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Iot Based Web App for Farmers: Precision Agriculture Using Satellite Monitoring System and Basic Sensors

M.G. Raut1, M.C. Naidu2
Hislop college , Nagpur, India

Abstract: *This project report deals with study and development of a web app as a tool for farmer to make them smart and understand businesses in an effective and efficient manner. " A Smart Farmer" is that modern energy access acts as a catalyst for development of country. In this report we focuses on improved resource use efficiency related to agriculture, monitored by satellite, Analyzed and simplified by the web app and through IOT based system made the data available for the farmers for smart decision making and efficient cultivation. The project aims to bring smartness in agricultural aspects of any village by making availablefarmers,data, through IOT with a web App.Analyzing and Simplifying data accessed from satellite monitoring system Such as:Theearth resources, specific to that geographical area using satellite imagery and offer Water resource monitoring with satellite data that includes hydrologic mapping, soil moisture studies,and in exploration for metal, oil, and gas deposits and through basic sensorssuch as (light, humidity, temperature, soil moisture, etc.) placed at the actual area, which can be useful to check real time agricultural parameters and act accordingly.*

One example of such System is the study of Lakes and Riversfor their chemical composition and contamination is also possible through satellite monitoring system which will immensely help farmers who have there land adjacent to lakes and rivers..Satellite crop monitoring is another technology which facilitates real-time crop vegetation index monitoring via spectral analysis of high resolution satellite images for different fields and crops which enables to track positive and negative dynamics of crop development.

Through IOT based Web App system the farmers can use readily available data which has been analyzed and simplified to help them increase their cultivation and make them Smart to understand there business efficiently ,with less time and efforts

Keywords: *IOT, Microcontroller, Satellite Monitoring system, Sensors*

I. Introduction

The project aims to bring smartness in agricultural aspects of any village by making available,farmers data through IOT with a web App.Analyzing and Simplifying data accessed from satellite monitoring system Such as:Theearth resources, specific to that geographical area using satellite imagery and offer Water resource monitoring with satellite data that includes hydrologic mapping, soil moisture studies,and in exploration for metal, oil, and gas deposits and through basic sensorssuch as (light, humidity, temperature, soil moisture, etc.) placed at the actual area, which can be useful to check real time agricultural parameters and act accordingly.

Study of Lakes and Riversfor their chemical composition and contamination is also possible through satellite monitoring system which will immensely help farmers who have there land adjacent to lakes and rivers..Satellite crop monitoring is another technology which facilitates real-time crop vegetation index monitoring via spectral analysis of high resolution satellite images for different fields and crops which enables to track positive and negative dynamics of crop development. The difference in vegetation index informs about single-crop development disproportions that speaks for the necessity of additional agriculture works on particular field zonesthat is because satellite crop monitoring belongs to precision agriculture methods.

Through IOT based Web App system the farmers can use readily available data which has been analyzed and simplified to help them increase their cultivation and make them Smart to understand there business efficiently ,with less time and efforts.

