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WALL PAINT SPRAYER USING UNMANNED AERIAL VEHICLE (UAV)

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Abstract: Painting of the tallest building and critical places are more sophisticated task for human beings. Painting of these places by human is unsafe as well as more time consumption task. There may be a chance for accident on these places. This project proposes UAV operated paint sprayer to overcome these drawbacks. An Unmanned Aerial Vehicle (UAV), which can be remotely controlled or fly autonomously based on pre-programmed flight plans, may be used to make timely and efficient applications over these small area plots. This project developed a low volume spray system for use on a fully autonomous UAV to apply to wall painting. This project discusses the development of the spray system and its integration with the flight control system of a fully autonomous, unmanned vertical take-off and landing Quadcopter.

Introduction: UAV method based on remote-sensing data acquisition,mostly flying critical position in the high buildings . By now, the systems are less weight and the development and to design the small size of the sensors and their operation. Limitations - In the building human being cannot be painted easily. it present more risk –in the tallest building human being need to paint more equipments and time- result mainly from painting in the high building without man power in the platform by using UAV.

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The radiometric quality of the wall painting images is critical in order to enable the application of remote sensing methodologies for a successful estimation of real parameters from remote sensing for wall painting imagery.

1. QUADCOPTER SYSTEM DESCRIPTION

i)Ardupilot

Overview

ArduPilot (also ArduPilotMega - APM) is an open source unmanned aerial vehicle (UAV) platform, able to control autonomous multicopters, fixed-wing

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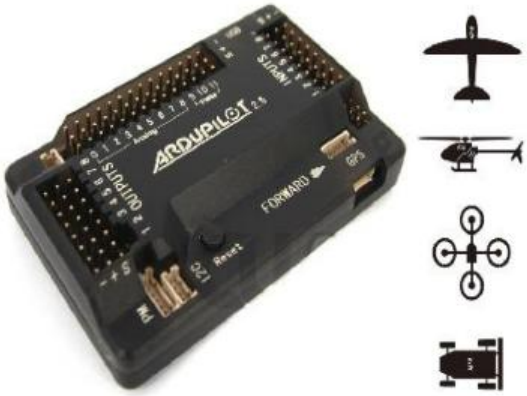
aircraft, traditional helicopters and ground rovers. Ardupilot is an award winning platform that won the 2012 and 2014 UAV Outback Challenge competitions. It was created in 2007 by the DIY Drones community. It is based on the Arduino opensource electronics prototyping platform.

The first Ardupilot version was based on a thermopile, which relies on determining the location of the horizon relative to the aircraft by measuring the difference in temperature between the sky and the ground. Later, the system was improved to replace thermopiles with an Inertial Measurement Unit (IMU) using a combination of accelerometers, gyroscopes and magnetometers. Today, the ArduPilot project has evolved to a range of hardware and software products, including the APM and Pixhawk/PX4 line of autopilots, and the ArduCopter, ArduPlane and ArduRover software projects.



Structure of ARDUPILOT

ii).ESC

An electronic speed control or ESC is an electronic circuit with the purpose to vary an electric motor's speed, its direction and possibly also to act as a dynamic brake. ESCs are often used on electrically powered radio con-trolled models, with the variety most often used for brushless motors essentially providing an electronically

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DIAGRAM OF ESC

iii)BLDC

The motors have an obvious purpose: to spin the propellers. Motors are rated by kilovolts, and the higher the kV rating, the faster the motor spins at a constant voltage. When purchasing motors, most websites will indicate how many amps the ESC to pair it with should be and the size of propeller should use. Brushless DC electric motor (BLDC motors, BL motors) also known as electronically commutated motors

iv).RF Transmitter and Receiver

The radio transmitter and receiver allow to control the quadcopter. An RF Module (Radio Frequency Module) is a usually small electronic circuit used to transmit and/or receive radio signals on one of a number of carrier frequencies. RF Modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required to achieve operation on a specific frequency.

TRANSMITTER

The transmitter is the hand-held controller used to remotely control the craft.

The transmitters have two sticks, two trim buttons or a slider per stick, a number of switches, a display, and a power button. Transmitters and receivers need a frequency range to operate and the new frequency range is 2.4 GHz, with digital spectrum modulation.2.4GHZ is the ISM (Industrial, Scientific & Medical) Radio band which needs no license to operate.

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v)Battery

Quadcopters typically use LiPo batteries which come in a variety of sizes and configurations. Lithium-ion polymer batteries, polymer lithium ion or more commonly Li-Po batteries (abbreviated Li-poly, Li-Pol, LiPo, LIP, PLI or LiP) are rechargeable (secondary cell) batteries. LiPo batteries are usually composed of several identical secondary cells in parallel to increase the discharge current capability, and are often available in series "packs" to increase the total available voltage. Li-poly batteries are also gaining favor in the world of radio-controlled aircraft, radio-controlled cars and large scale model trains, where the advantages of both lower weight and greatly increased run times and power delivery can be sufficient justification for the price. Radio-controlled car batteries are often protected by durable plastic cases to prevent puncture.

