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IOT Based Smart Agro System

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Abstract: Agriculture serves to be the major occupation in India which contributes to maximum of our GDP .It thus becomes important to have automated techniques for agricultural purposes. Measuring soil moisture is important in agriculture to help farmers manage their irrigation systems more efficiently. Embedded system for automatic irrigation of an agriculture field offers a potential solution to support site- specific irrigation management that allows producers to maximize their productivity while saving the water. Thus, this system may help to increase yields and the quality of the crop by better management of soil moisture during critical plant growth stages.

Keywords: WSN, IOT, Sensors, Pump Action, Sense, Client/Server, Time Efficient.

I. INTRODUCTION

Wireless Sensor Network (WSN) is an intelligent sensor network which is deployed at desired location to check the current value. WSN is a concept in which the environmental or physical conditions are monitored and this monitored data is passed through wireless channel on a main location. WSN contains various components such as sensors, microcontrollers, electronic board and data obtained from WSN is stored in the database which is further used in analytic process. WSN uses sensors to obtain the input data from the environment. The obtained input or the sensed value is compared with the preset threshold and then the desired action is taken. Comparison is done by the microcontroller. Microcontroller takes an action through relays as a result of comparison. The WSN system works as follows:

1) Sense the value using various available sensors in the field.
2) Send the sensed values to the controller for further use.
3) Controller takes the decision based on the current sensed vales and acts through the actuators.

In past days farmers have been facing many issues. Crop yields are reduced due to inadequate supply of water. While on the other hand, sometimes due to farmer's ignorance or illiteracy fields are filled with excess amount of water. This may result harmful for some of the crop types as the fertilizers are drained away by dissolving in the excess water. Also there are cases where is poor crop yield and bad crop quality due to above mentioned factors. Therefore, it became necessary to have a cost effective and time efficient system that can help to monitor and control the parameters related to soil moisture i.e. the pump on/off. Since the system can work remotely it can prove to be time efficient because the end user i.e. farmer can perform the pump on/off using the android application. Facilities like pump history, pump status can also be checked using the android application. The system can also help to save water or prevent water logging due to excessive water flow. Different other functionalities like current marker values, FAQs are also provided. Thus, this application may not only prove to be helpful but can also help the farmer to interact with the outside world in order to retrieve information related to farming.

II. LITERATURE REVIEW

A. *Providing Smart Agricultural Solutions to Farmers for better yielding using IOT.*

This paper includes the various technologies that can be used to automate the agricultural system. The detailed study of each type of sensor for specific purposes is described. It includes current technologies like cloud computing for storing sensed values for further uses. It also includes fault detection and recovers management. GPS co-ordinates are also saved. This can be then used for further purposes. The general flow about the network interfacing with the sensors to obtain the required parameters is also discussed. *[1]*

B. *IOT Based smart agricultural monitoring system.*

This project includes various features like GPS based remote controlled monitoring, moisture and temperature sensing, intruders scaring, security, leaf wetness and proper irrigation facilities. Various sensors are plotted in the field at different locations. The operations are performed by interfacing sensors, Wi-Fi, camera with microcontroller through internet services. *[2]*

C. *Smart Agro System.*

This paper describes the implementation of smart Agriculture System using of wireless sensor networks. Depending on the sensors sensed data is stored in database further actions are taken. Actions are taken using base station which includes arduino Uno with

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integrated GSM module. Base station allots actions to different sensor nodes. Sensors sensed data is passed to the base station using Zigbee sensor. To interact with the system android application is provided to the end user. Static sensors such as soil moisture sensor, pH scale sensor, Humidity sensor & temperature sensor are plotted in the field. *[3]*

D. Design And development of precision agricultural system using wireless sensor networks.

In this paper the theory behind the wireless sensor is discussed. The need along with the working about the wireless sensor network is discussed; the need to develop the wireless network for the agriculture. Using soil moisture sensor and temperature sensor, the sensed data is collected in central processing unit for taking further actions. *[4]*

III. PROPOSED MODEL

PC/APP: The user will have access to the system through computer or Android Application. The user will login into the app on successful registration. The user can check the moisture level, temperatures of the field. The user can take appropriate steps according to the water level i.e. switch on/off pump. User will also be able to check current market rates, new pesticides, fertilizers and research.