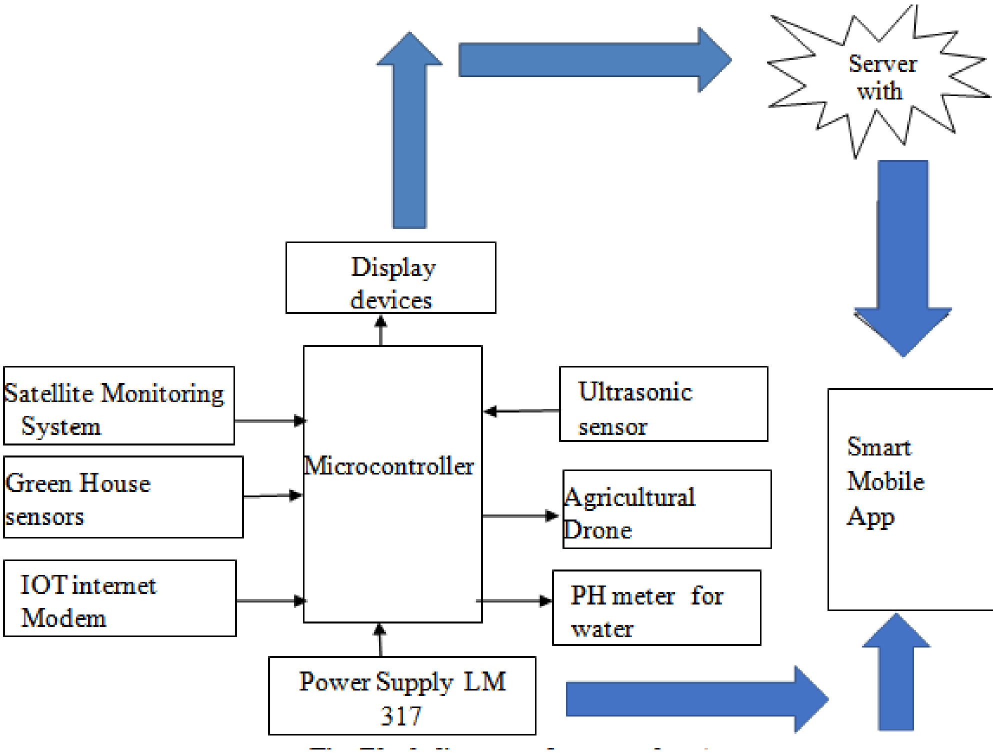
II. Objectives

This project report deals with study and development of a web app as a tool for farmer to make them smart and understand businesses in an effective and efficient manner. " A Smart Farmer" is that modern energy access acts as a catalyst for development of country. In this report we focuses on improved resource use efficiency related to agriculture, monitored by satellite, Analyzed and simplified by the web app and through IOT based system made the data available for the farmersfor smart decision making and efficient cultivation.

III. Methodology

World agriculture is big business, but its significance extends far beyond the economy. Food security for a rapidly increasing population is critical, and the use of precision agriculture has transformed farming. But much as agriculture is now big business, small farmers and farms, often in developing countries, are just as critical to world food markets and to the health of their local economies.In agriculture, Earth Observation imagery and data analytics have already revolutionised food production and supply chain management with the development of precision farming. This WEB APP offers precision agriculture companies access to timely and detailed geospatial information that can assist agricultural guidance systems to manage crop production and maximise yields in large-scale farming enterprises or provide critical decision-support to small-holder farms in developing countries.

This WEB APP will deliver geospatial intelligence to farmers, governments and agri-companies with a level of detail and actionable insight, over wide areas and with high frequency revisits. This enables effective decision-support and farm-based technologies that increase crop yields, crop health and farm productivity. When integrated with other data sources, such as predictive models for weather and pests, geospatial analytics and intelligence are combatting the impact of climate change and working towards more sustainable global food supply.



IV. Modules

Precision Farming

Also known as precision agriculture, precision farming can be thought of as anything that makes the farming practice more controlled and accurate when it comes to raising livestock and growing of crops. In this approach of farm management, a key component is the use of IT and various items like sensors, control systems, robotics, autonomous vehicles, automated hardware, variable rate technology, and so on. The adoption of access to high-speed internet, mobile devices, and reliable, low-cost satellites (for imagery and positioning) by the manufacturer are few key technologies characterizing the precision agriculture trend.

Precision agriculture is one of the most famous applications of IoT in the agricultural sector and numerous organizations are leveraging this technique around the world. Crop Metrics is a precision agriculture organization focused on ultra-modern agronomic solutions while specializing in the management of precision irrigation. The products and services of Crop Metrics include VRI optimization, soil moisture probes, virtual optimizer PRO, and so on. VRI (Variable Rate Irrigation) optimization maximizes profitability on irrigated crop fields with topography or soil variability, improve yields, and increases water use efficiency.

The soil moisture probe technology provides complete in-season local agronomy support, and recommendations to optimize water use efficiency. The virtual optimizer PRO combines various technologies for water management into one central, cloud based, and powerful location designed for consultants and growers to take advantage of the benefits in precision irrigation via a simplified interface.

