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Cloud Based Plant Leaf Disease Detection System Using an Android Application

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***Abstract* – Most of the population in India depends on agriculture and farming. Indian economy directly depends on agricultural production. The proper maintenance of plant growth includes various steps such as to examine the environmental factors and manage water supply for proper cultivation of plants. A traditional way of irrigation is not efficient and unreliable. Around 18% of crop yield is lost worldwide due to pest attack every year. Identification of plant disease is key to preventing the losses in the yield of agriculture product which is difficult to do manually. The project therefore involves a system architecture which allow user to achieve all above activities in real time so that farmers can view their farm details from remote location. It includes- 1.A module placed in a farm that contains various sensors and device for data conversion and transfer such that farm details and environmental factors are monitored and controlled correctly 2.Image processing for disease detection of visually seen symptoms of plant. Using an application the treatment is suggested to reduce the damage levels. The proposed system will thus improve in the productivity and benefit irrigation sector.**

Keywords: Internet of Things, Image processing, Wireless Sensors, Disease Detection, Smart Irrigation System.

1. INTRODUCTION

Internet of Things means Internetworking of physical devices which are embedded with electronic, software, sensors, actuators that make the data transfer possible. In 2013, he Global Standards of Initiative on IOT defined Internet of Things as "The Infrastructure of the information Society". It creates an opportunity about direct interaction of physical world with computer system world and in result its efficiency, accuracy helps in reducing human invention. Environmental monitoring application of IOT, as this application uses wireless sensors to protect the environment by monitoring various aspects of environment. In traditional method there are no modern techniques to for automatic detection and classification of plant diseases. It leads to reduction and loss of huge quantity and quality of agricultural production, if not recognized on the right time Continuous monitoring of farm is required which will require more labour and more experts in large farms. In remote areas, farmers may have to go long distances to seek expert advices. Agriculture is the backbone and one of important human activity of our nation. In agricultural sector, water is the most used resource. Irrigation helps to save large amount of water. Manual irrigation is the traditional method used in agricultural land and may require expert labours on larger farm.

II. PROBLEM STATEMENT

A. Existing system

• Upload photos of the diseased part of plant on the app and within seconds identify the disease and its solution.
• Pestoz(one of the application related to plant leaf disease detection) is your 24X7 crop doctor who helps you in identifying plant / crop diseases by clicking photos through your phone camera within seconds.

• Simple 2 Step process to Use the App:
1) Select the plant/crop with the disease.
2) Upload the photo of the disease infected part on the app. Within few seconds, you will get the disease description and its solution.
• Crops Covered - Tomato, Cauliflower, Cabbage, Soybean, Onion, Banana, Urad, Tuar, Sugarcane,

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Sorghum, Sesame, Paddy, Pigeonpea, Maize, Bhindi (okra), Cotton, Beans

B. Drawbacks of existing

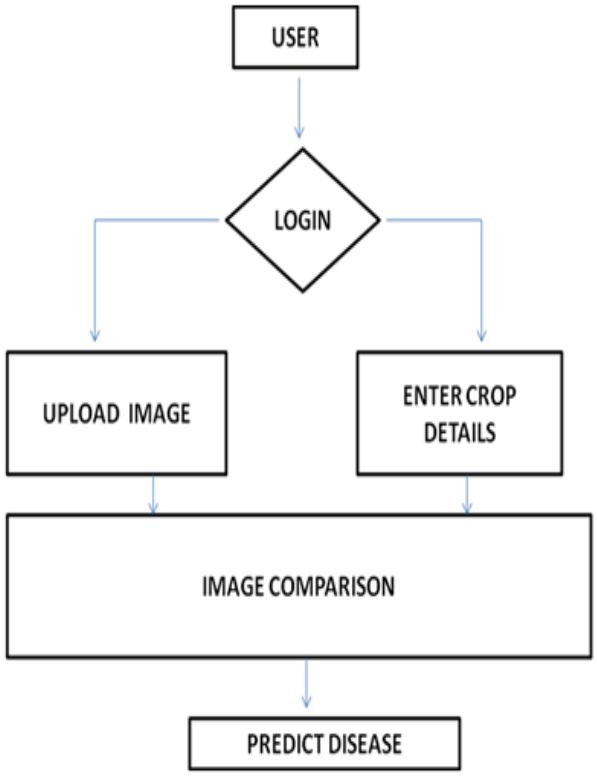
• That apps are with only bugs.
• Problems with uploading pictures.
• Does not recognize simplest household plants because the admin does not maintain properly.
• languages not working properly.
• Disease identification is poor. Many times false identification of diseases. False identification leads to loss of farmer and app users.