CLIENT: The client will collect the sensor data from the field and will also notify the user through SMS using GSM.

SERVER: The Server will authenticate the user; keep the record of user activity and history of pump action.

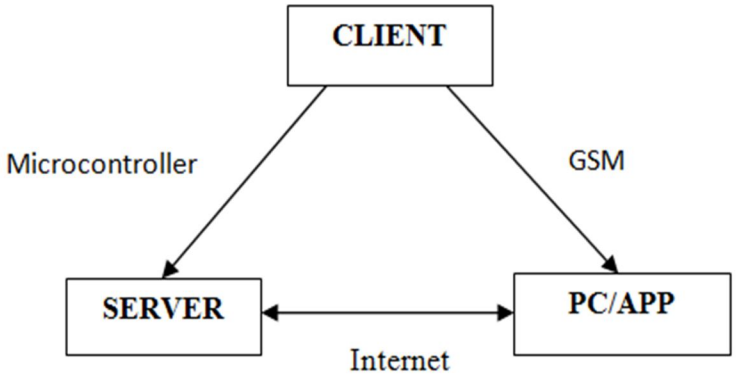

Figure 1: Proposed System

IV. SYSTEM OVERVIEW

When new users logins into the system first he has to register first. Login is provided to him after he uploads his information. Using his username he can login into the system and use the services. After the user logins into the system he can see pump history, set action of the pump i.e. either pump on/off. He can also view current market rates. Support is also provided to them in case of any queries that can be solved by administration module. The overall system can be divided into three modules: Client module, Server module, end user module (app/pc).

A. Module Splitup

1) Client Module - The client module senses the moisture, temperature and light using the sensor and ends the data to the server module. Client module acts as the intermediate between the external environment and the system and plays vital role in transferring the data. It uses the GSM. It also sends the message to the farmer by comparing the threshold and the current value so that the farmer can take appropriate action depending on his needs.

2) Server Module - The data sensed by the client module acts as an input to server module and the data is updated at regular time intervals. It uses MySQL, Apache server. This module is also referred to as administration module because all the managing rights exist with this module. It includes functionalities like registration, modification, authorization, deletion etc

3) Farmer Module - Farmer Module is controlled by end user like farmer to reads current agricultural information related his field and performs any appropriate action for the field Management like making his motor ON/OFF. This module is deployed by using an Android Application. This module provides functionalities like updates, FAQs, current market rates, research activities, current market trends etc.

