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# Review on IoT-Mobile App based on Rural Development in Terms of Agriculture

**Kalaivanan Saravanan, Stebin Sebastian, Tadepalli Balaji Sai Swapnil, Nikhil Ch, Nidhish Vemula Prabhakar**

***Abstract:*** ***As India is still a developing country, it has a lot of rural areas wherein the living conditions and standards are below world standards and may even be on the underdeveloped scale of living standards. In order to achieve development in these regions the first and foremost step to initiate is to improve the agriculture standards and methodologies and bring in new technology to improve the methods used in agriculture which is the major source of income to these people. This project is a four staged project which intends on improving the agriculture standards of India. The first stage of the project is an automated humidity and moisture control for the soil, this will help the farmers in automating certain aspects and hence eliminate certain human errors and improve yield. The second stage of the project is an agriculture auction portal wherein the farmers can directly auction their products to the wholesaler without the need of a middle man/broker. The third stage of the project is an android app which conducts various surveys and suggests a new farmer the type of farming/seeds to be planted / soil information and other such relevant data in respect to agriculture which would help increase the yield for a new farmer. The last part of the project is a seed cum financial bank which helps the farmers by providing financial as well as seed aid in times of financial crisis.***

***Keywords: Mobile Application, IoT, Rural, Auction, Humidity Sensor, Water-Level Sensor, Temperature Sensor.***

## I. INTRODUCTION

Agriculture being the backbone of our country and being one of the oldest sources of living known to our ancestors, is exactly where development has to begin in order to attain the entire development of our country. The farmers in the rural areas still use age old techniques which are not highly effective and also not a constant source of income. Hence, by combing technology and agriculture together we can bring about a huge turnaround in the overall production and sale of the products to make these farmers self-sufficient. This is targeted to be achieved by implementing the following four projects:

- Automated Humidity and moisture control: This is an IoT-based application that evaluates relative metrics such as temperature using a humidity sensor, soil moisture sensor, and temperature moisture sensor, air humidity, moisture humidity, moisture present in the soil, water level indication etc and analyses the analytics and automatically maintains the soil at an optimal temperature and also uses irrigation systems like drip irrigation to water the soil and plants when needed.
- Agriculture Auction: This is an android app in which the farmer can directly create an account and update a status of the quantity and type of product/crop and the cost of the product/crop online, and these products will be auctioned upon by various wholesalers and buyers and will eventually be sold to the highest bidder.
- AgroTeller: This also another android app which will be responsible in educating new farmers and other such farmers who don't have any idea about the farming techniques and the types of soil and the crops that will grow in that particular soil and various other techniques and tricks that can be used to achieve higher and better yield.
- AgroBank: This is also an android application project which acts as a dual-purpose bank that is serving as both a regular bank giving out loans and other financial help and as a seed bank loaning out crops and seeds during the misery or draught season.

## II. LITERATURE SURVEY

Shobha T and Dr. R J Anandhi, the authors of " Robust Classifier Design with Ensemble Neural Network using Differential Evolution ", proposes using ensemble neural networks using Differential Evolution (DENN) for the classification. Saravanan Kalaivanan, the author of, "Quality of service (QoS) and priority aware models for energy efficient and demand routing procedure in mobile ad hoc networks", explains the use of EEAODR to keep up the vitality stack among organizing hub to improve the system consistency. Janav S, S M Monisha, M G Pavan Kumar, and L Srinivasan, the authors of " Solar based Automatic Speed Control of Vehicles in Sensitive Zones", proposes using RF receivers inside the vehicle to help the driver control his/her speed and in turn control the speed of the vehicle. Vikas B O and Stebin Sebastian, the authors of "Agriculture Auction ", suggests various ways in which an agriculture auction system involving the farmer and the wholesaler directly can help benefit the farmers.

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It suggests creating a web- based platform to create a direct interaction between the farmer and the wholesaler without including any middleman which helps reducing both transportation and commission charges.

Shanmugam Shobha M, Vijay Hegde S, Yashwanth C V and Chandra Kiran S, the authors of " Crop Yield Prediction using Machine Learning Algorithm", tells us how to use machine learning algorithms to predict the yield of crops.

