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Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

IOT-Based Micro Quad Copter Drone

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ABSTRACT: Drones or mini-unmanned aerial vehicles, have becoming an emerging trend due to their boundless applications in surveillance, military and numerous public services. Nowadays, deployment of surveillance drone for monitoring or security application remains challenging and ongoing research. As Internet of Things (IoT) becomes more commercialized, various concept of IoT have been integrated with the drones due to efficient usage. Therefore, this paper proposed the development of surveillance drone system based on IoT for industrial monitoring-security applications.

KEYWORDS: Quadcopter, design, application, control

I. INTRODUCTION

The convergence of Internet of Things (IoT) technology with unmanned aerial vehicles (UAVs), commonly known as drones, has revolutionized numerous industries by enabling real-time data collection, analysis, and decision-making in diverse environments. This introduction provides an overview of IoT-based drones, their applications, and the synergies created by integrating IoT with other emerging technologies.

1. IoT-Based Drones:
IoT-based drones combine the capabilities of UAVs with IoT sensors, communication systems, and data analytics platforms to create intelligent and connected aerial systems.
These drones are equipped with various sensors such as cameras, LiDAR, thermal imaging, and environmental sensors to collect data on physical surroundings, environmental conditions, and infrastructure.
Through wireless connectivity, IoT-enabled drones transmit collected data to cloud-based or edge computing platforms for real-time analysis, storage, and visualization.
Advanced algorithms and machine learning techniques are employed to process and interpret the collected data, enabling actionable insights and informed decision-making.

2. Applications:
Environmental monitoring and conservation: IoT-based drones are deployed for monitoring ecosystems, wildlife populations, and natural disasters, providing valuable insights for conservation efforts and disaster response.
Precision agriculture: Drones equipped with IoT sensors monitor crop health, soil moisture levels, and environmental conditions, enabling farmers to optimize irrigation, fertilization, and pest management practices.
Infrastructure inspection and maintenance: Drones equipped with cameras and sensors inspect critical infrastructure such as bridges, pipelines, and power lines, detecting defects, corrosion, and other anomalies.
Public safety and emergency response: IoT-enabled drones assist first responders in search and rescue missions, firefighting operations, and disaster assessment by providing aerial reconnaissance and situational awareness.
Smart cities and urban planning: Drones equipped with IoT sensors capture aerial imagery and collect data on traffic patterns, air quality, and noise pollution, supporting urban planning and infrastructure development initiatives.

3. Synergies with Other Technologies:
IoT-based drones leverage synergies with other emerging technologies such as:
Artificial Intelligence (AI) and machine learning: Enable autonomous navigation, object detection, and data analysis to extract meaningful insights from sensor data.
5G connectivity: Facilitate high-speed data transmission and low-latency communication between drones and ground-based systems, enhancing real-time responsiveness and scalability.
Edge computing: Process and analyze data locally onboard drones or at the network edge, reducing latency and bandwidth requirements for time-critical applications.

In conclusion, IoT-based drones represent a transformative technology with wide-ranging applications across industries, from agriculture and environmental monitoring to public safety and urban planning. By harnessing the power of IoT and integrating with other cutting-edge technologies, these drones are poised to drive innovation and address complex challenges in the digital era.

II. PROPOSED SYSTEM

We have designed Micro Quadcopter Low cost Wizfi360-EVB-PICO based Drone which allows this drone to be controlled by an APP over a Wi-Fi network.
This drone comes with simple structured hardware and more stable.

III. PROJECT IMPLEMENTATION

EVB-PICO based micro controller with helping to evaluate the connection and further process. It allows devices to connect to the internet and exchange data wirelessly. The provides the processing power and interfaces necessary to control and interact with peripherals and sensors. It's using to implementing the hardware setup and software development. The lithium – polymer battery(lipo) it is used give the power supply in the all the devices.
Specifically, LIPO 3.7 Battery used and this is lightweight and high energy density. The MT3608 boost converter is used to stepping up the input voltage overall the devices. It's first of all connecting to the battery, Then the connecting the output to microcontroller give to the power supply.

The MPU6050 sensor is 6-axis combine of accelerometer and gyroscope used to stable or maintenance helping to the drone and connection establising between motor and microcontroller
directly give the power supply to the parellel connecting between the brushless motor and diode then connecting to the Elctronic Speed Controller(MOSFET).The microcontroller of four input pins give to the MOSFET gate terminal and then drain terminal connecting to the brushless DC Motor and each of them, then diode fixing between source and body terminal fix the GND.

We are using software side arduino ide and developing the application and main purpose is control the direction connecting between android phone and drone.

IV. HARDWARE DESCRIPTION

WizFi360-EVB:

The WizFi360-EVB Pico is a compact evaluation board designed for the WizFi360 module, which is a low-power, compact-sized Wi-Fi module with built-in TCP/IP network stacks. The WizFi360-EVB Pico provides a convenient platform for developers to evaluate and prototype Wi-Fi connectivity solutions quickly. It features various interfaces such as UART, SPI, and I2C, making it versatile for different applications. The small form factor of the Pico board makes it suitable for embedded systems and IoT (Internet of Things) projects where space is limited.

