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Controlling Various Parameters in Agriculture Sparyer Rope Way

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ABSTRACT

Rope way for agriculture spraying is a new method in agriculture with multiple benefits compared to presently available options. It is very efficient and cost-effective method compared to tractors and drones presently available in market. it has various functional elements to be synchronized with each other to perform accurately all these devices are remotely connected to each other and yet to operate in time and position sync to each other this is achieved by using a master radio controller with multiple receiver whose time delays are pre-set with this adjustment's rover along with all its functional devices work together to achieve even and precise spray pattern across the agriculture field .

Keywords: Spraying Rope way, Pixhawk, BLDC motor, Electronic Speed Controller, Transmitter and Receiver

I. INTRODUCTION

Rope way foragriculture spraying is a new method in agriculture, which prevent direct contact of pesticide, savesfarmershealth. Agriculturehasbeenthe backboneoftheIndianeconomyanditwillcontinuetoremainsoforalongtime. Pesticide spraying is a essential activity done by a farmer to control pest. 6,600 farmers die ofpesticide poisoning every year in INDIA, more than 40% of the farmers infected with skin diseases.Pesticidesarewidelyusedinagriculturalproductiontopreventorcontrolpests,diseases,weeds,andotherplantpathogensinanefforttoreduceoreliminateyielddlossesandmaintainhighproductquality.Exposure of the general population to pesticides occurs primarily through eating food and drinkingwatercontaminatedwithpesticideresidues,whereassubstantialexposurecanalsooccurinoraroundthe home. Regarding the adverse effects on the environment (water, soil and air contamination fromleaching, runoff, and spray drift, as well as the detrimental effects on wildlife, fish, plants, and othernon-target organisms), many of these effects depend on the toxicity of the pesticide, the measurestakenduringitsapplication,thedosageapplied,theadsorptiononsoilcolloids,theweatherconditions prevailing after application, and how long the pesticide persists in the environment.

Ropewayforsprayingisaninnovativeapproachtosolvethecurrentdrawbacksofexistingsystems,it is designed and built to meet Indian agriculture conditions. The rope way system basically consistsoftwopoleswhichareconnectedusingrope,Roverisplacedon ropeforsprayingofpesticidesfromoneendofcroptootherend,Amaincontrollerisembeddedonthetopofrovertocontrolthefunctionslike movement of the rover, pipe rewinder and pump on /off. The master pole consists of gear boxwhich is used to tighten the rope according to requirement. Single transmitter is used to control theallteoperationslikerovermovement,gearboxcontrol,piperewindingetc.receiverisconnectedtothe main controller to receive the commands from the pilot. The height of the rover calculated andadjusted to the user requirement according to the crop. The whole system is powered by the lithium-ion battery which helps us to design low operating cost system. Rope way system gives cutting edgeovertheexistingsystem by its characteristicslike lowcost, portabilityand less complex.

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II. METHODOLOGY

The working principle of the project is categorized into two parts one is one controllable approach in spraying rope way and the second part is synchronizing the devices and run the rope way

DESIGN A PLATFORM FOR ALL COMPONENTS INTO ONE CONTROLLABLEAPPROACH IN A SPRAYING ROPE WAY.

In stage I, Objectives are motor, electronic speed controller, LIDAR, Pixhawk controller and battery which are connected to each other to build a spraying pump. All these devices are aligned in a platform and controlled by a transmitter. One channel is used to operate the motor and other channel is used to move the rover.

SYNCHRONIZING ALL DEVICES AND RUN THE ROPE WAY WITH DESIRED CONTROLS

In stage II**,** All the devices are connected and works in a synchronized way in which the rope way runs in a desired speed. The speed of both electronic speed controller and motor should be same i.e in a synchronized manner. Also designing the poles and testing the different types of wires to improve the strength and decrease weight.

III. MODELING AND ANALYSIS

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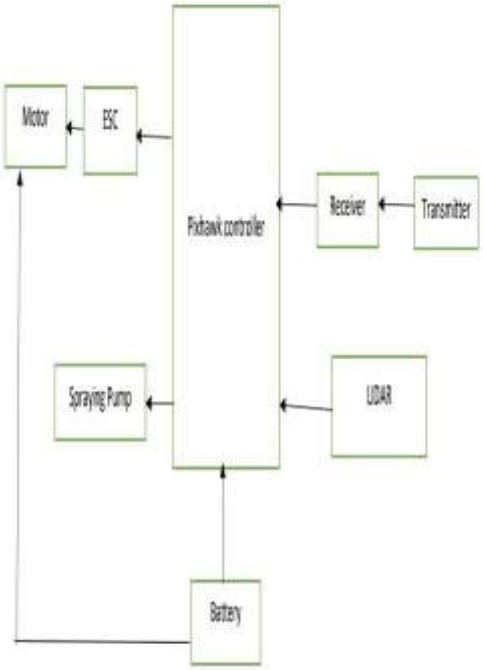

IV. WORKINGPRINCIPLE

- The main aim of this spraying rope way is to solve the current drawbacks of existing systems, it is designed and built to meet the Indian agriculture conditions.
- It is used for spraying the pesticides all over the field in same quantity, by row wise.
- It consists of two poles which are connected using rope, rover is placed on rope for spraying of pesticides from one end of crop to other end.
- A main controller is embedded on top of the rover to control the functions like movement of the rover, pipe rewinder and pump on/off.
- Single transmitter is used to control all the operations like rover movement, gear box control, pipe rewinding etc.
- Receiver is connected to the main controller to receive the commands from the pilot.
- Height of the rover is calculated and adjusted to the user requirement according to the crop.

