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DESIGN AND DEVELOPMENT OF APPLICATION SPECIFIC DRONE MACHINE FOR SEED SOWING

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Abstract - *The main motive for developing agricultural automation technology is nowdays decreasing labour force in the farm, to overcome this phenomenon making the automatic agricultural machines by engineers . Reserch on agricultural products to work easy in the farm get more productivity from the farm. The agricultural machinary has more efficient than previous one also from the man power. Seed sowing procedure in farm is too difficult for labour,so nowdays there are using like tractor machinary but for the some seeding technique there is no particular solution found. And current generation is not as skilled as old labour. So its necessary to automate the agricultural field .In india there are 70% people depends on agriculture.in the farm for some seeds like cotton seed is sowing too difficult by manpower and taken huge time,for this we want implement to design and devlopment of application specific drone machine for seed sowing. In this case uav vehical drone will sowing the seeds in farm at particular position with less time. The application of agricultural machinery in precision agriculture has experienced an increase in investment and research due to the use of robotics applications in the machinery design and task executions. Precision autonomous farming is the operation, guidance, and control of autonomous machines to carry out agricultural tasks. It motivates agricultural robotics. It is expected that, in the near future, autonomous vehicles will be at the heart of all precision agriculture applications. The goal of agricultural robotics is more than just the application of robotics technologies to agriculture. Currently, most of the automatic agricultural vehicles used for weed detection, agrochemical dispersal, terrain leveling, irrigation, etc. are manned. An autonomous performance of such vehicles will allow for the continuous supervision of the field, since information regarding the environment can be autonomously acquired, and the vehicle can then performs its task accordingly. So in this project drone vehicle using the following keywords.*

***Key Words*: Arduino ATMEGA 2560 Microcontroller, dc motor, wi-fi module , BLDC Motor, ESC, Accelerometer & Gyaroscopic module , Quadcopter/Drone(UAV), Flightcontroller, LipoBattery.**

1. INTRODUCTION

The design of agricultural a rover will often incorporate agricultural efforts, though it may not look much like a human being or function in a human like manner. These types of intelligent systems having robust and feasible model with a number of integrated functionalities is the demand of future in every field of technology, for the betterment of the society. Agriculture was the key development in the rise of human civilization. A remarkable change in agricultural practices has occurred over the past century in response to new technologies, and the development of world agricultural markets. This also has led to technological improvements in agricultural techniques. Robotics is the branch of technology that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback. The design of a rover will often incorporate agricultural efforts, though it may not look much like a human being or function in a human like manner. In the 21st century the trends of development on automation and intelligence of agricultural machinery is increasing. All kinds of agricultural robots have been researched and developed to implement a number of agricultural products in many countries. This Bot can performs basic elementary functions like harvesting, planting and spray the pesticides. The application of agricultural machinery in precision agriculture has experienced an increase in investment and research due to the use of robotics applications in the machinery design and task executions. Precision autonomous farming is the operation, guidance, and control of autonomous machines to carry out agricultural tasks. It motivates agricultural robotics. The goal of agricultural robotics is more than just the application of robotics technologies to agriculture. Currently, most of the automatic agricultural vehicles used for weed detection, agrochemical dispersal, terrain leveling, irrigation, etc. Unmanned aerial vehicles have become cheaper because many control functions can be implemented in software rather than having to depend on expensive hardware. This even allows multiple UAVs to be used for a single application. In this case, the UAVs must have communication facilities so that they can communicate with each other. This can easily be achieved by equipping an UAV with a wireless mesh node .In this scenario, the UAV swarm can be considered to be a highly mobile wireless mesh network. The main motive for developing agricultural automation technology is nowdays decreasing labour force in the farm, to overcome this phenomenon making the automatic agricultural machines by engineers . Reserch on agricultural products to work easy in the farm get more productivity from the farm. The agricultural machinary has more efficient than previous one also from the man power. Seed sowing procedure in farm is too difficult for labour,so nowdays there are using like tractor machinary but for the some seeding technique there

is no particular solution found and current generation is not as skilled as old labour. So its necessary to automate the agricultural field .In india there are 70% people depends on agriculture.in the farm for some seeds like cotton seed is sowing too difficult by manpower and taken huge time,for this we want implement to design and devlopment of application specific drone machine for seed sowing. In this case uav vehical drone will sowing the seeds in farm at particular position with less time and minimize manpower efforts.

