A NOVEL STRATEGY IN SEED SOWING AND WEATHER MONITORING SYSTEM FOR THE AGRICULTURAL APPLICATION USING IOT BY DRONE

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ABSTRACT

One of main source of income in of India is Agriculture. The production rate of crops in agriculture is based on various parameters like temperature, humidity, rain, etc. Which are natural factors and not in farmers control. The field of agriculture is also depends on some of factors like pests, disease, fertilizers, etc which can be control by giving proper treatment to crops. Pesticides may increase the productivity of crops but it also affects on human health. So the main aim of this paper is to design agriculture drone for spraying pesticides. In this paper, we are going to discus different architecture based on unmanned aerial vehicles (UAVs). The use of pesticides in agriculture is very important to agriculture and it will be so easy if will use intelligent machines such as robots using new technologies. This paper gives the idea about various technologies used to reduce human efforts in various operations of agriculture like detection of presence of pests, spraying of UREA, spraying of fertilizers, etc. This paper describes the development of quad copter UAV and the spraying mechanism. In this paper we also discuss integration of sprayer module to quad copter system. The discussed system involves designing a prototype which uses simple cost effective equipment like BLDC motor, Arduino, ESC wires, etc.

Keyword: - *Drone, Micro Controller, BLDC Motor, ESC ,Sensors, Nodemcu 8266, Atmel 44PA, Servo Motor, DC Battery, Seed Sowing Machine , etc…*

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1. INTRODUCTION

Today the Internet has become ubiquitous, has touched almost every corner of the globe, and is affecting human life in unimaginable ways. However, the journey is far from over. We are now entering an era of even more pervasive connectivity where a very wide variety of appliances will be connected to the web. We are entering an era of the “Internet of Things” (abbreviated as IoT). This term has been defined by different authors in many different ways. Let us look at two of the most popular definitions. The Internet of Things as simply an interaction between the physical and digital worlds. The digital world interacts with the physical world using a plethora of sensors and actuators. The Internet of Things as a paradigm in which computing and networking capabilities are embedded in any kind of conceivable object. We use these capabilities to query the state of the object and to change its state if possible. In common parlance, the Internet of Things refers to a new kind of world where almost all the devices and appliances that we use are connected to a network. We can use them collaboratively to achieve complex tasks that require a high degree of intelligence.

For this intelligence and interconnection, IoT devices are equipped with embedded sensors, actuators, processors, and transceivers. IoT is not a single technology; rather it is an agglomeration of various technologies that work together in tandem.

Sensors and actuators are devices, which help in interacting with the physical environment. The data collected by the sensors has to be stored and processed intelligently in order to derive useful inferences from it. Note that we broadly define the term sensor; a mobile phone or even a microwave oven can count as a sensor as long as it provides inputs about its current state (internal state + environment).

The storage and processing of data can be done on the edge of the network itself or in a remote server. If any preprocessing of data is possible, then it is typically done at either the sensor or some other proximate device.

The processed data is then typically sent to a remote server. The storage and processing capabilities of an IoT object are also restricted by the resources available, which are often very constrained due to limitations of size, energy, power, and computational capability. As a result the main research challenge is to ensure that we get the right kind of data at the desired level of accuracy. Along with the challenges of data collection, and handling, there are challenges in communication as well. The communication between IoT devices is mainly wireless because they are generally installed at geographically dispersed locations. The wireless channels often have high rates of distortion and are unreliable. In this scenario reliably communicating data without too many retransmissions is an important problem and thus communication technologies are integral to the study of IoT devices.

Now, after processing the received data, some action needs to be taken on the basis of the derived inferences. The nature of actions can be diverse. We can directly modify the physical world through actuators. Or we may do something virtually. For example, we can send some information to other smart things.

1.1 Existing System

Unmanned Aerial Vehicles are becoming more and more popular to meet the demands of increased population and agriculture. Drones equipped with appropriate cameras, sensors and integrating modules will help in achieving easy, efficient, precision agriculture. The proposed solutions related to these drones, if integrated with various Machine Learning and Internet of Things concepts, can help in increasing the scope of further improvement. In this paper, the related work in this field has been highlighted along with proposed solutions that can be integrated into the drone.

1.2 Objective

IoT devices enables network communication, data acquisition through sensors and actuators, and distributed processing in a low-cost hardware which operate for long periods of time using low-powered batteries. The advantages of collecting data to support decision making in real-time to control field devices (e.g. irrigation) enables the creation of a robust and fault tolerance system. Several IoT devices have already been applied to agriculture settings to monitor soil conditions such as PH and humidity through a wireless sensor network (ZigBee for mesh network) or using cellular communication system's global system for mobile communications (General Packet Radio Service (GPRS). Such devices communicate with a system supported by web technologies and using open Application Programming Interfaces (API) or even third-party APIs to offer geo referencing services to support decision-making. The proposed prototype was designed only with open hardware and open source software, and it could be built with usual components for prototyping. This study investigate whether such components could be organized in such architecture to be effective in precision agriculture. Unmanned Aerial Vehicles are becoming more and more popular to meet the demands of increased population and agriculture. Drones equipped with appropriate cameras, sensors and integrating modules will help in achieving easy, efficient, precision agriculture. The proposed solutions related to these drones, if integrated with various Machine Learning and Internet of Things concepts, can help in increasing the scope of further improvement. In this paper, the related work in this field has been highlighted along with proposed solutions that can be integrated into the drone using Sensors technology.