Robock Alan, Konstantin Y Vinnikov, Govindarajalu Srinivasan, Jared K Entin, Steven E Hollinger, Nina A Speranskaya, Suxia Liu, and A Namkhai, the authors of "The Global Soil Moisture Data Bank", tells us about how soil moisture is quite an important factor when it comes to the overall growth of the plant/crop. They also explain about how surface temperature, draught, climate changes and various other factors play a role in increasing the quality and productivity of the soil.

Rodríguez M Verónica, Peter E Toorop, and Roberto L Benech-Arnold, the authors of "Challenges Facing Seed Banks and Agriculture in Relation to Seed Quality", explains about the major problems that are faced in the seed banks that is seed dormancy. They explain about how seed dormancy can interfere with the crops and germination of wild crops. The author also explains how this problem can be avoided.

Chikkamannur Ajeet A, the author of," Semantic Annotation of IoT Resource with ontology orchestration", explains about the problems of choosing the right IOT resources. The authors suggest using a novel framework for mapping IOT devices vendor specifications to semantic annotations of IoT resources augmented by IoT Resource Ontology.

Baswaraju Swathi, Koushalya R, Vishal Roshan J and Gowtham M N, the authors of," Color Blindness Algorithm Comparison for Developing an Android Application", explains about using experimental color correction algorithms to overcome the Dichromacy color blind issue in some people.

Ding, Yang, Yunguo Liu, Shaobo Liu, Zhongwu Li, Xiaofei Tan, Xixian Huang, Guangming Zeng, Lu Zhou, and Bohong Zheng, the authors of" Biochar to improve soil fertility. A review", explains about biochar and its importance. They explain about how adding biochar is a solution to soil erosion and improving the fertility of the soil and hence improve crop growth and increase the yield.

Patil Seema and R J Anandhi, the authors of "Diversity based self-adaptive clusters using PSO clustering for crime data", explains about using diversity based self-adaptation on particle swarm optimization in order to obtain better clusters.

Shobha T, and R. J Anandhi, the authors of, "Adaptive strategy operators based GA for rule discovery", explains about the new variant of genetic algorithm with which equal opportunity for parent solution to produce the offspring solution is applied to continuous datasets.

## III. METHODOLOGY

The primary objective of this project is to bring about development in the rural parts of India especially towards the agriculture dependent sector as it is the major profession of the people living in these areas. The methodologies used for each are mentioned below as follows:

### A. Automated humidity and moisture control:

The model consists of an Arduino unit followed by a temperature, water level and soil moisture sensor. The three individual sensors sense the three aspects it is supposed to detect and then sends the required information to the Arduino unit it is connect to. The Arduino unit then sends these respective values received from each sensor into the cloud at regular intervals of time with the help of a Wi-fi. The cloud then can be used to view the live data at any instant of time to all the viewers at their comfort.

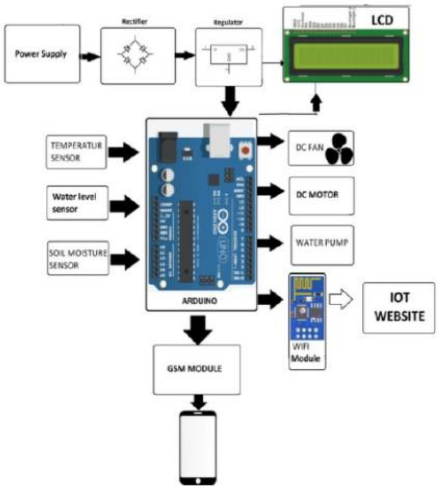


**Fig 1.1: Automated humidity and moisture control**

The sensors used are:

*I. Temperature sensor:*

This is an electronic device that can measure the temperature of a device and send it back to the user in the form of an electronic signal. It does not require an external calibration or anything of that sort and is very quick and accurate. It quickly analyses the temperature of a particular device that it is connected to and within a few seconds send the accurate result back to Arduino unit it is connected to.

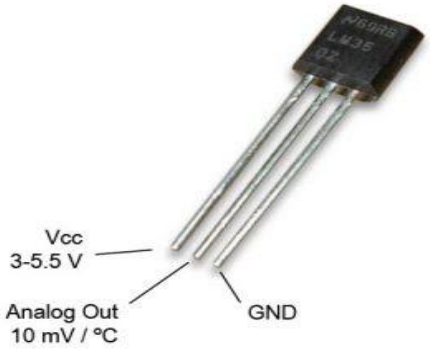


**Fig 1.2: Temperature sensor**

*II. Water-level sensor:*

This sensor is used to measure the level of water present in a particular setup and will automatically sense the level of water present in it and when the level of the water exceeds a certain threshold then it cuts off the supply of water to the setup using it. Calibration is required for this device and it is required to calibrate it according to the type of water that it is being used for in order to get accurate results.