1.1 Necessity

If farming is done manually then a lot of human efforts are required and then also the required quality work is not possible. Also there is wastage of seeds and fertilizers due to improper use of it. Also the harvesting part is very difficult manually because it may happen that the fruits are cut before their maturity level of it because grading of fruit is done manually. Manual harvesting method is slow and also very cost-ly. Unavailability of labor in now a days and no one like to work in the farm . That's why I design of agricultural seed sowing drone.

1.2 Objectives

To design intelligent embedded system based specific drone machine for seed sowing. To provide flexibility to use smart phone application model mechanism for communication for farmers. The concept of agricultural drone mechanism is on unmanned aerial vehicle (UAV) and with the seed sowing mechanism.

2. DESIGN AND DEVELOPING OF SEED SOWING AGRICULTURAL DRONE

In this project I propose architecture based on unmanned aerial vehicles (UAVs) that can be employed to implement a control loop for agricultural applications where UAVs are responsible for sowing the seeds in the farm. The process of applying the seeds is controlled by means of the feedback from the wireless sensors network deployed at ground level on the field. The aim of this seed is to deep in farm support short delays in the control loop so that the UAV can process the information from the sensors.

Furthermore , we evaluate an algorithm to adjust the UAV route under changes in the row and column .and the impact related to the number of messages exchanged between the UAV and the WSN. The information retrieved by the WSN allows the UAV to confine sowing of seeds to strictly designated areas. Since there are sudden and frequent changes in environmental conditions the control loop must be able to react as quickly as possible.

Table -1: Comparison between Present sowing techniques and sowing with drone System

Sr.No.	Parameters	Manual	Tractor	Seed Sowing Drone
1.	MANPOWER	MORE	MODERATE	LESS
2.	TIME REQUIRED	MORE	MODRATE	LESS
3.	SOWING	MANUALLY	AUTOMATIC	ATUOMATIC
4.	ADJUSTABLE SEED DISTANCE	NO	NO	YES
5.	SEED WASTAGE	MODERATE	MORE	LESS
6.	POLLUSTION	NO	MORE	NO
7.	ENERGY NEED	HIGH	VERY HIGH	LESS
8.	ALARM AND DISPLAY	NO	NO	YES

2.1.RELATED WORK OF SEED SOWING

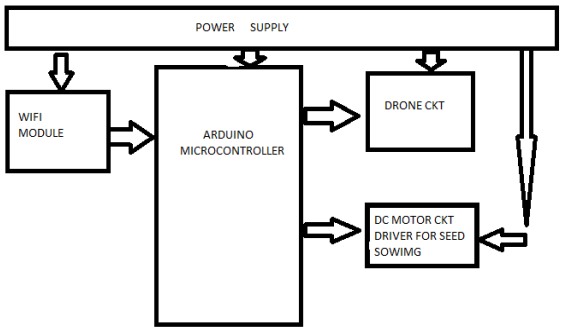
Drone integrated system which uses Wi-Fi to communicate between two robots is presented in, which perform seeding. It is controlled using Arduino Atmega2560 controller and computer to control and monitor working. It has quad copter body which can move in any direction as per required. It has ultrasonic proximity sensor to avoid the obstacles in the path, and underbody sensor system to detect that seed is planted or not. And it communicating with other computer / android phone near to it using Wi-Fi.

