IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Special Issue-15, May 2019 E-ISSN: 2347-2693

Agriculture Portal for Decsion making, Plantation and Marketing of Crops

Gayathri R S[1*], Mangala C N[2]

[1,2]Department of Computer Science and Engineering, East West Institute of Technology, Bengaluru, India

DOI: https://doi.org/10.26438/ijcse/v7si15.361366 | Available online at: www.ijcseonline.org

***Abstract*—**India is said to be a land of agriculture. Engineering techniques in agriculture brings a lot of advantages to the farmer. The proposed system aims to provide support to farmers during all three stages of farming preprocessing, plantation and post production. Preproduction support includes providing the various crop demand information to farmers through android application. The plantation support includes the automation in monitoring of crops and post production support includes providing the information regarding the market rates for every crop. Preproduction support has an algorithm that calculates the crop demand in real time considering the crop demand input from the surveys and the crops grown by various farmers. This information will be made available to farmers to help them choose the crop that is in demand and hence get a good profit at the end. The plantation support includes automatic irrigation based on dryness of land. The other plantation support includes the intruder detection, providing temperature sensing, humidity sensing and intruder detection. The post production support includes providing information regarding the market rate for various crops on their android phones.

***Keywords*—**Agriculture, pre-production, decision making, demand and supply of crops, crop maintenance, market rate

I. INTRODUCTION

Agriculture is the backbone of Indian economy. About sixty five percent of the country's population depend on agriculture for their livelihood. Human ability to do agriculture is the basis of our civilization. The phenomenal process of transforming mud into food is agriculture. India has a history of over twelve thousand years in agriculture. India is the largest producer of many crops including pulses, rice, wheat, spices and spice products. Agriculture sector is always a major consideration in Central and State Government budgeting. Lot of facilities and support has been provided to the farmers by both the Central and State Government. Still the life of the farmers who give us food is pathetic for many reasons like lack of education, poverty, lack of necessary infrastructure etc. Less than fifteen percent of the people show interest in farming. Over 3 lakh farmers have committed suicide in last twelve years. Survey says that only less than five percent of the farmers want their children to do farming. Agriculture has become a heart breaking job. It is very important that farming be made an economically attractive process that youth will get engaged in farming. It will raise the standard of living in rural India. Organizing agriculture and bringing technology is very important to raise the agricultural standards.

Engineering technologies in farming can bring revolution in this field. The information exchange between the agriculture experts and among the farmers can contribute a lot to bring stability in demand and supply of crops and hence a reliable profit to farmers. Proper crop planning by the Government and the farmers can help a lot to farmers and the consumers. Automation in farming will reduce labor and bring lot of convenience to farmers. Also knowing the market rates will help them to negotiate for good price if they are selling it through brokers.

Government predicts the crop demand and supply for every crop to exercise import and export duties for crop. We aim to exchange this information with our farmers through Android Application on their phone while business logic resides in the cloud on server. We also provide methodology for easy maintenance of crop which include automatic irrigation, intruder detection, temperature and humidity sensing. This helps them to get update of their field from remote places. We also publish the market rates of various crops in the android phone so they can cleverly negotiate with broker for good money.

The paper is organized as follows. Section I contains the introduction to the paper, Section II contains the related work in this field. Section III contains the method used for demand calculation of crops, maintenance of field and providing the market rate information of crops. Section IV contains the result of discussion which includes a table of calculated results that would be available to farmers and the merits and demerits of implementation. Section V contains the conclusion and future scope of the project.

II. RELATED WORK

Crop survey agencies conduct survey to estimate the demand of crops and the availability of crops. Government uses this

data to decide on the import and export duties for crops. Data mining technique is also used to estimate the crop requirement. The National Sample Survey Office (NSSO) takes responsibility of providing technical guidance to the States in developing suitable survey techniques for obtaining timely and reliable estimates of crop yield. The findings of the sample supervision are brought out in the form of State-wise reports for two major seasons and an All India Status Report titled "Review of Crop Statistics System in India through Scheme for Improvement of Crop Statistics". The status reports are exclusively sent to concerned state governments for effective and lasting improvement in the system of data collection and generation of quality statistics on crop estimates. Work related to planning of survey, compilation & analysis of data and publication of the reports is done at Agricultural Statistics (AS) Headquarters of NSSO (FOD) located at Faridabad.

