FARM MONITORING AND CROP DISEASE DIAGNOSIS

Nikhil Shinde[1], Rounak Saraf[2], Pooja Yadav[3], S.M.Kulkarni[4]
Department Of Electronics and Telecommunication.
MIT College of Engineering, Kothrud, Pune

Abstract

Crop monitoring is basically harvesting the crop towards maximum yield with available resources. However nowadays monitoring also involves protecting the crop during its lifetime from theft or damage due to unwarranted intrusion.

In order to meet the monitoring requirements farmers can use the economical, user-friendly technological provisions like highly reliable sensing devices and their interfacing with mobile network. Nowadays, farmers are more involved in various unproductive activities like protecting the crop from human/animal intrusion leading to probable theft or damage of the crop.

Farmers also tend to waste their time and efforts in walking across the farm to switch on/off the lights, motors, sprinklers, etc. All these unnecessary efforts of the farmer can be reduced by using modern technology. As in the case of our project, a simple android application can be used to carry out the above mentioned activities.

In the case of any crop disease, the farmer will be able to identify the disease type by simply taking a picture of the infected portion and uploading it to the image processing device. Not only will the farmer be provided with the name of the disease but also with the treatment information and remedies.

Index Terms: Agriculture, Crop Monitoring, Disease Detection, Image Processing.

INTRODUCTION

In today's technologically advanced world, farmers can make use of the technology to reduce their workload and concentrate more on improving the crop yield. Farmers can use smart phones to monitor their entire farm from anywhere in the world. Using their smart phones they can carry out activities like turning on/off the lights, motor as well as checking the soil moisture level. Animal and human intrusion is also a major problem for the farmer which requires continuous monitoring. However farmers will be notified in case of any kind of intrusion and the farmer can take the necessary action.

Crop disease detection can be done using image processing which will help the farmers to identify the crop disease by simply taking a picture of the infected part of the crop and uploading it to a image processing device.

NECESSITY OF CROP MONITORING

Today, India ranks second worldwide in farm output. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. In this technologically advanced generation, farmers need to avail or make use of the available technology to the fullest. Their main problem relates to the wildlife that is present in the vicinity around the farm. Human interference is also a major issue that can cause problems to these farmers. Hence, they need to be aware of the activities that go on in their farm in their absence and therefore we have included a smart phone application in the project which will come in handy and will provide continuous information wherever the individual may be.

METHODOLOGY

• Intrusion by human/animal can be detected using PIR sensor.

• Farmer can be notified on his mobile phone in case of any intrusion.

• Siren/Musical buzzer can be used to scare away the intruder.

• Ultrasonic Emitter can be used to drive away the animals, pests, rodents, rats ,lizards, cockroaches, etc.

• Vibration sensor placed on the fence wire can be used to sense the vibrations created by the animals trying to enter the farm.

• Water sprinklers placed at a certain distance from the fence can be activated to scare away the animals.

• A simple user friendly mobile application can be used to switch on/ off the lights, motor and check the soil moisture level.

• Disease detection can be done using image processing. The farmer will receive information regarding the disease and also various treatment measures.

Fig.1:- Block diagram

Fig.2:- Disease detection

IMPLEMENTATION OF THE PROPOSED SYSTEM

4.1 INTRUDER ALERT USING PIR SENSORS:

• PIR sensors have a sensing range of about 30m and 15 degrees are placed at the corners in such a way that all the sides of the farm are covered.

• When any intruder tries to break in, the PIR sensors will sense the motion and the sensor's Output pin goes HIGH. On receiving this HIGH input from the PIR sensor, the Arduino sends an SMS to the farmer via the GSM module.

• Also, the musical buzzer/Ultrasonic emitter will be turned on to scare away the intruders and to alert the nearby people in the locality.
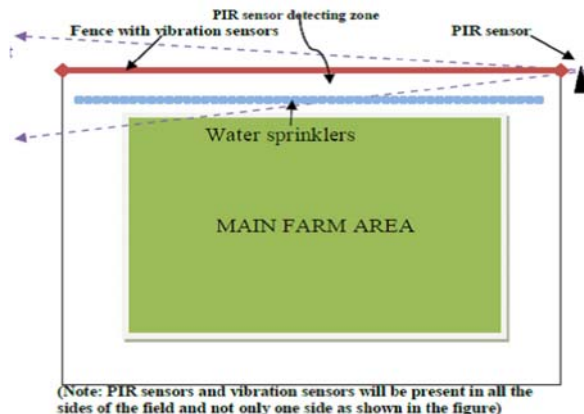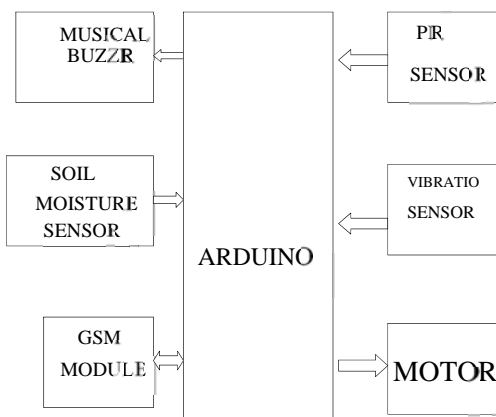

