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Eagle Eye Elevated Temperature screening system

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ABSTRACT: The technological advancement of drones benefited the industrial fields and positively transformed operations by providing real-time data. This allows for the identification and mitigation of mining hazards as they emerge, rapid collection of data in risky locations and the ability to share accurate maps and models with shareholders. In order to better the proposed frameworks integrate digital imaging object behind the wall using drone, image processing and data acquisition procedures for crack detection and assessment of surface degradation. A novel approach is proposed combining hat transform and Hue, Saturation & Value (HSV) three holding technique for crack detection. A Demonstration multi-rotor Unmanned Aerial Vehicles (UAV) model is developed to carry out full field inspection of civil structures and real time testing is performed in our large university campus. The system consists of several components for necessary sensor input, a radio Transmitter, Windows user interface and an Arduino microcontroller. All altering of signals, estimation of system states, calculation of control inputs and communication handling is done on the microcontroller, while the Windows application allows the user to command various actions.
Furthermore, the current applications and future potential of drones in the industrial fields are discussed.

KEYWORD: UAV(unmanned aerial vehicle), Thermal sensor,Arduino-uno,Image processing algorithm, Computer vision and machine learning.

I. INTRODUCTION

The sustainability of civil infrastructures can be achieved by periodic and continuous assessment that necessitates easy and effective digital imaging behind the wall using drone and also effective in Structural Health Monitoring (SHM) tools and techniques. As is readily acknowledged by the global fraternity, the field of SHM represents an integrated paradigm of networked sensing and actuation, data interrogation and statistical assessment that helps to assess structural health. SHM practices are integral to functional safety of critical civil structures during the designated life spans and beyond. Especially, in the case of large span bridges, heritage structures, monuments and elevated buildings of national importance, traditional methods are not effective for rapid full-field monitoring with of the drone and hence a radical monitoring approach is most needed.

A Drone, also called a quad copter, is a multicolor helicopter that is lifted and propelled by four rotors. Most helicopters, quad copters use two sets of identical fixed pitched propellers; two clockwise (CW) and two counter-clockwise (CCW). These use variation of RPM to control lift and torque. Control of vehicle motion is achieved by altering the rotation rate of one or more rotor discs, thereby changing its torque load and thrust/lift characteristics by using a microcontroller.

In recent years, by virtue of low-weight high strength materials, versatile sensors, microelectronics, portable powerful computing systems and miniature propulsion systems, UAVs are gaining prominence in several sectors such as environmental monitoring, precision agriculture, industrial inspection, power line and telecom tower inspection, surveillance and exploration activities. The employment of UAVs in SHM of bridges and other civil structures are exceptional and practical feasibilities are still under research. The deployment of UAVs for civil infrastructure monitoring is new arena and very few practical case studies are carried out for industries, monuments and other civil structures. In most applications, UAVs are equipped with image acquisition system and the captured data are processed manually. Though this strategy is convenient, there is laborious work involved in

quantifying and analyzing the acquired data in a reliable way.

We design and implement a complete experimental tested that enables two octo-copters to properly localize, navigate, and collect wireless measurements. We then present 3D through-wall imaging of unknown areas using our test bed. Our results confirm that high-quality through-wall imaging of challenging areas, such as behind thick brick walls, is possible with only Wi-Fi RSSI measurements and UAVs. To the best of our knowledge, our 3D imaging results showcase high-quality imaging of more complex areas than what has been reported in the literature with even phase and/or UWB signals.

III. LITERATURE SURVEY

Y. Zeng, R. Zhang, and T. J. Limthe authors provide an overview of UAV-aided wireless communications by introducing the basic networking architecture and main channel characteristics. They also highlight the key design considerations as well as the new opportunities to be explored.L. Gupta, R. Jain, and G. Vaszkun, "Survey of important issues in UAV communication networks," The authors attempt to focus on research in the areas of routing, seamless handover and energy efficiency. First, they distinguish between infrastructure and ad-hoc UAV networks, application areas in which UAVs act as servers or as clients, star or mesh UAV networks and whether the deployment is hardened against delays and disruptions. Then, they focus on the main issues of routing, seamless handover and energy efficiency in UAV networks.

S. Hayat, E. Yanmaz, and R. Muzaffar, "Survey on Unmanned Aerial Vehicle Networks for Civil Applications, UAVs can be used in many civil applications due to their ease of deployment, low maintenance cost, high-mobility and ability to hover [3]. Such vehicles are being utilized for real-time monitoring of road traffic, providing wireless coverage, remote sensing, search and rescue operations, delivery of goods, security and surveillance, precision agriculture, and civil infrastructure inspection.

Herrick, Katrina, Development of the Unmanned Aerial Vehicle Market: Forecasts and Trends, Air and Space Europe. The rise in the procurement of military UAVs by defense forces worldwide is one of the most significant factors projected to drive the growth of the UAV market. The increasing use of UAVs in various commercial applications, such as monitoring, surveying & mapping, precision agriculture, aerial remote sensing, and product delivery, is also contributing to the growth of the UAV market. Developments in field of computer vision and machine learning are expected to provide UAVs with capabilities to become autonomous collectors of data along with the ability to carry multiple payloads making it an important weapon for defense forces in near future.

S. R. Herwitz.et.al in this paper, we propose a novel strategy integrating UAVs with image acquisition and processing algorithm for inspecting extensive infrastructures in an effective way. The measuring instruments are mounted on UAVs to transmit information in real time thereby facilitating inspection from ground station. Along with that, real time interfacing with image processing systems can support processing of thousands of images which can expedite the diagnosis process significantly. The noteworthy benefit is, digitization of whole monitoring activity has widened the scope for easy storage, sharing and better accessibility to end user.