Many android applications are developed and are made available in Google's play store to provide the information related to farming such as the fertilizer requirement, types of pesticide to be used, irrigation etc. Farmers make use of this to get optimum result. 'Kisan Network', 'Agri Science Krisi', 'My Agri Guru', 'IFFCO Kisan', to name a few. More than 30 andriod applications are developed for farmers of India and humdreds of applications around the Globe. These apps intend to provide various kind of support in various stages required by a farmer.

The maintenance of the crop will be usually carried by farmers themselves stepping in to their fields or by hiring labors. This can be made more convenient by automating the process for irrigation and monitoring using various sensors. The market price information is published daily in newspapers. The same information can be made available to them through the application on their smart phone.

III. METHODOLOGY

We develop a simple android application on the phone that lists the various crops, the expected demand for each crop, the amount of acres that have already been registered throughout the State for each crop. The business logic resides in the server on cloud. It has the crop demand information for each crop. This information is obtained by the complex analysis of demand performed by the Central Government for every crop in order to assign import and export duties for each crop. This information is sent in an understandable way to farmers. The farmers can check the data and register his decision in the app. Every time farmer registers a crop, the demand for the crop is reduced by the number of acres that he decides to grow. Indirectly every farmer is exchanging his crop information with every other farmer so that only required amount of crops will be grown at any point of time. This brings a lot of stability in demand and supply of crops.

A. Pre-production Support

Preproduction support involves helping farmers to make right decision of crops based on crop demand.

1) High Level View of the Pre-production Support

The data obtained from the survey Agencies are updated in the server on the cloud. The User or the farmer in this case registers himself in the system using the Andriod Application on his phone. The users fetch the data related to crop requirement as a whole which includes the number of acres registered by other farmers and the demand status for various crops. He then chooses the crop that has high demand in the market and registers the same on the server. Server updates the data and sends an acknowledgement to the user.

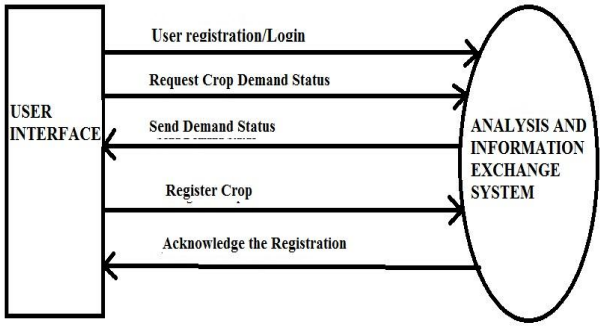

Figure 1: Context Level Data Flow Diagram

Figure 1 shows Context level Data Flow Diagram for the proposed system. User Interface is provided through Android Application on a smart phone. The Analysis and Information Exchange System contains business logic that resides on the Server in Cloud.

2) Demand Calculation Algorithm

Below is the algorithm used to calculate the crop demand in real time. Here 'CropDemandData' refers to a list of demand for all crops(in acres) and 'crop' refers to the number of acres registered for a perticular crop by farmer using the appplication and 'demand' refers to the demand of the crop the farmer want to register.

```
Step 1:
if(valid user)
        Register user in server.
End if
Step 2:
If (valid user)
        Login to application
End if
Display CropDemandData
Read crop
Register crop
demand=demand - crop
if(demand >= 0)
```


Print "Crop registered"
else
Print "Crop registered. Threshold reached. Cannot guarantee Amount"
end if

Any user is successfully registered if he enters his name, phone number, Aadhar number and his land area. After registering he can use his name and password to login to the application on his android phone. The application fetches data from the cloud and displays the demand(in acres) and the registered area(in acres) for each crop. The farmer can check the demand status for various crops and register his crop in acres. Now the farmers crop(in acres) will be subtracted from the previous demand to update the demand in the server. The farmer gets a message that his registration is successful. If farmer tries to register his crop whose requirement is already meet by other farmers, his registration will be successful with a warning "Threshold reached. Cannot guarantee Amount" Below is the algorithm for the same

B. Maintenance Support for Agriculture

Maintenance Support is provided by using various sensors and programming the microcontroller to action on the sensed data. An LCD Display is used to display notifications on the sensed data in the farm. Buzzer is placed in the farm to give an alarming sound if intruder is detected.