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These traces are interleaved so that per two power traces there is one sensory trace. When submerged, these traces are usually not linked but are bridged by water. On the board, there is a Power LED that will light up when the board is turned on.

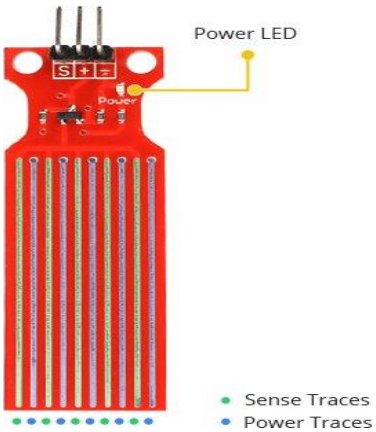



**Fig 1.3: Water level sensor**

*III. Soil moisture sensor:*

It has a fork-shaped probe with two conductors that enters into the soil to measure the moisture content and relay the precise data back to the Arduino. To acquire correct findings, this instrument, like the water level sensor, must be calibrated according to the kind of soil it is immersed in.

The installation process for the soil moisture sensor is we have to connect the 2 pins from the sensor to the two pins on the amplifier with the help of hook up wires. Then connect the VCC from the amplifier to the 3.3V pin on the Arduino board and the ground (GND) pin to the ground (GND) pin on the Arduino. Finally connect the Analog data pin to the A0 pin number on the Arduino.

**Fig 1.4: Soil moisture sensor**

**B. Agriculture Auction:**

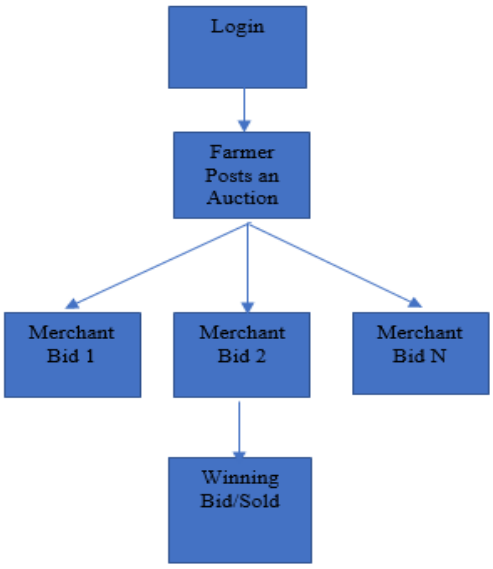



**Fig 1.5: Agriculture auction flow chart**

This module of the project begins with both the merchant and the farmer first creating an account on the android app that is being created. On successful authentication, the farmer first uploads the type of crop or yield that he/she wants to auction and then uploads the quantity of the yield he/she is willing to sell. After this they have to decide the price for the yield. After successfully uploading the product, it will be visible to the merchants who wants to buy the product, post which there will be a time period during which all the merchants will constantly be bidding and then upon completion of the time period the merchant with the highest bid will receive the products and the farmers details through which they can directly get the products delivered to them.

**C. Agro-Teller:**

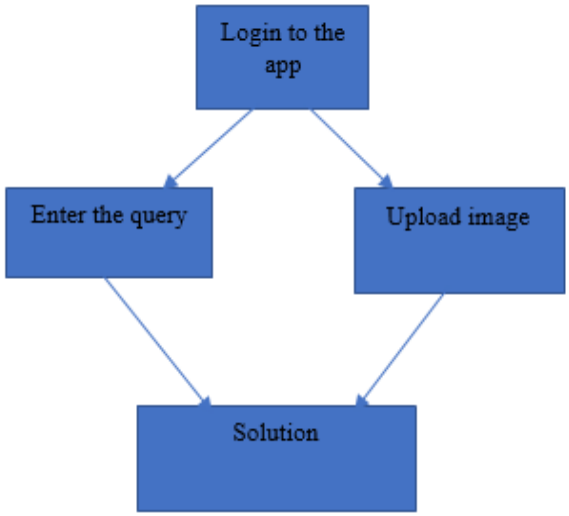



**Fig 1.6: Agro-Teller flow chart**

This module is majorly to help all kinds of farmer's, especially new farmers with all techniques and issues that a person could face when farming. It includes detailed study of various types of soils, climate conditions, types of crops that can grow, pesticide/insecticide information, smart farming techniques and other new techniques which can improve the fertility of the soil and the improve the growth of the crops.