Fig.3:- Top View of the Farm

4.2 ANDROID APPLICATION:

• A simple android application can be used to monitor the entire farm from anywhere in the world. The application screen is shown in the following figure.
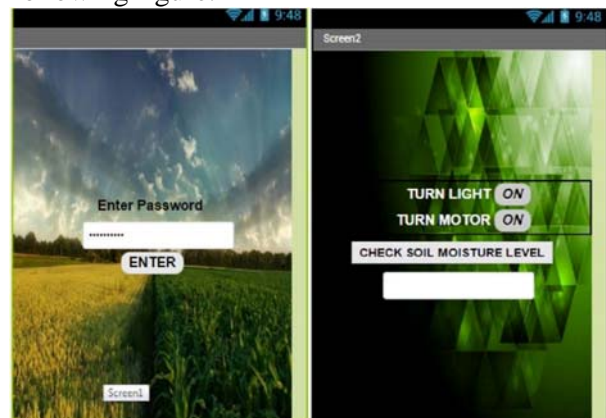

fIG.4:- Android Application Screenshot

The application can be used for:

1) Receiving an alert notification in case of any intruder alert.
2) Turning on/off the motor located anywhere in the farm.
3) Turning on/off the lights in the farm.
4) Checking the moisture level by simply pressing the respective button.
5) Receiving update regarding soil moisture level.

4.3 DISEASE DETECTION:

The farmer will take a picture of the infected crop portion and upload it to the image processing device. The system will have a database of common plant diseases and using image processing the uploaded picture will be compared with the database and if a match is found the farmer will be provided with the essential information regarding the disease such as symptoms, treatment measures and remedies.
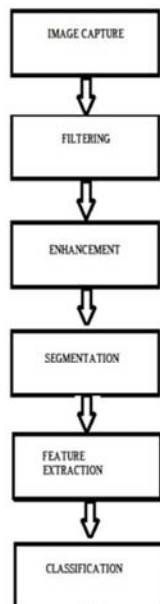

Fig.5:- Steps involved in image processing

On uploading the image of the disease infected crop to the image processing device, the image is first filtered and enhanced. Then the image undergoes segmentation to form different clusters. Then the features of the image such as Contrast, Correlation, Energy, Homogeneity, Mean, Standard Deviation, Entropy, RMS, Variance, Smoothness, Kurtosis, Skewness and IDM are extracted and compared with the database of already learned images. Based on the idea of maximum feature similarities, the disease of the crop is identified and the corresponding symptoms, prevention and treatment measures are provided.
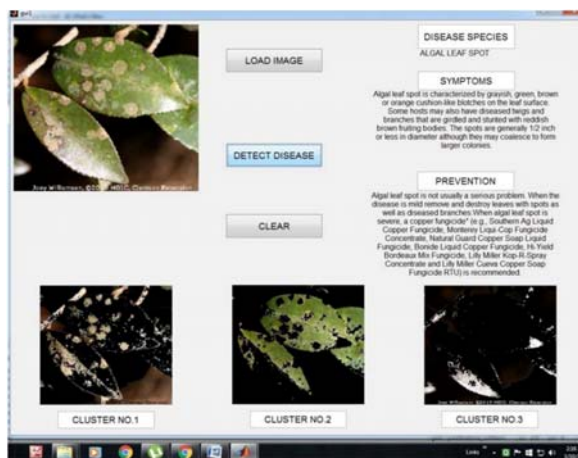

Fig.6:- GUI for Disease Detection

CONCLUSION

By using this system it will be possible for the farmer to monitor his farm from anywhere in the world. Also, using the disease detection feature the farmer will be able to identify the crop disease if any by simply taking a picture. Thus with the help of such an intelligent farm, the farmer will be able to concentrate more on the crop yield.

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