2.2 PROPOSED METHODOLOGY

Farming using Drone is major task to achieve. Pro-posed system will be totally based on it. Drone deals more strongly with proper execution of task like hu-man being. It also proper utilizes the resources available like seeds there should be less wastage of things and complete the task in as minimum time as possible. As shown in the Figure 1, a manual switches are used to control the Drone action of seed sowing. When the power supply is turned on the drone will be in idle mode it performs nothing till any one instruction given to him. As soon as given a instruction to drone. It will perform the dedicated task-provided in the program. After the drone start performing the task at same time it can detect obstacles in the path using IR sensors. If any obstacle comes in the path then the drone will try to avoid that obstacle by changing the path but at the same time it continuously monitors any other obstacles in the path. The drone will follow only the dedicated path if there is no obstacle in the path. Climatic condition, such as the intensity and direction of the wind while seed sowing add further

complexity to the control problem. In this paper ,we describe an architecture based on unmanned aerial vehicles(UAVs) which can be employed to implement a control loop for agricultural applications where UAVs are responsible for seed sowing in the farm. The process of applying to controlled by means of the feedback obtained from the wireless sensor network (WSN) . The aim of this solution is to support short delays in the control loop so that the seed sowing UAV can process the information from the sensors. We evaluate an algorithm to adjust the UAV route under changes in wind intensity and direction. Moreover, we evaluate the impact of the number of communication messages between the UAV and minimize the waste of seed.

Fig. 1. Proposed system block diagram



2.3 AGRICULTURAL SEED SOWING DRONE HARDWARE DESIGN

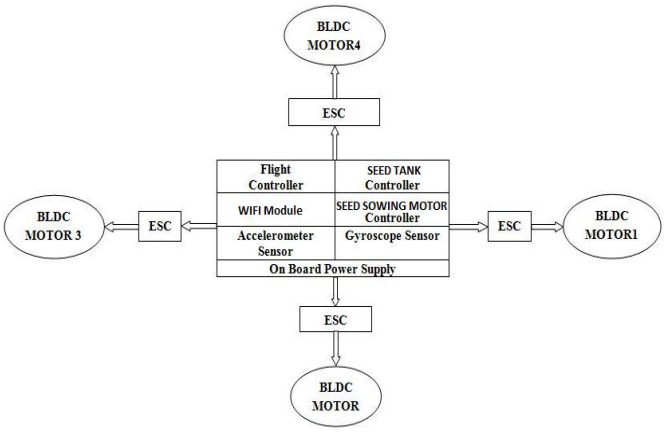
The application of seed sowing in agricultural farm is of prime importance for the plant birth from seed. The use of drone is becoming speed and effectiveness in the sowing operation. However, some factors may reduce the seed wastage.

Connectivity:

In this environment we have hosted a SQL server from our laptop which is connected to an android mobile device. This connection can be established in from of Wi-Fi, Bluetooth, or a simple data network connection over the network or service provider . The diagram below represents the connection of the system program of TERMITE to the Code Composer Studio.

Command based self-guided digging and seed sowing rover, a sensor guided rover for digging, precise seed positioning and sowing has been proposed to reduce the human effort and also to increase the yield is presented in . The rover's navigation is per-formed by remote guiding devices fortified with the positioning system. It uses Arduino Atmega2560/328 controller and ultrasonic radar sensor for obstacle avoid-ance. It is controlled using wireless module that can be control by PC/ TAB/ Mobile. It gives acknowledgement massage of seed tank empty or full to the farmer.

Fig.2 Agriculture seed sowing Drone



Quad copter/ DRONE :

- MultiWII pro flightcontroller
- Flightcontroller communicates via Bluetooth /wifi
- Can be flown manually with RC controller
- Sensors:

–3-axis gyro (ITG3205)

–3-axis accelerometer (BMA180)

–3-axis magnetometer (HMC5883L)

–Barometer (BMP085)

–GPS receiver (MTK3329)

–2 Ultrasound distance sensors (HC-SR04)

- Motor RPM counter

ARDUINO ATMEGA CONTROLLER

ATmega328/ATMEGA2560

High Performance, Low Power AVR® 8-Bit Microcontroller.

Advanced RISC Architecture.
131 Powerful Instructions – Most Single Clock Cycle Execution
Six PWM Channels.
6-channel 10-bit ADC in PDIP Package.
Programmable Serial USART
Master/Slave SPI Serial Interface

BLDC

The brushless motors are multi-phased, normally 3 phases, so direct supply of DC power will not turn the

motors on .BLDC electric motor also known as electronically commutated motors.