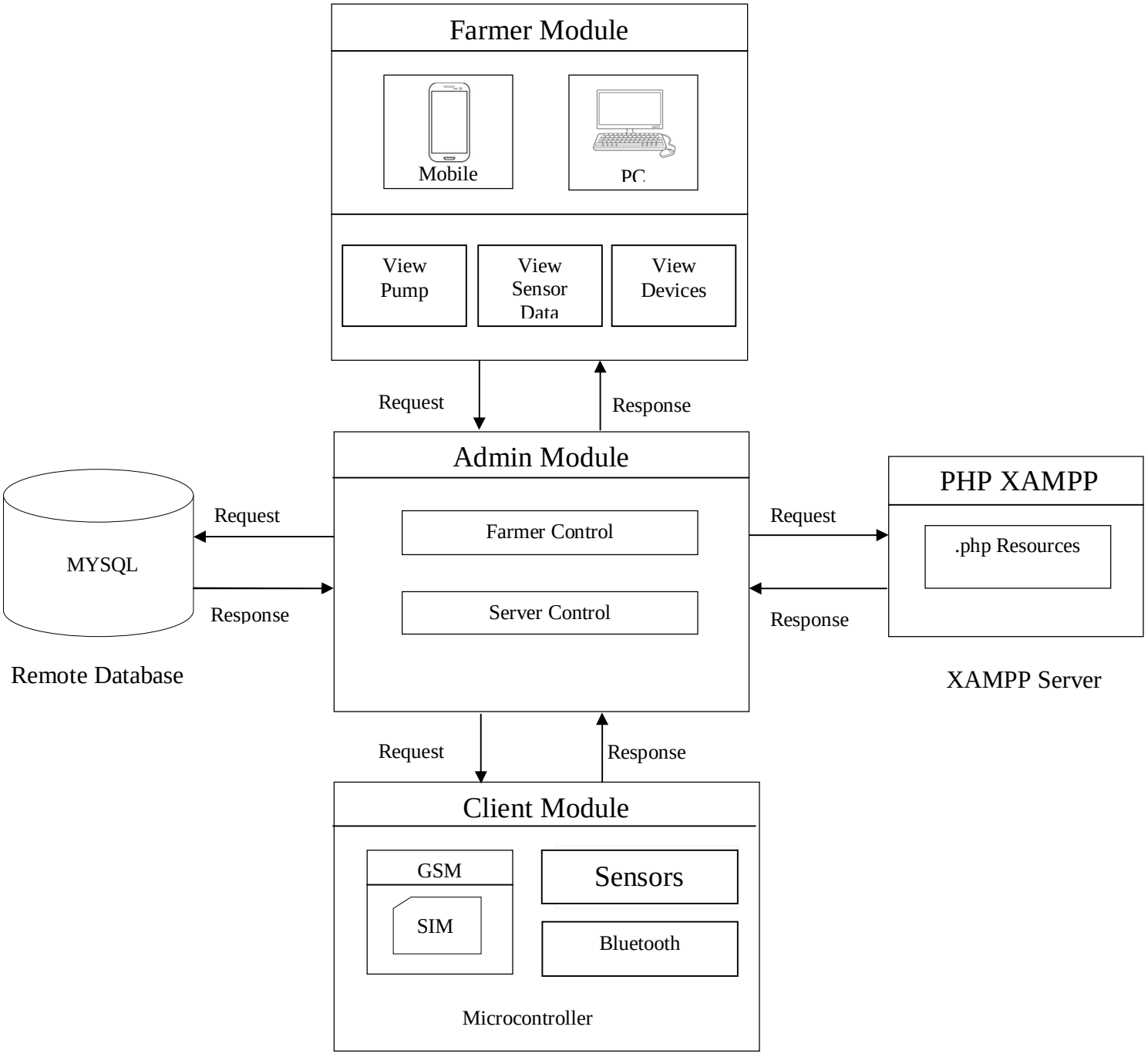

Figure 2: System Architecture

B. System Features

1) *Cost Effective:* The overall system can prove to be cost effective since the farmer has to pay fewer amounts and he can have more effective services on one click. Other than services he can also have updates to the current market schemes.
2) *Time efficient:* The system can prove to be time efficient because the time required by the farmer to travel to the farm can be saved thus proving to time efficient.
3) *Remote monitoring:* The farmer can monitor his parameters using the android application. He need not to travel to the place so the system can prove to be efficient .Since the interfacing between the external and internal environment is done by android application therefore, system proves to be efficient and less time consuming.

4) *Less water wastage:* Many times huge amount of water is wasted due to the improper time management for the pump on/off. Therefore, the paper may prove to be solution for proper water management since water is the most important and essential integrity not only for the agriculture but also to make the living.

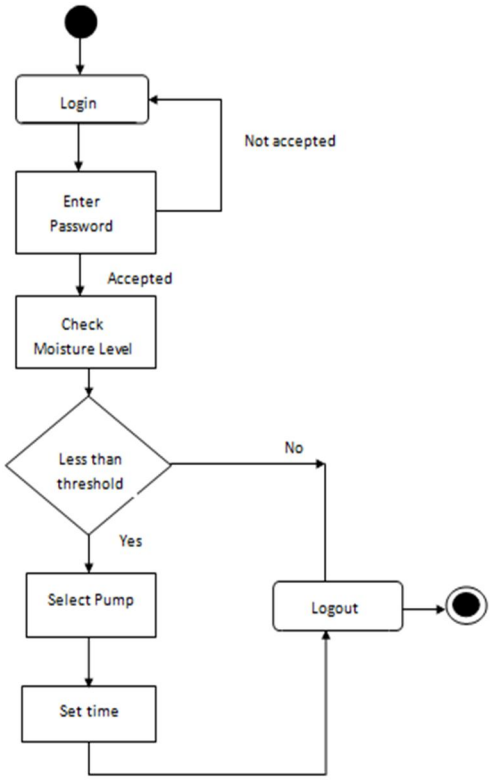

Figure 3: System Flow Diagram

V. CONCLUSION

In this paper farmer can monitor and control his farm remotely using the android application. The system can be integrated to check the moisture level of soil by analyzing the collected data of the farm. He also can take specific actions like on/off water pump depending on his requirements without actually visiting the farm. Thus, the system proves to be cost effective and time efficient.

