

Agriculture Based on Automation &IoT Technology

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Abstract

Computer vision, machine learning, mobile and cloud computing are the most immersing techniques which are used in almost all fields of research as well as in our day-to-day activities. India being an agriculture based developing country has more than 70% of its population depending on agriculture and cultivation. The development in the agriculture production directly increases the Indian Economy and vice-versa is also true. An expert system in the field of agriculture can be the best option to spread out countries agriculture production. But the life style of Indian farmers and agriculture is varying rapidly due to boost in non-agricultural opportunities. The scientific innovations in agriculture are not reaching to the farmer's, either because most of them are illiterates or due to lack of knowledge. Hence, most of the farmers are failing to gain the possible production rate. The failure in agriculture is growing more than 40% in worldwide which includes more than 19.1% of loss due to diseases caused, bacteria, virus and fungi, 10.2% due to insects attack and 12.2% due to weeds .

Agriculture is considered as the resource of life for the human species as it is the main source of food grains and other raw materials. It plays fundamental role in the growth of country's economy. It also provides large abundant employment opportunities to the people. Growth in agricultural sector is essential for the development of economic condition of the country. Unfortunately, many farmers still use the conventional methods of farming which results in low yielding of crops and fruits. The implementation of automation and human beings replaced by automatic machineries, has resulted in a yield of improvement. Hence there is need to employ modern science and technology in the agriculture area for increasing the yield. The task aims at making agriculture smart using automation and IoT technologies. The prominence features of this project include weeding, switching ON/OFF of water pump, moisture sensing, bird and animal scaring, etc. Controlling of all these operations will be through any remote smart device or computer and the operations will be performed by interfacing sensors, Wi-Fi or Bluetooth.

Introduction

Indian economy is mostly based on agriculture. The most important factor for the agriculture is appropriate and sufficient supply of water. Most of the farmers are dependent on electric water pumps for irrigation which needs electricity. The frequent, irregular, low voltage supply of power to the agriculture division has caused problems to the farmers who are spending their time to monitor the supply of power without which their work cannot start. The highly unreliable power supply with frequent power cuts have not only lowered the effectiveness of farmers but also have led to the disappointment of the farmer to quit agriculture and move to urban areas for their better future.

Objectives

- The propose a system shows, how software application benefits millions of farmers in rural area by giving solution to the agriculture problems caused by irregular electrical power supply.
- The goal of this system is to design an implanted device, which can send a specific SMS message/ Automated call from a cell-phone and to manage temperature & humidity, Soil Moisture, Animal & Bird scaring, grass cutter, water leakage detection.
- The controller is handy at places where we have to control the ON and OFF switching of the devices but no wired connection to that place is available.

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Literature Survey:

Agriculture is a traditional art which was performed by our ancestors and main source for this is water. Traditional methods used were like pots, paddles, hand pumps etc to lift and carry water from its source which was tiring, time taking, requirement of more labours. As the technology has widely spreaded more reliable methods came into existence and electric pumps were

Were introduced, a machine or device raising, compressing and transferring fluids. But even these methods carry few drawbacks such as once the electric water pump is started the person need to wait there till time to off the machine or there will be loss of water, electricity. This is waste of time, effort. There are also possibility that the person is miles away from machine and need to go there each and everytime to on/off the machine. Now we have reliable proposed system where the person can on/off pump, electricity just through a miss call even though he is away from the machine.

Researchers have proposed different models for agriculture sector with one or multiple technologies mentioned above. Use of IoT has been proposed in agriculture domain . The farmers will get Easy access to information and advice through this architecture. In IoT has been used for product supply chain business process.

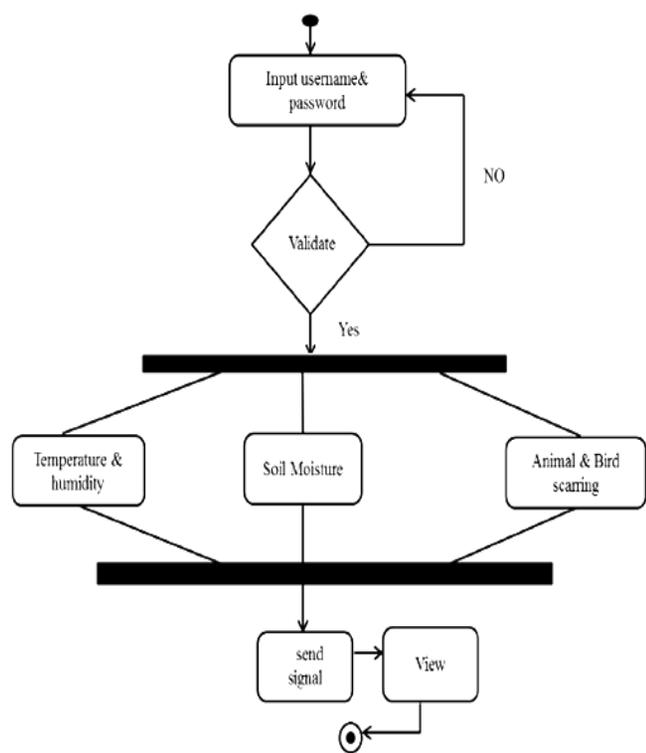
Problem Definition

Agriculture plays important role in the development of agricultural country. In India about 70% of population depends upon farming and one third of the nation s capital comes from farming. The issues related to agriculture have been always hindering the development of the country. The solution to this problem is by making smart agriculture by modernizing the current conventional methods of agriculture. Hence this system aims at making agriculture smart using automation and IoT technologies.