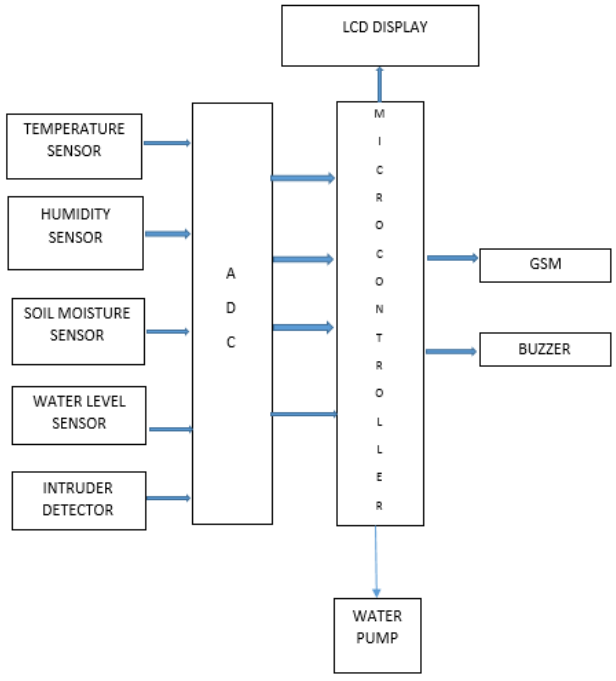

Figure 2: Block diagram for Automation

Figure 2 shows the block diagram for automating various tasks in the field. The microcontroller is programmed to sense data from various sensors and perform predefined actions based on the data. Microcontroller is connected to GSM to send notifications to the user on his mobile.Temperature Sensor and Humidity Sensor monitors the temperature and humidity respectively and sends message to the farmer's mobile if they cross threshold. Soil Moisture sensor checks for the wetness and dryness of the land and starts irrigation if the land is dry and sends the notification to the users mobile. Water Level Sensor starts the water pump if water level is low in the tank and shuts off once the tank is full. Intruder detector checks if there is any movements near the sensor. If it finds any, a buzzer will make an alarming sound in the field and sends a notification to the users mobile.

Below is the specification of components used for demonstration

Temperature Sensor: LM35 IC has been used for sensing the temperature. It is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in degree centigrade).

Humidity Sensor:SY-HS-220 has been used for sensing the humidity. The humidity reading are often notified to the user so that the user can be able to know the field conditions from anywhere.

LCD Display: A single HD44780U can display up to one 8-character line or two 8-character lines.
Power Supply: An AC to DC adaptor has been used to get DC input for the mother board. LM7805 is used for 5V regulated supply.

Microcontroller: The main centre part of the project is the microcontroller. Here we are using the 8051 based Philips P89V51RD2 microcontroller.

Water Level Sensor: It has a small plastic ball that floats on water that gives two readings low and high specifically designed for demonstration purpose.

Intruder Detector: IR SENCE VER-2 has been used that can detect any object in its vicinity.

Water Pump: A small Water Pump has been used to pump water for demonstration purpose.

Buzzer: A small buzzer is connected to microcontroller and is programmed to buzz when intruder to detected by Intruder Detector.

C. *Post-production Support*

The Android Application on users mobile shows the market rate for each crop. This information is fetched from the server that is updated as per the analysis made and published by the Government. Farmer can make use of this information to negotiate cleverly if they use middle man for selling their crops.

IV. RESULTS AND DISCUSSION

The application has been tested with 10 farmers and random inputs for demand and registration for paddy, sugercane, banana and pomogranate. The results are as tabulated.

Table 1: Total Demand of Crops and the Registeration of Crops

Users	Crop	Demand (in acres)	Registration (in acres)	Result
User 1	Paddy	2500	250	Registration successful Demand=2250 acres
User 2	Sugercane	7000	100	Registration successful Demand=6900 acres
User 3	Banana	300	7	Registration successful Demand=293 acres
User 4	Pomogranate	220	70	Registration successful Demand=150 acres
User 5	Sugercane	6900	72	Registration successful Demand=6828 acres
User 6	Banana	293	40	Registration successful Demand=253 acres
User 7	Paddy	2250	36	Registration successful Demand=2214 acres
User 8	Sugercane	6828	22	Registration successful Demand=6806 acres
User 9	Banana	253	70	Registration successful Demand=183 acres
User 10	Banana	183	200	Registration successful Cannot guarantee amount Demand=-7 acres

Table 1 shows the Total Demand of Crops and the Registeration of Crops and the Acknowledgement that user recieves after successful registration.