III. PROPOSED SYSTEM

A proposed system consists of:
• An android application
• smart irrigation system

IV. SYSTEM ARCHITECTURE

The system architecture is shown in below.

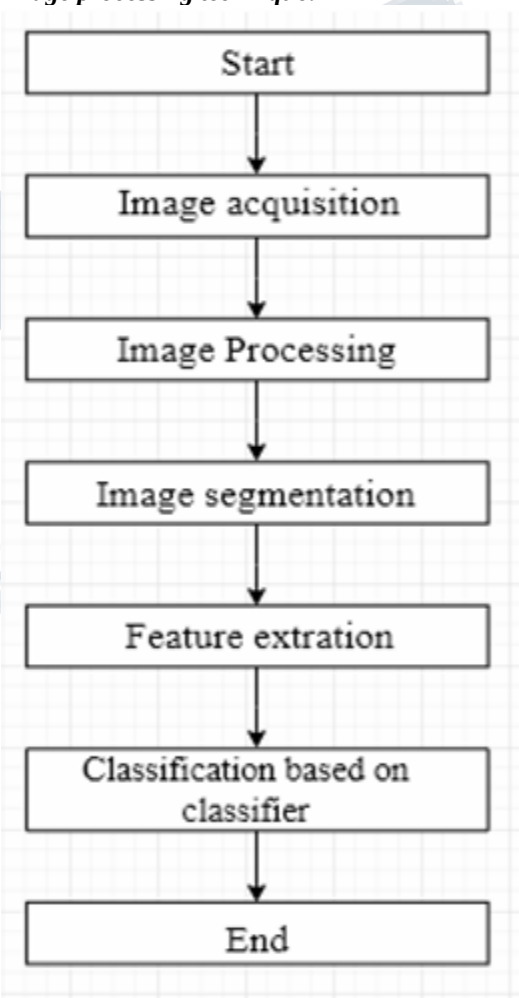


A. proposed model and design

The technology can be used in two ways:

As a direct tool in agriculture production, such as satellite technologies, geographical information systems, agronomy and social sciences.
As an indirect tool for empowering farmers to take information and have discussions which positively improves the agricultural activities that were traditionally conducted. In this proposed system, mobile cloud computing in perspective of farmers provides SaaS and also IaaS used for education and awareness of agriculture and cultivation.

Image processing technique:



Plant leaf disease detection using image processing The photo taken from the camera is send to the cloud and the image is processed there. The image processing algorithm is implemented in self image comparison.