1.3 Contribution

Nowadays, Agriculture is one of the primary industries that have embraced IoT applications since wireless sensors networks composed of devices that can work in coordination to cover broad spatial areas. In order to design an IoT device to monitor crops a number of essential parameters need to be considered. These can be categorized into four types of parameters: the visual, physical, chemical and biological. The visual parameters include changes of color of the soil, dust, water uptake or growing of weed that could be monitored by cameras or satellite images. Physical parameters include, among others, soil density, texture, humidity and soil temperature. Usually, such parameters are measured in the laboratory using several methods as described in and.

Agricultural producers must embrace revolutionary strategies for producing food, increasing productivity, and making sustainability a priority. Drones are part of the solution, along with closer collaboration between governments, technology leaders, and industry. Drone technology will give the agriculture industry a high-technology makeover, with planning and strategy based on real-time data gathering and processing Uses a network of sensors for temperature, humidity, and field analysis ,Crop monitoring ,Irrigation ,Health assessment. In this paper, many possible solutions have been highlighted and combined to produce a comprehensive solution for the betterment of agriculture drones.

For, future work, a proposed method is the installation of solar panels on the drone itself. By installing solar panels, the need for external charging is eliminated and the drone can charge during the day when it is operating on the field. Another future application may be the use of the Support Vector Machine (SVM) for classification of crops and plants according to yield. The SVM can work on a given database of crops and their respective physiological characteristics and time of yield. Using this, the SVM can predict appropriate yield times of the planted crops,or it could predict the time of ripening of fruits with sufficient accuracy. Thus, drones serve as a perfect aerial platform for gathering the data needed in precision agriculture.

2. LITERATURE SURVEY

In this work [Abdullahi HS, Mahieddine F and Sheriff RE (2015)] they proposed Technology application to agricultural productivity is thought to be the solution to meet food demand of the growing population. In a rapidly changing world, with the prospect of decreasing arable land due to urbanization and industrialization, agricultural output requires a 70 % increase in production levels and efficient growth in the harvesting, distribution and consumption of the resources, to meet demand. There are innovations in Information and Communications Technology that can be applied to the agricultural sector in areas of precision farming, use of farm management software, wireless sensors, and use of agricultural machinery. Remote sensing technology is playing a key role through precision agriculture. This paper highlights ways in which precision agriculture is impacting on agriculture with the use of unmanned aerial vehicles for image capturing, processing and analysis. In this work [Iftikhar Ali and et al., 2015] discussed about The enormous increase of remote sensing data from airborne and space-borne platforms, as well as ground measurements has directed the attention of scientists towards new and efficient retrieval methodologies. Of particular importance is the consideration of the large extent and the high dimensionality (spectral, temporal and spatial) of remote sensing data. Moreover, the launch of the Sentinel satellite family will increase the availability of data, especially in the temporal domain, at no cost to the users. To analyze these data and to extract relevant features, such as essential climate variables (ECV), specific methodologies need to be exploited. Among these, greater attention is devoted to machine learning methods due to their flexibility and the capability to process large number of inputs and to handle non-linear problems. In this work [Torres-Sanchez et al. in 2015] The geometric features of agricultural trees such as canopy area, tree height and crown volume provide useful information about plantation status and crop production. However, these variables are mostly estimated after a time-consuming and hard field work and applying equations that treat the trees as geometric solids, which produce inconsistent results. As an alternative, this work presents an innovative procedure for computing the 3-dimensional geometric features of individual trees and tree-rows by applying two consecutive phases: 1) generation of Digital Surface Models with Unmanned Aerial Vehicle (UAV) technology and 2) use of object-based image analysis techniques. Our UAV-based procedure produced successful results both in single-tree and in tree-row plantations, reporting up to 97% accuracy on area quantification and minimal deviations compared to in-field estimations of tree heights and crown volumes. The maps generated could be used to understand the linkages between tree grown and field-related factors or to optimize crop management operations in the context of precision agriculture with relevant agro-environmental implications.

3. PROPOSED SYSTEM

The purpose of the System Analysis is to produce the brief analysis task and also to establish complete information about the concept, behavior and other constraints such as performance measure and system optimization. The goal of System Analysis is to completely specify the technical details for the main concept in a concise and unambiguous manner.