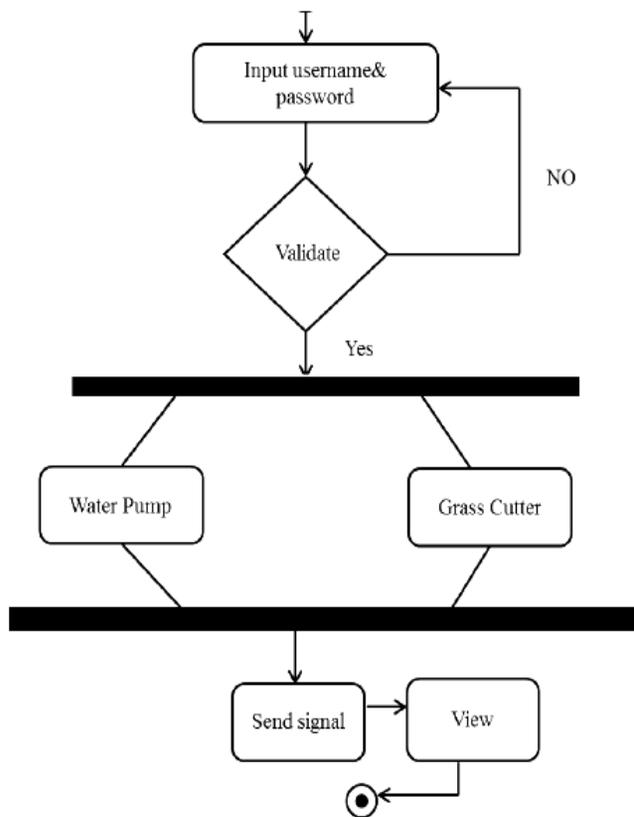
Scope and Importance

The scope of this system is to make agriculture smart by using automation and IoT technologies. These features can be used by farmers worldwide and improve their yield.

Evaluation



Activity Diagram for temperature humidity and soil moisture



Activity Diagram for water pump and grass cutter



Features

- User creation: This module is used to add the user
- Login: The user will login to the main page with his registered name and password. If the password doesn't match, an error message will be displayed.
- Weeding: This feature allows the user to operate the weeding machine remotely.
- Soil Moisture Sensing: This feature detects the moisture content in the soil.
- Manage Pump: In this module user can ON /OFF the pump using system software
- Animal and Bird scaring: In this module birds and animals will be chased by the recorded voices.
- Temperature and Humidity Sensing: This module is used to sense the temperature and humidity in the air.
- Hardware Connect: This module will connect software to hardware.

Hardware Interfaces

- HC-05 Bluetooth Transceiver
- Arduino UNO R3
- Regulated Power supply board with pull-up junction
- LCD 16x2 with driver PCB
- 2 Channel Relay with driver PCB
- APR33A3 8channel voice recorder/playback device
- LM 35 temperature sensor, humidity sensor, PIR sensor, moisture sensor
- 5v DC water pump with 100RPM DC geared motor

Software Interfaces

Front-end: Visual Studio 2010

- Programming language: C# .Net
- Operating system: Windows 7 or above
- Back end: My SQL 5.0
- Framework: .NET Framework 4.0

Architectural Design

Architectural design is a process of decomposing a large complex system into small sub system. These sub system are meant for providing some related services. The Architectural design is basically a framework of the system for subsystem control the communication. There are three layers in Architectural design, namely: Presentation, Business and Access Layers

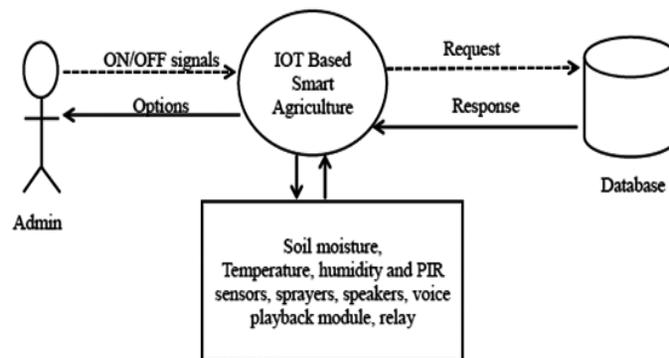


Figure Architectural Diagram

Conclusion And Future Scope

As seen in the above system, the cultivation and the agriculture industry overall can really benefit from implementation of such IoT solution. Monitor and collection of data of soil moisture, temperature and humidity across multiple fields will improve effectiveness of water usage and crop yield of large and local farms. As the world populace increases, farming and food manufacture will have to increase with it. IoT platforms will enable this efficiency and production. The system can be further improved by implementing a wireless sensor network like WI-FI instead of the Bluetooth, which will be better suitable for longer distances. Some additional features that can be added are extensible features of sensors can be added as per the need of the crop, Motion sensors for monitoring behaviour of the animals, robotic sprayers to sprinkle fertilizers and pesticides and much more.

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