The higher the altitude, the lighter the air, the smaller the forces against the frame, which implies the copter's frame, is being stretched. This is what is kept in mind when considering for

the base material for our aircraft. For the project, three materials are possibilities due

to their popularity in the RC World: aluminum, wood, and carbon fiber tubing.

vi)Propeller

It is also main part of the quad copter for flying. A quadcopter has four

propellers, two "normal" propellers that spin counter-clockwise, and two "pusher" propellers that spin clockwise. The pusher propellers will usually be labeled with an 'R' after the size.

vii)Camera and sensors

Because of limited payload and place, UAV´s are handling product with less-weight consumer cameras. They deliver green field images in high quality and resolution, but are often unstable concerning the parameters of inner orientation (IOP). This problem can be solved; while the camera lens is

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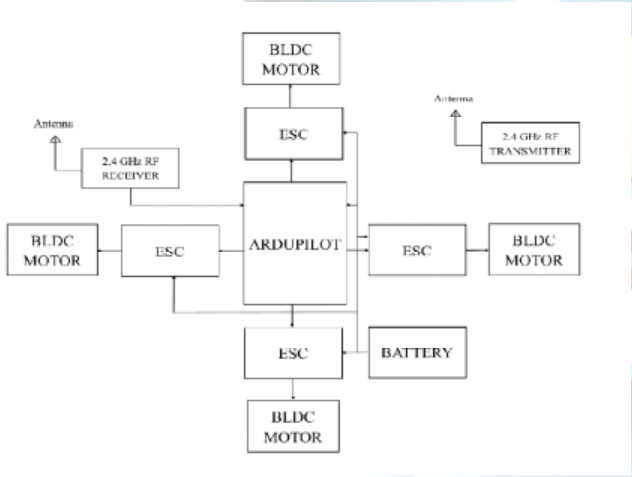
mechanical fixed or a constant focal length is used.

The camera is sensor by the RC and captured the green field images either with interval or at identified places. The green field images are stored on a memory-card and downloaded after the mission. For plants-analyses other sensors,

QUADCOPTER WORKING PRINCIPLE



2. SPRAYER MODULE

i) Sprayer

Sprayer is used for the spray the paint in the tallest building from the tank.The paint controller from the actuator.The Rf receiver and transmitter is important for the spray system

Tank

Tank is used for the store the paint of the spray system. The tank has the storage level of the lavel is 2000gm.It spray the full level of the paint of the system

Nozzle

Nozzle is also important for the sprayer module. This is look like wire of the system. Nozzle has the control from the transmitter and receiver of the tank and sprayer of the module.

3. NAVIGATION SYSTEM

Auto Navigation System

Vehicle piloted UAV´s are navigated with the aid of a small onboard Global Navigation Satellite System/ inertial navigation system unit. The main additives of the navigation unit are gyroscopes for measuring roll, nick and gear angles of the platform, air stress sensor, magnetometer and

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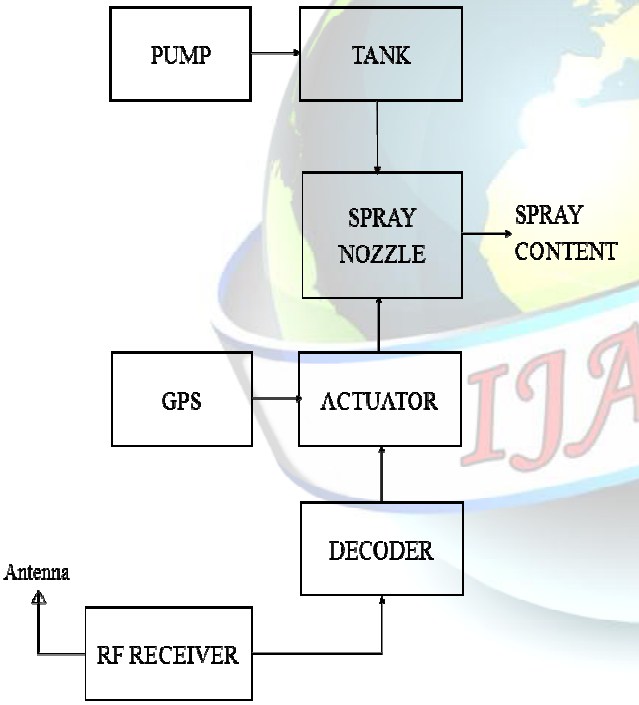
accelerometer. In ground station, the planning of mission is prepared and the path of flight, flying height, velocity and trigger to be defined. The planned mission runs in auto piloted mode, in between we can track the flight and can change the plan of flight. ii)sprayer module controller



CONCLUSION

An wall painting based UAV model created and demonstrated with generation of remote sensing products, COTs thermal and multispectral sensors. Image Detection Techniques were required to capture the Pixel-based field imagery to mapping coordinates. Camera images were geometrical logics and features with responsible intrinsic parameters. The automation of flying position and attitude with longitude real-time information collected from the autopilot connected the generation of automatically with minimum use of ground control points. Motor rotations, spraying pump motor, navigation system and RF transmitter are matched and tested with including precision farming or irrigation scheduling, where time-critical management is required.

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