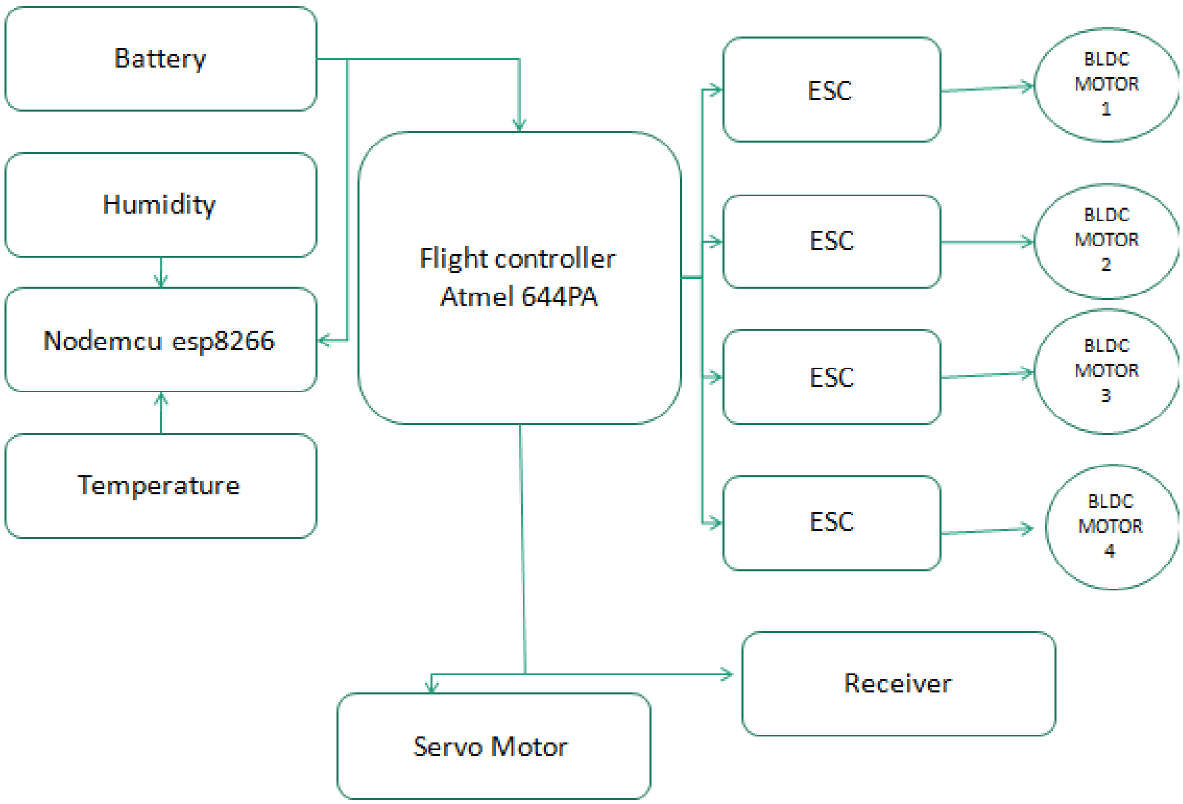

Fig.No. 1 Block Diagram For Proposed System

3.1 Advantages of Proposed System

- Manual Monitoring
- Fixed Sensor communication
- Centralized management
- Easy and Simple Architecture
- Traffic & Bandwidth Utilization is less

4. RESULT & DISCUSSION

This system should have all nodes has a solar panel to provide enough energy to make system working and also charge a rechargeable battery of supply output 2500mAH and 3,7V. For that the available solar panel had a supply output of 10W with 6V. All nodes also has a sensor technology with current drain between 5mA to 10mA and up to 750mW. The sensors used in this prototype are broadly available in several countries, which permits this system could be built in anyplace with the same hardware specification. The cost was taken into consideration and the chosen sensors provide accuracy measures and measurement range to provide useful data to several soil modelling used in agriculture. In order to design an IoT device to monitor crops a number of essential parameters need to be considered. These can be categorized into four types of parameters: the visual, physical, chemical and biological. The visual parameters include changes of color of the soil, dust, water uptake or growing of weed that could be monitored by cameras or satellite images.

Fig.No. 2: Snapshot of Hardware Prototype

5. CONCLUSIONS

Thus, we can conclude that drones or UAVs will be of immense help in the field of agriculture with the increase in population as they are essential at the very beginning of a crop cycle. It will not only reduce time but also yield better cultivation based on analyzed data. Crop management will be more efficient due to systematic monitoring. With the Young People involvement, the production rate will increase rapidly with lesser consumption of energy. Drones are not just used in the analysis of soil and fields but also in planting seeds and shooting plant nutrients in the soil. Crop monitoring obstacles faced previously can also be done away with the help of drones. The application of drones does not stop here when embedded with hyper spectral, thermal-spectral or multispectral sensors, drones can identify which parts of the land are dry and thereby assessing an irrigation plan becomes easier. Additionally, drones also find use in assessing the crop health by scanning them using near-infrared and visible light. Thus, drones serve as a perfect aerial platform for gathering the data needed in precision agriculture.

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