OVERVIEW OF IOT BASED AGRICULTURE MONITORING SYSTEM

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ABSTRACT
The Indian agriculture sector is contributing 18% to the GDP. About 50% of Indian workforce has got an employment through agriculture and allied sector. Indian economy is dependent on agriculture sector since many decades and the contribution of the sector always important for the development of India. In ancient days the conventional farming was the only method implemented in India. With development of India in last few decades and availability of the technology at affordable cost has opened up the doors of opportunities for Indian agriculture sector. Internet of things (IoT) technology being simple and with availability of the open source hardware and software is contributing for the smart management of the farming activities. This paper presents the overview of agriculture monitoring by means IoT based systems.

KEYWORDS: IoT, Sensors, Wi-Fi module, ZCD, Optical Isolator, TSOP Receiver, IR Remote, etc.

INTRODUCTION
India, being a country of farmers mainly focuses on the improvements in the cultivation and the methods of farming. Indian agriculture sector has growth of 2% for the year 2019-20 as compared to 5.1% of 2018-19. In the recent budget Rs. 2.83 Lac Cr is allocated to the agriculture and the allied fields. The Indian agriculture sector despite of the several uncertainties and the environmental challenges is improving in terms of the farming methodologies implemented. The country is mainly depended on the agriculture and allied sector for employment.

The uncertain rainfall and floods are the reasons behind less production of the various agriculture products on the other hand the sector is also affected due to less water availability if many regions of country. Despite of these challenges there are many examples in the country where the farmers have broken the records of per hector production every year.

Indian farmers are becoming smart, although the percentage is less but now a days farmer have started implementing the smart systems for better results. The technology is developed to control the utilisation of resources and improving the per hector cultivation.

Farmers are facing the situation where the effects of atmospheric conditions are severe on the crop. On the other hand the improper planning of the type of crop to be cultivated may lead to the low returns from market. Many of the farmers are illiterate, and Indian Government is guiding them in order to understand the farming operations for improvement in the cultivation of crop. Government now a days also providing the soil card for the farmers, it helps in understanding the situation of soil and the type of crop for which the soil is most suitable.

The Smart systems for monitoring the crop and soil help the farmer to enhance the cultivation. The IoT based system can be implemented to monitor the crop and soil in order to control the use of resources depending upon the requirement.
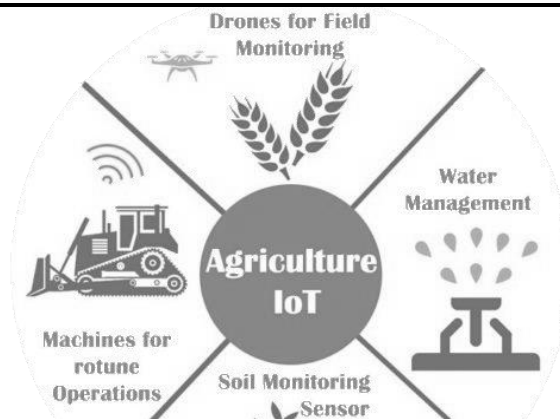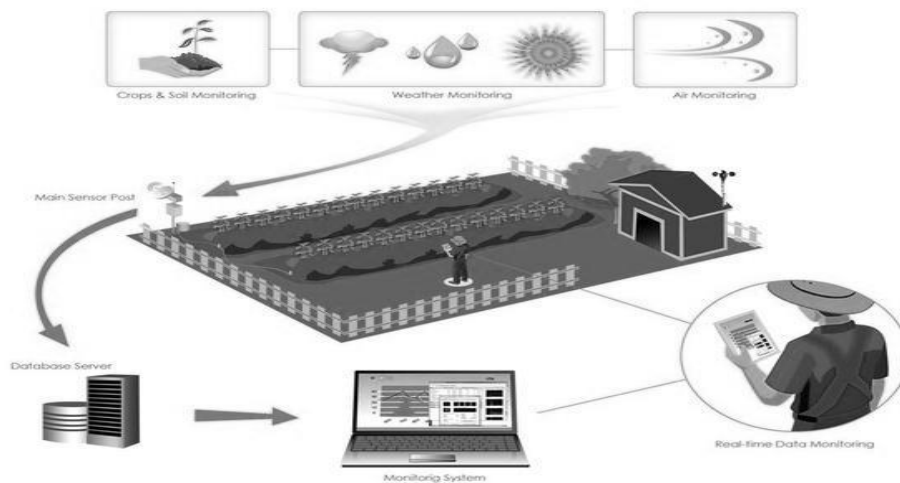
Fig.1: IoT in Agriculture

Fig.2: Smart Farming with IoT Applications

Many times the major concern with farming is the improper management of water. Water management with IoT can not only improves per hector production but also enables the cultivation twice or thrice per year. The field monitoring with drone cameras helps the farmers to understand the situation of the crops over the longer areas. The sensors are useful for the monitoring of soil condition such as humidity and the moisture.