ESC(Electronic Speed Controller):

ESC generating three high frequency signals with different but controllable phases continually to keep the motor turning. The ESC is also able to source a lot of current as the motors can draw a lot of power**.** ECS's are required to run the BLDC motors in the Quadcopter. The ESC is a standalone chip that's connected to the receiver's control channels and then coupled with the BLDC motor. For a better understanding of the ESC, it's more conventional to consider it as a pulse-width modulation (PWM) controller for the BLDC motors. PWM in short is a great way of controlling some modern electronics such as a BLDC motor, a fast variation between the motor being fully off and fully on powered, more conveniently described as a percentage called the duty cycle. Controlling the duty cycle means controlling the speed of the BLDC motor without any losses and also without affecting the load **.**

ACCELEROMETER SENSOR

The accelerometer measures acceleration and also force, so the downwards gravity will also be sensed. As the accelerometer has three axis sensors.

LIPO BATTERY

LiPo battery can be found in a single cell (3.7V) to in a pack of over 10 cells connected in series (37V). A popular choice of battery for a Quad Copter is the 3SP1 batteries which means three cells connected in series as one parallel, which should give us 11.1V.Lithium batteries are the preferred power sources for most electric modelers today. They offer high discharge rates and a high energy storage/weight ratio. However, using them properly and charging them correctly is no trivial task.

DC VOLTAGE SUPPLY

- A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and, as a result, power supplies are sometimes referred to as electric power .
- 30 RPM Side Shaft 37mm Diameter Compact DC Gear Motor is suitable for small robots automation systems. It has sturdy construction with gear box built to handle stall torque produced by the motor. Drive shaft is supported from both sides with metal bushes. Motor runs smoothly from 4V to 12V and gives 30 RPM at 12V. Motor has 6mm diameter, 22mm length drive shaft with D shape for excellent coupling.
- 30RPM 12V DC motors with Gearbox
- 6mm shaft diameter with internal hole ,125gm weight.

3. CONCLUSIONS

In this project I am working to overcome some problems in agriculture. The rapid growth in the industries is influencing the labors who are situating in the villages to migrate to the cities. This is creating the labor problem for the agriculture. The wages for the labor is also more. As the prices of commodities such as food grains, fuels, cloths and other essentials of daily life is increasing rapidly the labors demand for the more wages from the owners. These factors influencing the farmers who are interested in agricultural activity to leave their land uncultivated. By implementing this project in the field of agriculture we can help the farmers in the initial stage of agriculture i.e. during the seeding. This project can be a better substitute for the human who performs the seeding, fertilizing and removing weeds. This project is very useful for the farmers who are intended to do agriculture activity but facing the labor problem for seed sowing in the farm

This agricultural drone machine will designed to facilitate the farmers to ease their work and increase the productivity with its working features such as automatic seeding system, By developing this drone. it overcomes the difficulty of farmers in farming their land in every season no matter what is the weather that day. Considering all the situations, the robot integrated with different sub modules can be used for redemption and agricultural purposes worldwide especially countries like India where agriculture provides the principal means of livelihood for the major Indian population.

In this paper we have described an architecture based on unmanned aerial vehicles (UAVs) means drone that can be employed to implement a control loop for agricultural applications where UAVs are responsible for seed sowing in the soil of farm. The process of applying the seeds is controlled by means of the feedback from the wireless sensors network deployed at seed container. Furthermore, we have evaluated an algorithm to adjust the UAV route under changes in the wind (intensity and direction) and the impact related to the number of messages exchanged between the UAV and the WSN. and wifi network communication.

This project is mainly based on minimizing man power and cost of the equipment, which can be affordable to all farmers. Most of the present successful models represent use of powerful fuel based IC engines and heavy machineries, which require skilled technician and causes unnecessary environmental pollution and also reduction in fossil fuel. In order to solve this problem, the use of automation unmanned aerial vehicle or agricultural drone machine is implemented by this work. This project is developed to automatically cultivating the land. The project has consisted two mechanisms. The first mechanism contain to navigate the assembly of the UAV , whereas second mechanism is preparing the plough the soil for seeding it. This project can be very useful for farmers.

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