Pixhawk is an advanced autopilot designed and made in collaboration with Holybro and the PX4 team. It is optimized to run PX4 v1.7 and later, and is suitable for academic and commercial developers.

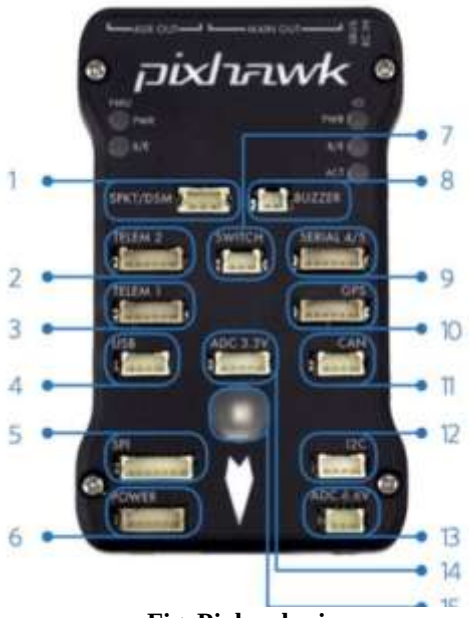

Fig Pixhawk pins

1.Spektrum DSM receiver
2.Telemetry (radio telemetry)
3.Telemetry (on-screen display)
4. USB
5.SPI (serial peripheral interface) bus

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6.Power module
7.Safety switch button
8.Buzzer
9.Serial
10.GPS module
11.CAN (controller area network) bus
12.I2C splitter or compass module
13.Analog to digital converter 6.6V
14.Analog to digital converter 3.3V
15.LED indicator

Specifications

Processor

- 32-bitARMCortexM4corewithFPU
- 168MHz/256KB RAM/2MBFlash
- 32-bitfailsafeco-processor

Sensors

- MPU6000asmainaccelandgyro
- STMicro16-bit gyroscope
- STMicro14-bitaccelerometer/compass(magnetometer)
- MEAS (Measurement Specialties) barometer

Power

- Idealdiodecontrollerwithautomaticfailover
- Servorailhigh-power(7V)andhigh-currentready
- Allperipheraloutputsover-currentprotected,allinputsESDprotected

Interfaces

- 5xUARTserialports,1 high-powercapable,2withHWflowcontrol
- SpectrumDSM/DSM2/DSM-XSatelliteinput
- FutabaS.BUSinput(output notyetimplemented)
- PPMsumsignal
- RSSI(PWM orvoltage) input
- I2C,SPI,2xCAN,USB

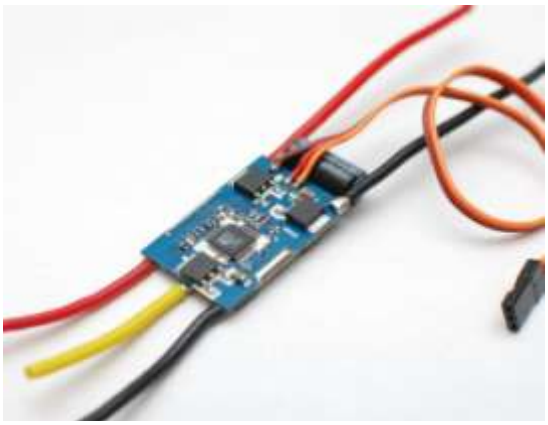
ELECTRONIC SPEED CONTROL

Anelectronicspeedcontrol(ESC)isanelectroniccircuitthatcontrolsandregulatesthespeed of an electric motor. It may also provide reversing of the motor and dynamic braking.Miniature electronic speed controls are used in electrically powered radio controlled models.Full-sizeelectricvehiclesalso havesystemsto control thespeed oftheirdrivemotors.

An electronic speed control follows a speed reference signal (derived from a throttlelever,joystick,orothermanualinput)andvaries theswitchingrateofanetworkof fieldeffecttransistors (FETs). By adjusting the duty cycle or switching frequency of the transistors, thespeedofthemotorischanged.Therapid switching ofthecurrentflowing throughthemotoriswhatcausesthemotoritselftoemitits characteristichigh-pitchedwhine,especiallynoticeableatlower speeds.