MOTIVATION OF RESEARCH:
Agriculture sector in India is facing several problems with environmental hazards. The situations like floods, uneven rain, lack of technology to control the farming operations and conventional irrigation and other crop related operations etc. The researchers are working on providing the solution for the agriculture related operation with automation and IoT. IoT has made it possible to monitor and control the crop for better cultivation. The sensors help in sensing the exact situation of the crop and the soil. The various parameters will be checked and compared with the standards for controlling the flow of resources such as water.

OBJECTIVES OF RESEARCH:
The objectives behind the study carried out are:
- To study the various agriculture monitoring systems available.
- Understand the requirements of the IoT based agriculture monitoring system
- Develop the framework for agriculture monitoring system development.
- Selection of the proper components for development of the system.

BLOCK DIAGRAM OF PROPOSED SYSTEM
The figure below shows the basic blocks of the proposed system for IoT based agriculture monitoring. The sensors for identification of various parameters affecting the crop are shown in the figure. The rain sensor

mainly detects the rainfall related information and its effect on the crop can be studied. Humidity, temperature and moisture sensors are used for real time monitoring of the parameters. The water pump is controlled through ATMega 2560 microcontroller. Wi-Fi module enables the storage of real time parameters on cloud. The parameters can also be displayed on the LCD on real time basis.
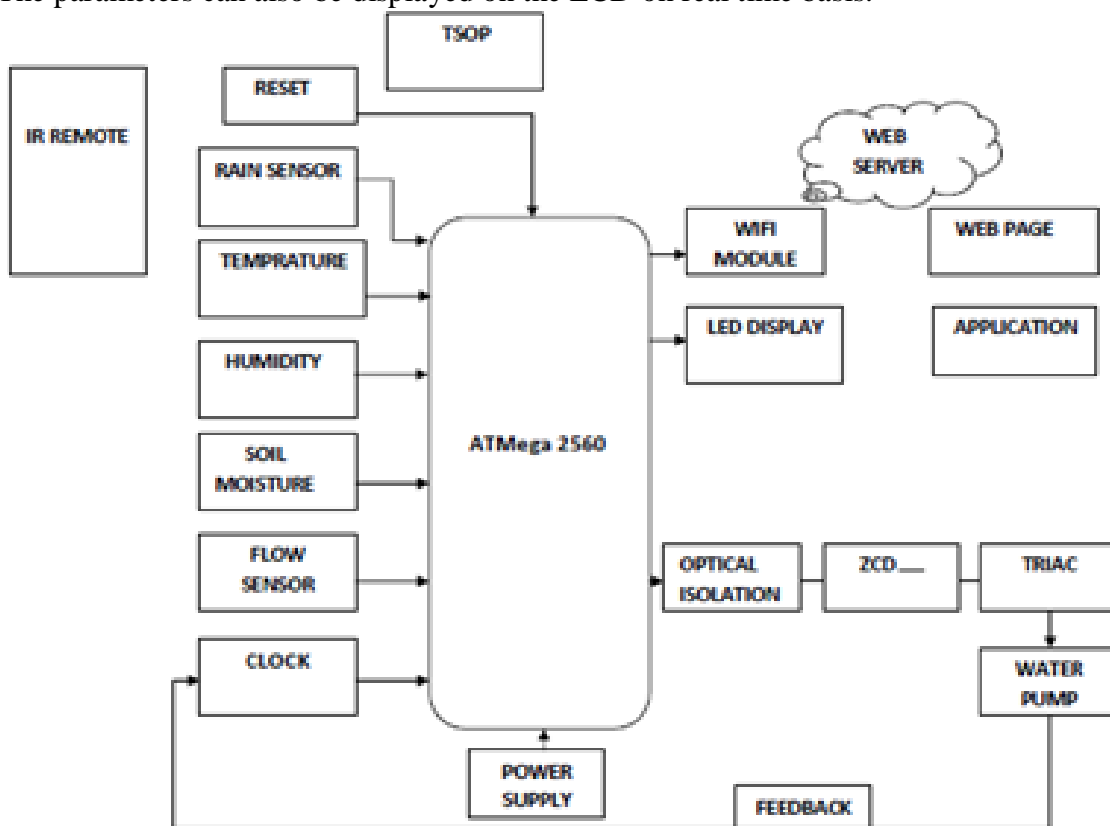