VI. FUTURE WORK

Using different technologies and devices the system can be converted into drone where it can prove useful and there is no need to fix the sensors at desired location. This the system can prove to be cost effective and not location oriented. Analysis can also be carried out on the collected data. Video conferencing can also be implemented.

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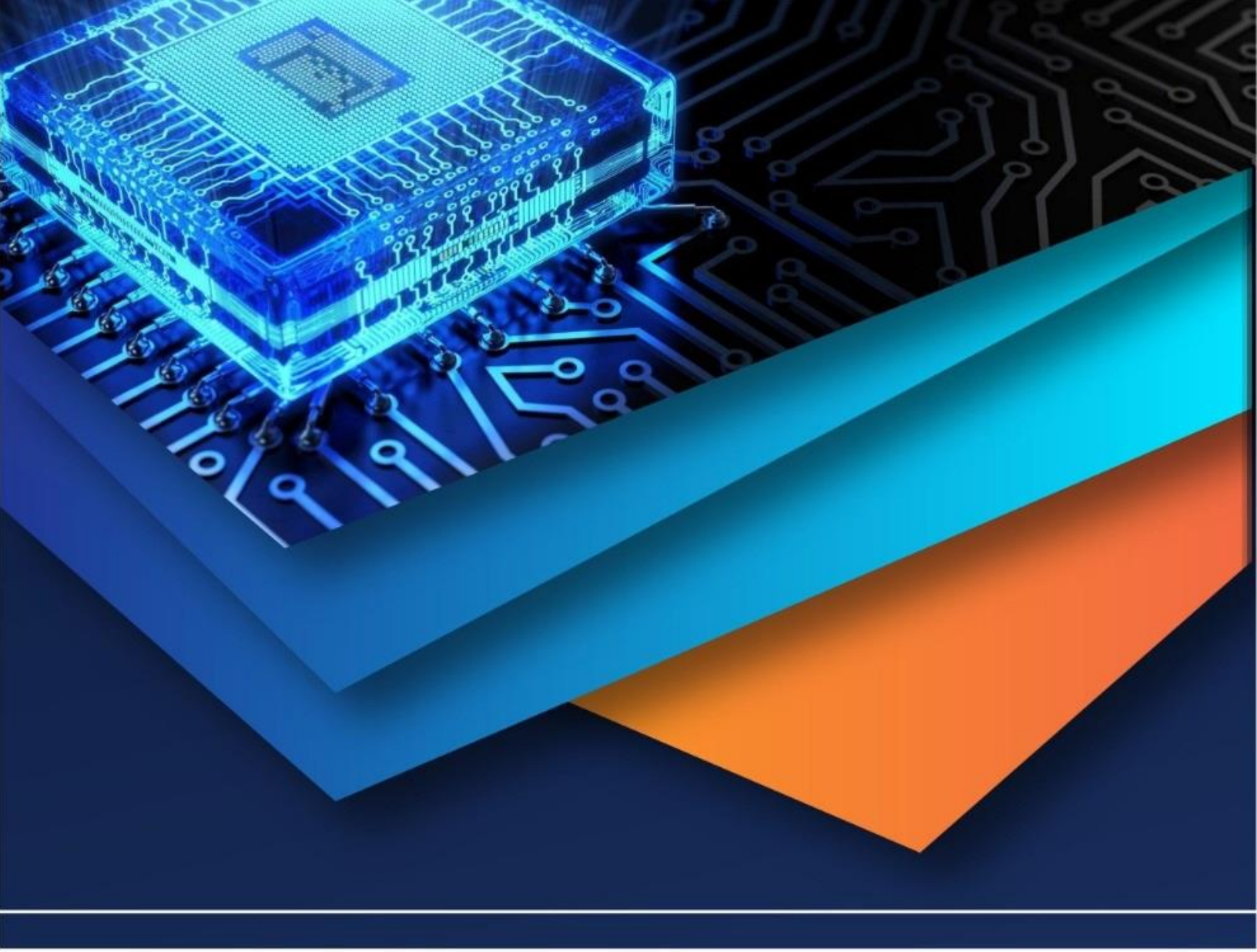

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