V. Agricultural Drones

Technology has changed over time and agricultural drones are a very good example of this. Today, agriculture is one of the major industries to incorporate drones. Drones are being used in agriculture in order to enhance various agricultural practices. The ways ground-based and aerial based drones are being used in agriculture are crop health assessment, irrigation, crop monitoring, crop spraying, planting, and soil and field analysis.

The major benefits of using drones include crop health imaging, integrated GIS mapping, ease of use, saves time, and the potential to increase yields. With strategy and planning based on real-time data collection and processing, the drone technology will give a high-tech makeover to the agriculture industry. Precision Hawk is an organization that uses drones for gathering valuable data via a series of sensors that are used for imaging, mapping, and surveying of agricultural land. These drones perform in-flight monitoring and observations. The farmers enter the details of what field to survey, and select an altitude or ground resolution. From the drone data, we can draw insights regarding plant health indices, plant counting and yield prediction, plant height measurement, canopy cover mapping, field water ponding mapping, scouting reports, stockpile measuring, chlorophyll measurement, nitrogen content in wheat, drainage mapping, weed pressure mapping, and so on.The drone collects multispectral, thermal, and visual imagery during the flight and then lands in the same location it took off.

VI. Livestock Monitoring

Large farm owners can utilize wireless IoT applications to collect data regarding the location, well-being, and health of their cattle. This information helps them in identifying animals that are sick so they can be separated from the herd, thereby preventing the spread of disease. It also lowers labor costs as ranchers can locate their cattle with the help of IoT based sensors.

JMB North America is an organization that offers cow monitoring solutions to cattle producers. One of the solutions helps the cattle owners observe cows that are pregnant and about to give birth. From the heifer, a sensor powered by battery is expelled when its water breaks. This sends an information to the herd manager or the rancher. In the time that is spent with heifers that are giving birth, the sensor enables farmers to be more focused.

VII. Smart Greenhouses

Greenhouse farming is a methodology that helps in enhancing the yield of vegetables, fruits, crops etc. Greenhouses control the environmental parameters through manual intervention or a proportional control mechanism. As manual intervention results in production loss, energy loss, and labor cost, these methods are less effective. A smart greenhouse can be designed with the help of IoT; this design intelligently monitors as well as controls the climate, eliminating the need for manual intervention.

VIII. Result and Conclusions

The global population is set to touch 9.6 billion by 2050. So, to feed this much population, the farming industry must embrace IoT. Against the challenges such as extreme weather conditions and rising climate change, and environmental impact resulting from intensive farming practices, the demand for more food has to be met.

Smart farming based on IoT technologies will enable growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized to the number of journeys the farm vehicles have made. So, what is smart farming? Smart farming is a capital-intensive and hi-tech system of growing food cleanly and sustainable for the masses. It is the application of modern ICT (Information and Communication Technologies) into agriculture.

In IoT-based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. IoT-based smart farming is highly efficient when compared with the conventional approach.

The applications of IoT-based smart farming not only target conventional, large farming operations, but could also be new levers to uplift other growing or common trends in agricultural like organic farming, family farming (complex or small spaces, particular cattle and/or cultures, preservation of particular or high quality varieties etc.), and enhance highly transparent farming.

In terms of environmental issues, IoT-based smart farming can provide great benefits including more efficient water usage, or optimization of inputs and treatments. Now, let’s discuss the major applications of IoT-based smart farming that are revolutionizing agriculture.

IX. Scope of future work

As the internet is spreading faster in every small part of the world, internet of things can make the things digitized, the scope from the project is that by providing knowledge of internet and its uses for rural people we can make Farmers smart by providing these features like Precision farming, Agricultural drone, Livestock Monitoring, Smart Greenhouse and Useful data collected analyzed and simplified for the farmers.

In our project we are using Microcontroller which is a small computer, it can provide many functions to the project as it will be upgraded in the future and which is low cost and powerful devices. Displaying the agriculture related things helps to uneducated people to get know about facilities given by the government to them. E-learning improves and provide standard education to village student and it will bring them from imaginary to real environment.

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