IV.PROJECT OBJECTIVE

Through Wall Imaging concepts, Wall and Scatterer modeling,electromagnetic wave propagation through any given media and Digital Beam forming. To also understanding techniques for wall, clutter, phase, velocity, motion and reflection compensation.To arrive at an appropriate functional block diagram for Through Wall Imaging and Digital Beam forming.2D USM Antenna array with beam steering to scan a 3D space and obtain the radiation pattern.To model the input to the Wall and the Scatters (stationary & moving) behind the wall.To obtain and analyze electromagnetic fields pattern along the path of transmitter-wall and back to the receiver.To develop high an image of behind the wall scenarios using the received signals.

V. PROPOSED METHODOLOGY

An open-source microcontroller board based on the microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the ArduinoIDE (Integrated Development Environment), via type B

It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts digital I/O Pins: 14 (of which 6 can provide PWM output).

Having a top-quality drone gimbal is essential to capturing great aerial film, photography, 3D

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mapping, lidar, photogrammetry and other sensor driven imagery.

For drones to be widely used across different sectors, it is essential that UAV gimbal stabilization technology keeps in line with drone innovation. This is very much the case so far. Here is a quick overview of the design and workings of a drone gimbal, including the gimbal components. With this knowledge you will be able to choose the best drone gimbal for your aerial cinematography.

When space and weight requirements are tight, the LIDAR-Lite v3 soars. The LIDAR-Lite v3 is the ideal solution for drone, robot or unmanned vehicle applications.

This easy-to-use 40-meter laser-based optical ranging sensor has all the core features that made the LIDAR-Lite v2 so popular. Small in form and light in weight with low power consumption of less than 130mA during an acquisition. And its user-configurable so you can adjust between accuracy, operating range and measurement time

Point-and-click waypoint/fence/rally point entry, using Google Maps/Bing/Open street maps/Custom WMS.Select mission commands from drop-down menusDownload mission log files and analyze themConfigure autopilot settings for your vehicleInterface with a PC flight simulator to create a full software-in-the-loop (SITL) UAV simulatorRun its own SITL simulation of many frames' types for all.Buy a diverse range of Quad copter Flight Controller on Robe. Our quality flight controllers are affordable & necessity for any drone enthusiast. The number of flight controller for FPV drone can be overwhelming for beginners. Choosing a FC is a tedious task, let leave it up to us and enjoy your flight. Our main intend is always to provide rapidly evolving becoming smaller, with more features integrated. The FC is the brain of the aircraft. It's a circuit board with a range of sensors that detect movement of the drone, as well as user commands. Using this data, it then controls the speed of the motors to make the craft move as instructed.

VI. BLOCK DIAGRAM

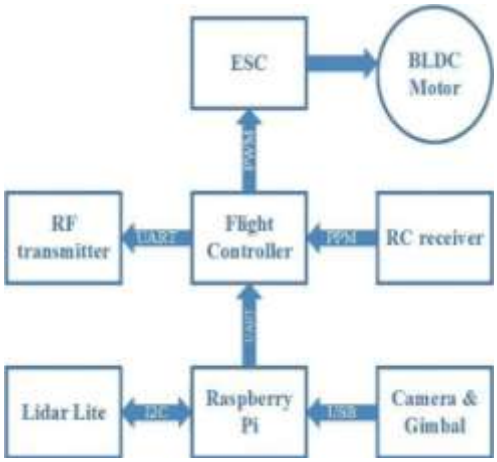

Figure 1 Block diagram of Drone with thermal Camera

VII. HARDWARE& SOFTWARE DESCRIPTION

Pixhawk 2.4.8 PX4 32 Bit Flight Controller-Trees HmfS550 F550, Helicopter**,** Motors and propellers.Electric Speed, Controller. (ESC), Transmitter andReceiver,Battery. Power module & Lipo Balance charger Arduino UnoRaspberry Pi camera (or)MLX90640 & ESP32, TFT Display IL19341 Driver, Raspberry Pi 2 Model, Wires, Batteries, Pin headers, MissionPlanner, ArduinoIDE**,** MATLABGraphical, User, Interface, (GUI)**,** OpenCV**,** Raspbian**,** DroneDeploy**,** GlobalMapped.

VIII. APPLICATION

Power Engineering, FlatRoofs, Photovoltaic Power Plants, Cereal Cultivation and Phenotyping, Water Stress Detection,Fakel Burner Inspection, Security Application and UAV Surveillance, Pipeline Inspection ,Building envelope inspections and energy losses in buildings, Gas Leak Visualization Digital infrared thermal imaging in health care.Research,Digital Infrared Thermal Imaging (DIT) is a diagnostic technique that is non-invasive and involves no exposure to radiation Early detection of breast cance

IX RESULT AND CONCLUSION

Results:

Commercial-grade UAVs handled by professional operators provide closer, higher-resolution imagery than ground-based alternatives and are also significantly quicker. UAVs are able to fly at an optimum distance from the structure, usually from 3 to 10m, and can circle around it to cover the whole surface area. This data can then be

used in conjunction with photogrammetry software and used to build a three-dimensional model of the blade, delivering a level of accuracy and detail that is hard to achieve with manual methods. When and if repairs are needed, the team knows the exact location on the turbine. Because it is GPS enabled, it also points to the repair's exact location.

CONCLUSION:

Digital imaging of object behind steel wall using drone improve the user experience of information access and interaction. We learned important soldering & mechanical Balancing, Motors Frame, Design and electric system fabrication skills including making a power harness and digital to analog motor control, This project majorly finds its use in military and defense for surveillance at the border as a part of border security force and can reduce the loss of human lives by intimating the soldiers about the target. All altering of signals, estimation of system states, calculation of control inputs and communication handling is done on the microcontroller, while the Windows application allows the user to command various actions.

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