Fig.3: Proposed System for IoT based Agriculture Monitoring System

The feedback signal is useful to control the operation of the pump there by controlling the flow of water. The system is found suitable to control the water flow depending upon the need of the cultivation. The programming enables the operations in different environments and various soil types to control the water flow. The moisture of the soil is checked through the sensor and the flow of water can be controlled through the circuit.
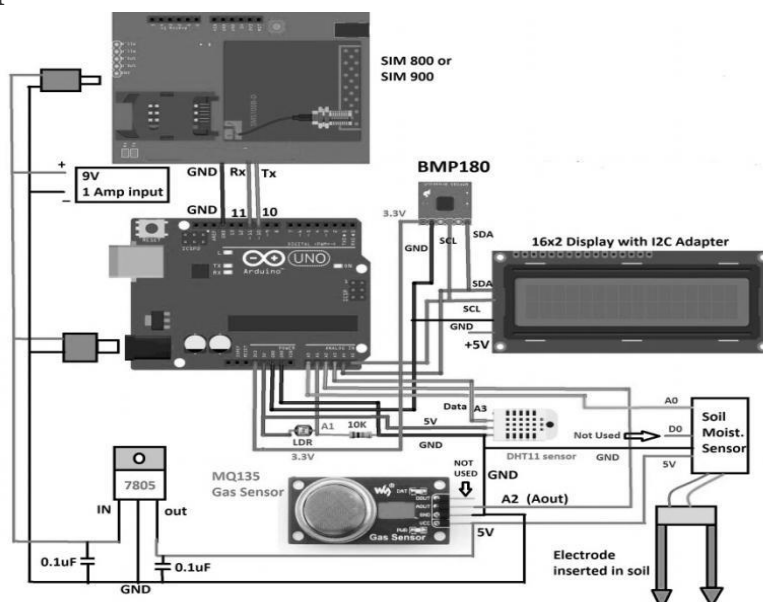
CIRCUIT DIAGRAM

Fig.4: Circuit Diagram of Smart Farming System

PROPOSED METHODOLOGY:

The Arduino based system for monitoring and controlling the agriculture operations is proposed to be developed by Authors. Authors have proposed to use the sensors such as humidity, moisture and temperature sensor. The objective of the work is to develop the low cost solution for automation of agriculture operation.

SYSTEM REQUIREMENT

Sr. No.	Components	Specifications
1	ATmega 2560	8Bit, 54 digital Input/ Output pins, 16 analog inputs, 4 UART
2	ESP8266 Wi-Fi Module	Wi-Fi Direct, 1MB Flash Memory, SDIO 1.1/2.0, SPI, UART, Standby Power Consumption of <1.0mW.
3	Temperature Sensor-DS18B20	1-Wire Interface; Measures Temperature from -55 ℃ TO +125℃; Coverts temperature to 12-bit digital word in 750ms
4	Soil Moisture Sensor	3.3V to 5V; Analog Output; VCC external 3.3 V to 5V
5	GSM Module RS-232	900/1800 MHz.
6	Humidity Sensor	3.5V to 5.5V, Analog Output; VCC external 3.3 V to 5V

CONCLUSION

The IoT based smart monitoring system is useful to optimize the use of resources such as water in agriculture field. The system uses sensors and devices for identification of need of the crop, controlling the water flow, storing the information for analysis and real time monitoring of the crops.

The IoT based system will be suitable in order to improve per hector cultivation of crops there by reducing the cost with better utilisation of the resources. The system will be useful for the Indian farmers and can be developed at minimal cost as the software and hardware is mostly open source. The various parameters such as moisture, humidity, atmospheric temperature and the flow of water can be monitored and controlled with the proposed system.

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