This starts with the user entering the query/issue that they are currently facing or else to upload a picture of it on the app and then this query will be addressed by going through the keywords of the query and giving the required solution whereas uploading the picture of the soil would display the farmer the type of soil that is present and the types of crops that can grow in that particular soil and the techniques that he/she should use to increase the growth of the crop and to improve the fertility of the soil. This module in the project makes use of Machine Learning to sense the image and retrieve the appropriate result based on the content of the soil uploaded from the image. Depending on the type of soil, the application offers various suggestions on what type of crop/yield is suitable and also educates the user on the type of farming that is required for that particular soil.

**D. Agro Bank**:

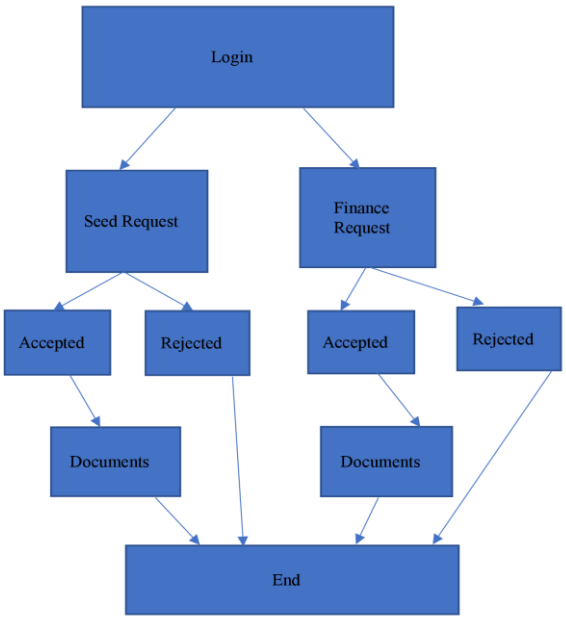
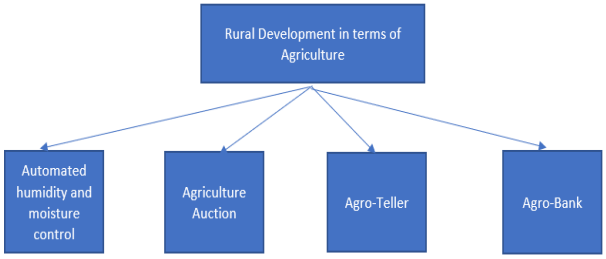


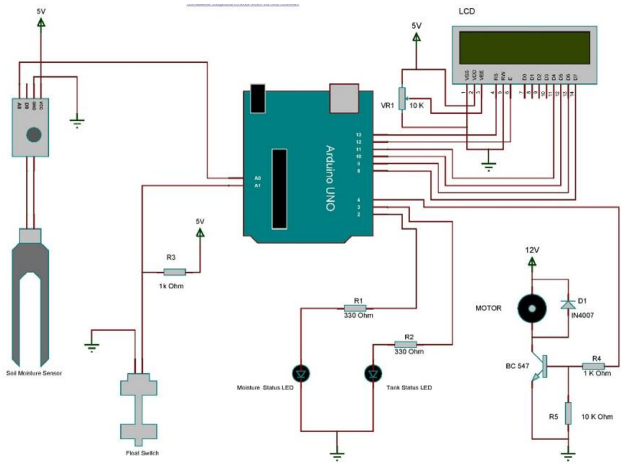

**Fig 1.7: Agro-bank flow chart**

This module works just like any banking application where the user has to first login and then upon successful authentication will be redirected to the home page where the farmer will have the option to request for either the seed or for financial help. After this the seed/finance help will be accepted or rejected based on the his/her credit history. After this step, if the farmer's request is accepted then he/she has to upload the required documents after which either the money or seed will be given to them.