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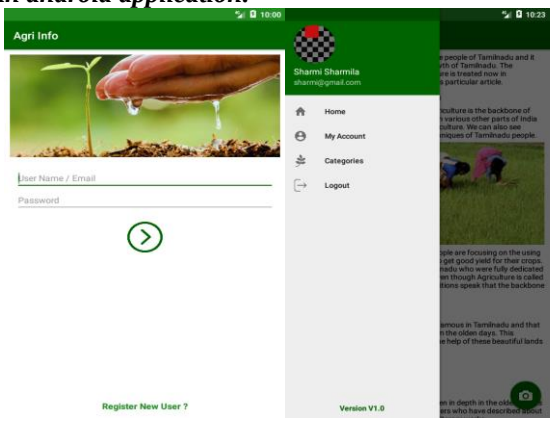
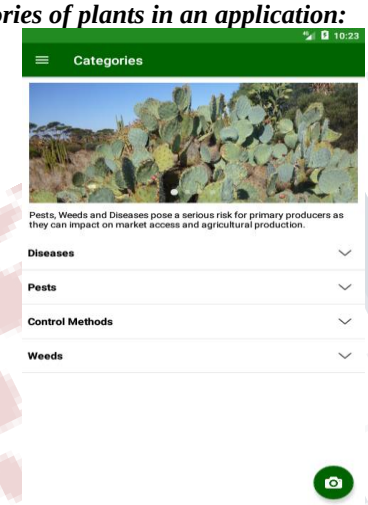
1)An android application:



•The user can access the cloud services using the android application.
•The user must login into the cloud using the user name and the password to access the cloud.

The categories of plants in an application:



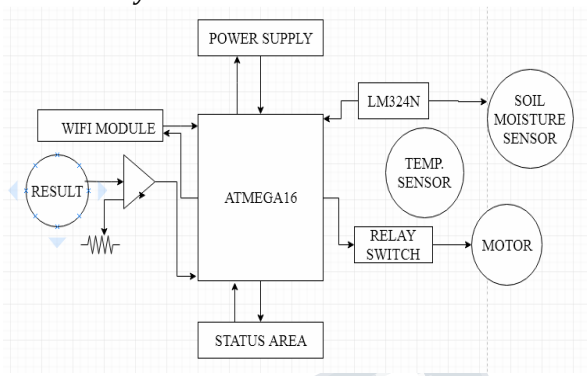
2)An Irrigation system:

•Optimizing the usage of water.
•Monitoring the soil and the crop conditions and low cost.
•Automated irrigation by using microcontroller.
•Using IOT, the user can informed about the exact condition of the field.
•Sense temperature, moisture and humidity level.
•When the soil condition exceeds, sends the message to the farmer.

Advatages of Irrigation system:

•Simple to design.
•Highly sensitive, feasible and reliable.
•Receive immediate message alerts.
•Provide effectiveness

Embedded system:



The micro controller used is ATMega16 which is an 8-bit high performance micro controller of Atmel's M ega AVR family. It is a 40-pin micro controller which uses only low power for working. So, it is suitable for embedded system design which uses a 12V DC power supply. The soil moisture sensor reads the moisture content of the soil in which it is inserted. LM324N op-amp is used to amplify the signals from the soil moisture sensor. LM35 temperature sensor is used to measure the temperature. The readings from the soil moisture sensor and the temperature sensor are calculated continuously when the power of the embedded system is on or in auto mode. The result is then inputted to a pin of the comparator. The other input pin of comparator is set to the average water requirement of the plant.

The comparator outputs a binary 0 if the calculated reading from the sensors is less than average water requirement value which makes the relay switch on and motor starts. The embedded system waters the plants till the moisture content of the soil reaches average water requirement of the plant. Otherwise, the comparator outputs a binary 1 which makes the relay switch off.
The embedded system is connected to the cloud service through a Wi -Fi module. The control information are transferred from the mobile application to the micro controller of the embedded system via the cloud. The micro controller then switches from manual or automatic mode according to the control information received.

CONCLUSION:

Digital capturing of visually observed symptoms on the stem and leaf of the plant and images processing on it is used for detecting the plant disease at an early stage. Treatment is suggested corresponding to the recognized ailment which will help farmers with low experience to prevent the vegetation. Smart irrigation environment

helps to optimize the water usage in the field and provides a remote controlling and monitoring for the irrigation system.The system communicates and processes data from sensors and using android application as user interface, notification about humidity and moisture level is given to the farmer so as to control the water supplied to the farm.

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