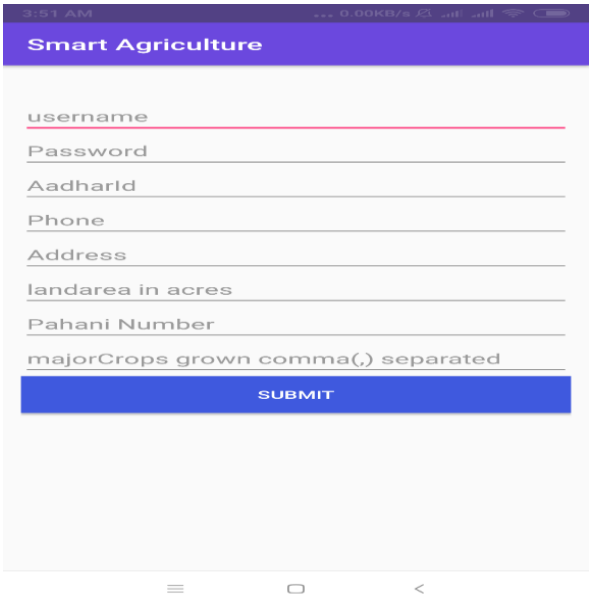

Figure 2: Registration Page in Android Application

Figure 2 shows the registration page for the first time user of the application. Once he successfully registers he can access the application using username and password.

Figure 3: Application listing the total demand and registration information for each crop

Figure 3 shows list of the total demand and registration information for each crop. User can check the demands for various crops and choose the one with high demand to get maximum profit.

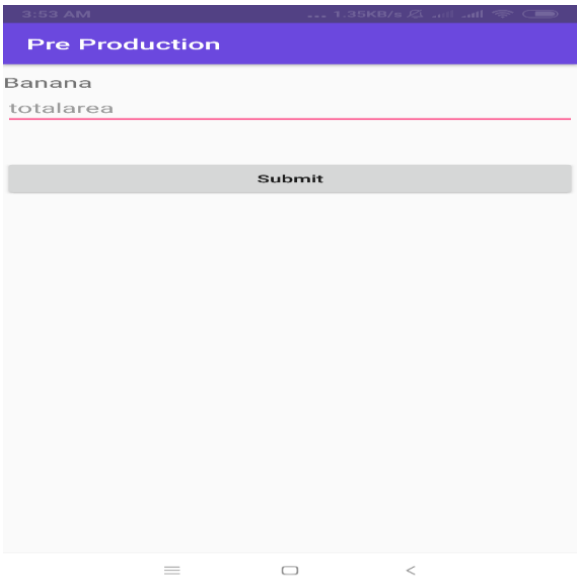

Figure 4: Android Page to register the crop

Figure 4 shows the android page through which user can register the crop he decides to grow. The crop registered (in acres) will be subtracted from the total demand of the crop.

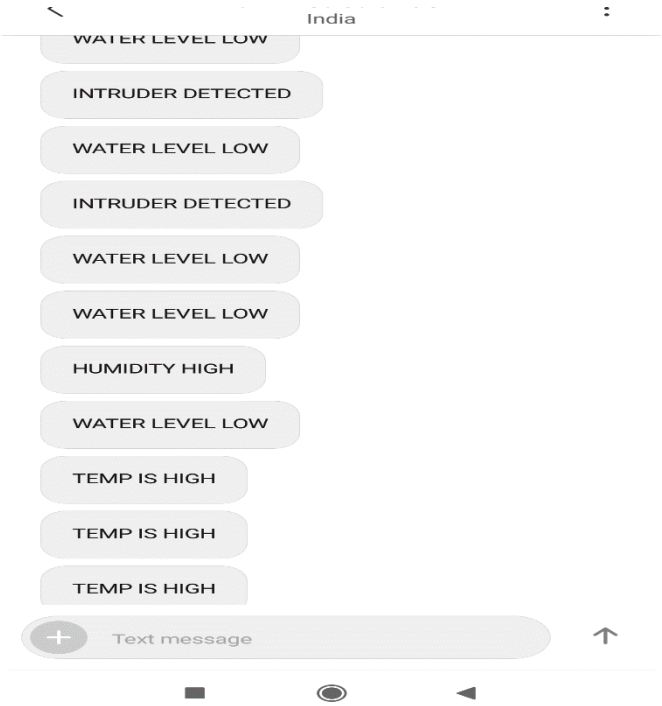

Figure 5: Notifications received on registered phone

Figure 5 shows the notification received on phone for various parameters and activities in land.