Differenttypesofspeedcontrolsarerequiredfor brushedDCmotorsandbrushlessDCmotors. A brushed motor can have its speed controlled by varying the voltage on its armature.(Industrially,motorswithelectromagnetfield windingsinsteadofpermanentmagnetscanalsohave their speed controlled by adjusting the strength of the motor field current.) A brushlessmotorrequiresadifferentoperatingprinciple .Thespeedofthemotorisvariedbyadjustingthetimingof pulses ofcurrent delivered to theseveralwindings of themotor.

Thecorrectphaseofthecurrentfedtothe motorvarieswiththemotorrotation,whichistobetaken into account by the ESC: Usually, back EMF from the motor windings is used to detect thisrotation, but variations exist that use separate magnetic (Hall effect) sensors or optical detectors.Computer-programmable speed controls generally have user-specified options which allow settinglow voltage cut-off limits, timing, acceleration, braking and direction of rotation. Reversing themotor's direction may also be accomplished by switching any two of the three leads from the ESC tothe motor.



A motor converts supplied electrical energy into mechanical energy. Various types ofmotorsareincommonuse.Amongthese,brushlessDCmotors(BLDC)featurehighefficiencyand excellent controllability, and are widely used in many applications. The BLDC motor haspower-savingadvantagesrelative to othermotor types.

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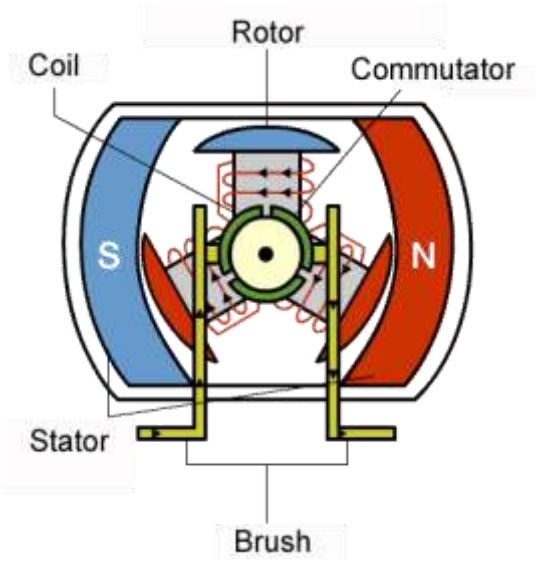

Fig Transmitter and Receiver

Fly Sky CT6B 2.4Ghz 6 Channel Transmitter and Receiver (FS-R6B) Remote is the popular 6 Channel Radio CT6B manufactured by Fly Sky. CT6B FLYSKY 2.4GHZ 6CH TRANSMITTER is an entry level 2.4 GHz radio system offering the reliability of 2.4 GHz signal technology and a receiver with 6 channels. CT6B FLYSKY 2.4GHZ 6CH TRANSMITTER radio is a value for money, entry level 6 channel transmitter, ideal for quadcopters and multi copters that require 6 channel operation. This radio has very lightweight and handy design with two retract switches and proportional flap dials in easy reach for channels 5 and 6. It can be powered by 8 x AA Size Batteries or a 12V Power Supply. It comes with a trainer port to help beginners learn flying. This remote is comes with FS-R6B receiver which is one of the best receiver we had in the class in very reasonable cost. we received many happy and satisfactory feedback from our hobbyist buyers for the same. It can be configured by connecting it to the computer. Use the T6 config software to configure your radio on a computer.

V. RESULTS AND DISCUSSION

Result of objective 1

Fig Input and Output of Sprayer rope way

Result of Objective 2

Fig Synchronized Output

ADVANTAGES

1. Veryefficientsystemonlyconsumes50whperacer
2. Advanced controllersare implementedtomakeituserfriendly
3. Veryeconomicalforfarmerscomparetoitspresent alternatives
4. Highspeed

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APPLICATIONS

1.Usedforsprayingofpesticidesinagriculturefarms

VI. CONCLUSION

In agriculture,a sprayer is a piece of equipment that is used to apply herbicides, pesticides ,and fertilizers on agriculture crops .In spraying , the chemicals to be applied are dissolved or suspended in water and sprayed over the field equally. The sprayer function is to break the liquid into droplets of effective size and distribute them uniformly over the surface.

A pressure regulator controls the pressure and therefore the quantity of spray material delivered by the nozzles, it protects other parts from damage.

All the devices are aligned in a platform and worked together to spray the fertilizers in a systematic or synchronized way.

Hence the project "CONTROLLING VARIOUS PARAMETERS IN AGRICULTURE SPRAYER ROPE WAY" has been successfully designed and tested.

VII. FUTURE SCOPE

The future scope to this project "CONTROLLING VARIOUS PARAMETERS IN AGRICULTURE SPRAYER ROPE WAY" Rope way method of spraying is currently at a prototype stage we want to improve the performance, reliability, cost of the system and make it available to the farmers in a affordable price. In testing phase we are able to complete one acre in 30 minutes as now, we will improve the design and increase speed of the rover to complete acre in 10 minutes. Our vision is to build a system which is cheaper in cost and works efficiently as drone.

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