between light intensity reflected by the field in two different frequencies: NDVI is the ratio of near infrared (NIR) reflectivity minus visible red reflectivity (VIS), divided by NIR plus VIS:

NDVI = (NIR-VIS)/(NIR+VIS)

Literature Survey

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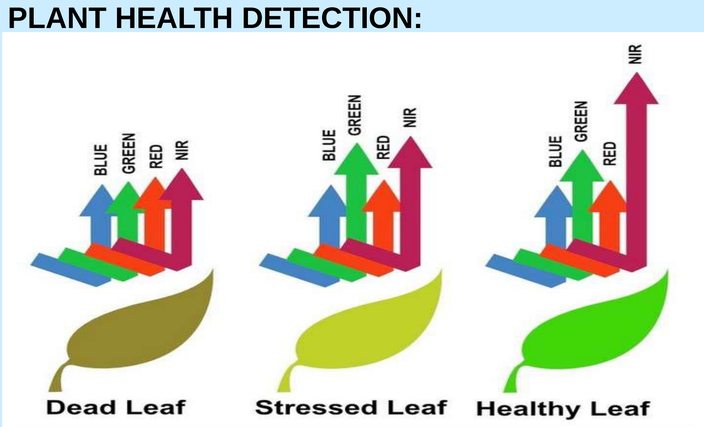
- Materials Selection in Mechanical Design by Michael F. Ashby

Proposed Work

PLANT HEALTH DETECTION:



DIFFERENCE IN REFLECTANCE BASED ONPLANT HEALTH:

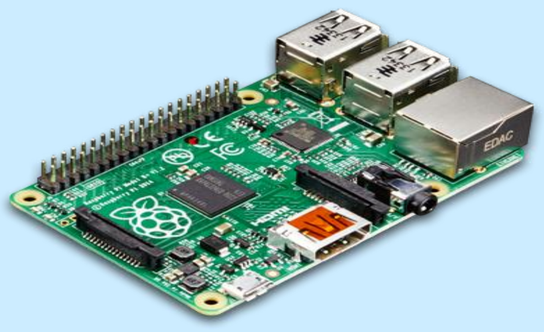
These spectral reflectances are themselves ratios of the reflected over the incoming radiation in each spectral band individually, hence they take on values between 0.0 and 1.0. By design, the NDVI itself thus varies between -1.0 and +1.0. It should be noted that NDVI is functionally, but not linearly, equivalent to the simple infrared/red ratio (NIR/VIS).

NoIR CAMERA:

NoIR pi camera is a camera which can be connected to raspberry pi. The Pi NoIR gives everything the regular Camera Module offers, with one difference that it does not employ an infrared filter. (NoIR = No Infrared). The camera works with all models of Raspberry Pi 1, 2, and 3. It can be accessed through the MMAL and V4L APIs, and there are numerous third-party libraries built for it, including the Pi camera Python library.

QUADCOPTER:

At a small size, quadcopters are cheaper and more durable than conventional helicopters due to their mechanical simplicity.Their smaller blades are also advantageous because they possess less kinetic energy, reducing their ability to cause damage. For small-scale quadcopters, this makes the vehicles safer for close interaction. It is also possible to fit quadcopters with guards that enclose the rotors,further reducing the potential for damage. Quadcopters are used to gather a variety of image-based data about the condition of crops, fields and livestock – including: plant height,plant count,plant health,presence of nutrients, presence of disease, presence of weeds, relative biomass estimates, 3D / volumetric data (piles, patches, holes and hills) Quadcopter data is used to do farming jobs more effectively and efficiently, including:Crop Health Monitoring



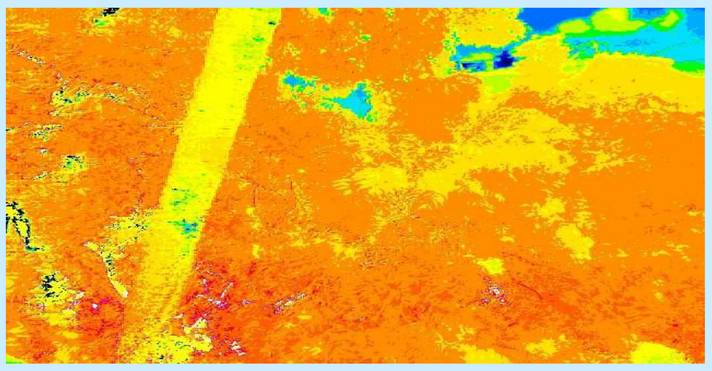
Raspberry Pi

Applications

- sub-surface drip irrigation for precise water and fertilizer application
- robots for no-till sowing, weed removal, harvesting and other operations.
- Identification of harvest time
- Identification of water logging in field
- Spying of the agricultural field
- increasing its productivity and maximizing its yields

Expected Outcome/ Results

The below image is a colored version of the NDVI image.Color is applied to the NDVI image for better human interpretation. The Red color indicates the region where there is maximum vegetation. Orange color also indicate the vegetation which has good vegetation. The yellow color indicates the moderate vegetation and Blue indicates No vegetation regions. From this image the poor vegetation region is found and it can be sent to the Agriculture unit to take care of pest and for applying suitable pesticides.



COLOR COMPOSITE IMAGE

Conclusion

Using the NDVI index crops affected by pests are identified.The percentage of crops affected in a image is calculated and hence the total percentage of crops affected in a field is also calculated.So more pesticides can be used in the pest affected areas than the unaffected areas.This ensures in optimization of pesticides and hence reduction in cost.The quadcopter saves time in covering the field.This process requires cumbersome initial calibration.The quadcopter flying at a fixed height covers a specific area which can be calculated.The entire field is divided into strips and overlapping of strips can be avoided by analyzing the camera coverage at different heights.

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