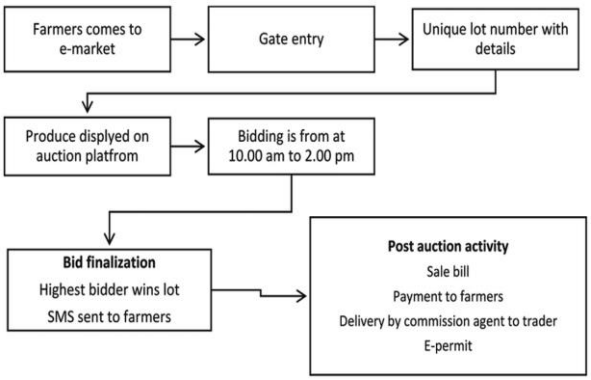
## IV. SYSTEM ARCHITECTURE



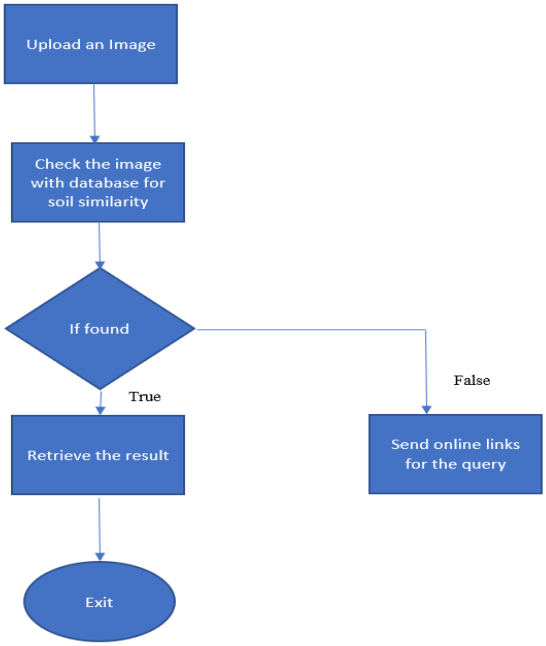

**2.1: Modules used in the project**



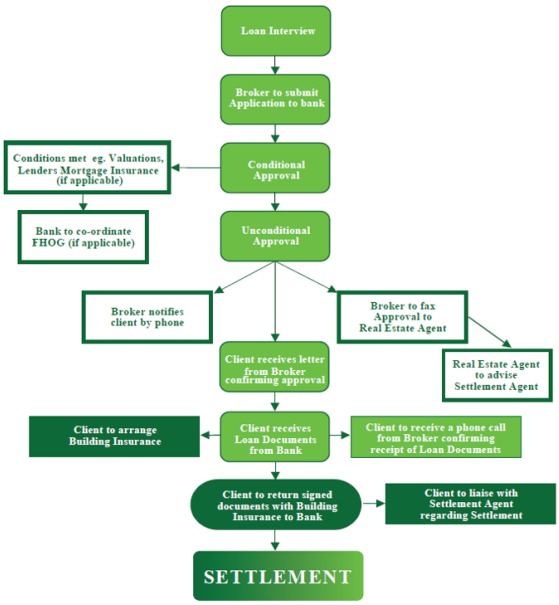

**2.2: Automated humidity and moisture control system architecture**




**2.3: Agriculture Auction system architecture**




**2.4: Agro-Teller system architecture**




**2.5: Agro-Bank system architecture**

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## V. RESULTS

The result of this project is to bring about a certain development in the farming community of India and to reduce their workload and also to increase their produce and income while making sure he/she doesn't overload themselves with work.

i. The first module of the project aims to automate certain work like irrigating the field/farm, which would generally be done by the farmer. By using this model, he/she can save some time and effort, as this will automate everything based on the soil moisture level and the humidity and temperature of the crop and the soil.

ii. The second module of this project is to eliminate the middleman that are usually present when a farmer has to sell his/her crops to the market/wholesaler. With this module the farmer will be able to list his/her products on the app and it will be auctioned off to the highest bidder which directly help in increasing the farmer's finances.

iii. The third module of the project helps to educate a farmer/ newbie in every possible technique and secret to farming and help in increasing the yield and minimize losses and risks.

iv. The last module of the project helps to support the farmer during his/her time of distress by providing them with either financial help or by providing them with seeds on loan to help them survive till the harvest season.

## VI. CONCLUSION

In conclusion this project looks to bring about an overall development in the country's agriculture system starting from automating various tasks to adding new technology and methods to pre-existing farming techniques to bring out the best of both and improve the quality and quantity of the crops that are being produced in the country. The project also targets to improve the overall living condition and lifestyle of the farmers as well.

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