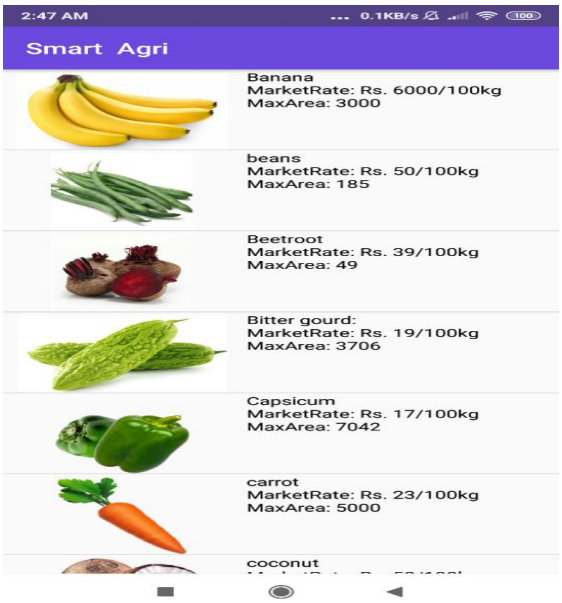

Figure 6: Android Page to display the market rate of crops

Figure 6 displays the market rate for the crops and the farmers can know the market rate of crops they want to sell.

V. CONCLUSION AND FUTURE SCOPE

The proposed model makes farming more attractive. It provides the necessary assistence to decide on crop, maintain their land and sell crops for proper price. If farmers make use of the available technologies they can make attractive money while working at ease. However Government and General Public should come forward to bring awareness to farmers about the existing technologies and train them on the same. One time investment is required to set up infrastructure to maintain the farm remotely.

The applications can be made in regional languages with voice input and output to make them farmer friendly. For automating maintenance softwares should be customised as per the individual's requirement.

ACKNOWLEDGMENT

The authors would like to thank East West Institute of Technology, Bengaluru.

REFERENCES

[1] C. Brewster, I. Roussaki, N. Kalatzis, K. Doolin and K. Ellis, *"IoTin Agriculture: Designing a Europe-Wide Large-Scale Pilot,"IEEE Communications Magazine*, vol. **55**, no. 9, pp. **26-33**,**2017**.

[2] P. P. Ray, M. Mukherjee and L. Shu, "*Internet of Things for Disaster Management: State-of-the-Art and Prospects*," *IEEE Access*, vol. **5**, pp**. 18818-18835, 2017**.

[3] J. Haxhibeqiri, A. Karaagac, F. Van den Abeele, W. Joseph, I. Moerman and J. Hoebeke, "*LoRa indoor coverage and performance in an industrial environment: Case study*," Proceedings of the IEEE International Conference on Emerging Technologies and Factory Automation, pp. **1-8, 2017**.

[4] S. Persia, C. Carciofi and M. Faccioli, "*NB-IoT and LoRA connectivity analysis for M2M/IoT smart grids applications*," Proceedings of the AEIT International Annual Conference, pp. **1-6, 2017**.

[5] O. Georgiou and U. Raza, "Low Power Wide Area Network Analysis: Can LoRa Scale?," IEEE Wireless Communications Letters, vol. **6**, no. **2**, pp. **162-165, 2017**.

[6] A. Makhoul and H. Harb, "*Data Reduction in Sensor Networks:Performance Evaluation in a Real Environment*," IEEEEmbedded Systems Letters, vol. **9**, no. **4**, pp. **101-104, 2017.**

[7] Z. F. Liu, L. Wang, G. S. Xi, Z. Luo and Y. Li, "*Temperature and Humidity Sensor Location Optimization Based on BP Neural Network*," Proceedings of the International Conference on Instrumentation and Measurement, Computer,Communication and Control, pp. **283-287, 2015**.

[8] A. A. Raorane, R. V. Kulkarni, "*Data Mining: An effective tool for yield estimation in the agricultural sector*", IJETTCS, vol. **1**, no. **2**, pp. **75-79, 2012**

Authors Profile

Ms Gayathri R S pursued Bachelor of Engineering in Computer Science and Engineering from G M Institute of Technology, Davanagere affilited to Visvesvaraya Technological University, Belagavi in 2012. She is currently pursuing M.Tech at East West Institute of Technology, Bengaluru affiliated to Visvesvaraya Technological University, Belagavi.

Mrs Mangala C N received B.E degree in Computer Science andEngineering from NCET, Bengaluru, VTU in 2006 and received M.Tech degree in Computer Science from RVCE, Bengaluru, India. She is currently working as Associate Professor in the Department of CSE, EWIT, and persuing PhD in DSCE, Bengaluru, India. Her area of interest includes Image Processing, Network Security, Data Minig and Big Data.