MPU6050 sensor:

The MPU6050 sensor is a popular inertial measurement unit (IMU) that combines a 3-axis gyroscope and a 3-axis accelerometer in a single chip. It is commonly used in motion tracking, orientation estimation, and gesture recognition applications. The MPU6050 provides accurate motion sensing capabilities and communicates with microcontrollers via I2C or SPI interfaces. It is widely used in robotics, drones, gaming controllers, wearable devices, and other motion-sensitive applications due to its small size, low power consumption, and ease of integration.

MOSFET(ESC):

A Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET) is a type of transistor commonly used in electronic speed controllers (ESCs) for controlling the speed of electric motors. MOSFETs are semiconductor devices that can switch or amplify electronic signals, making them ideal for power control applications like ESCs. In an ESC, MOSFETs act as switches to regulate the power delivered to the motor based on the control signal from the user or a

microcontroller. By adjusting the switching frequency and duty cycle of the MOSFETs, ESCs can precisely control the speed and direction of motors in various applications such as drones, RC vehicles, electric bikes, and industrial machinery. MOSFETs are preferred for ESCs due to their high efficiency, fast switching speed, and ability to handle high currents and voltages.

Brushless DC (BLDC) motor:

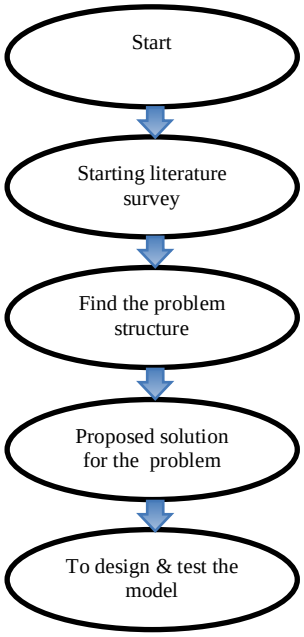
A Brushless DC (BLDC) motor is an electric motor that operates using direct current (DC) but does not use brushes to control the commutation of the motor windings. Instead, it relies on electronic controllers to manage the switching of the motor phases, making it more efficient, reliable, and quieter compared to brushed DC motors. BLDC motors are commonly used in various applications such as drones, RC vehicles, electric vehicles, industrial machinery, and household appliances due to their high power density, smooth operation, and precise speed control capabilities. They are known for their higher efficiency, longer lifespan, and lower maintenance requirements compared to brushed motors, making them a popular choice for many modern motorized systems.

V. SOFTWARE DISCRIPTION

Arduino IDE:

The Arduino Integrated Development Environment (IDE) is a software platform used for programming Arduino microcontroller boards. It provides a user-friendly interface for writing, compiling, and uploading code to Arduino boards. The IDE includes a text editor with syntax highlighting, a compiler, and a bootloader to upload code to the Arduino board via USB or other communication interfaces. It supports the Arduino programming language, which is based on C and C++, making it accessible to beginners and experienced developers alike. The Arduino IDE simplifies the process of creating projects with Arduino boards, making it a popular choice for hobbyists, students, and professionals working on embedded systems and IoT (Internet of Things) projects.

VI. FLOW CHART



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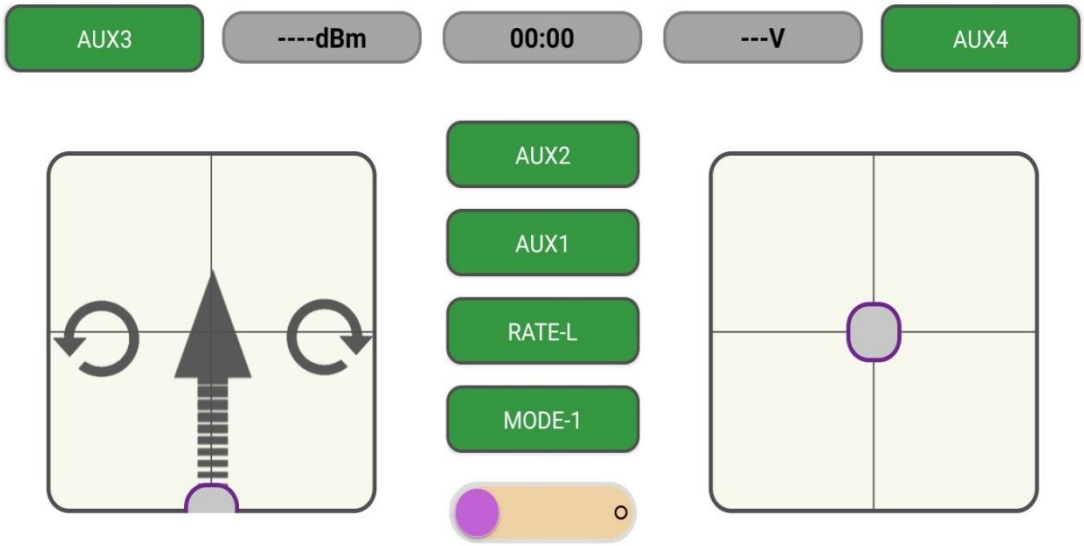
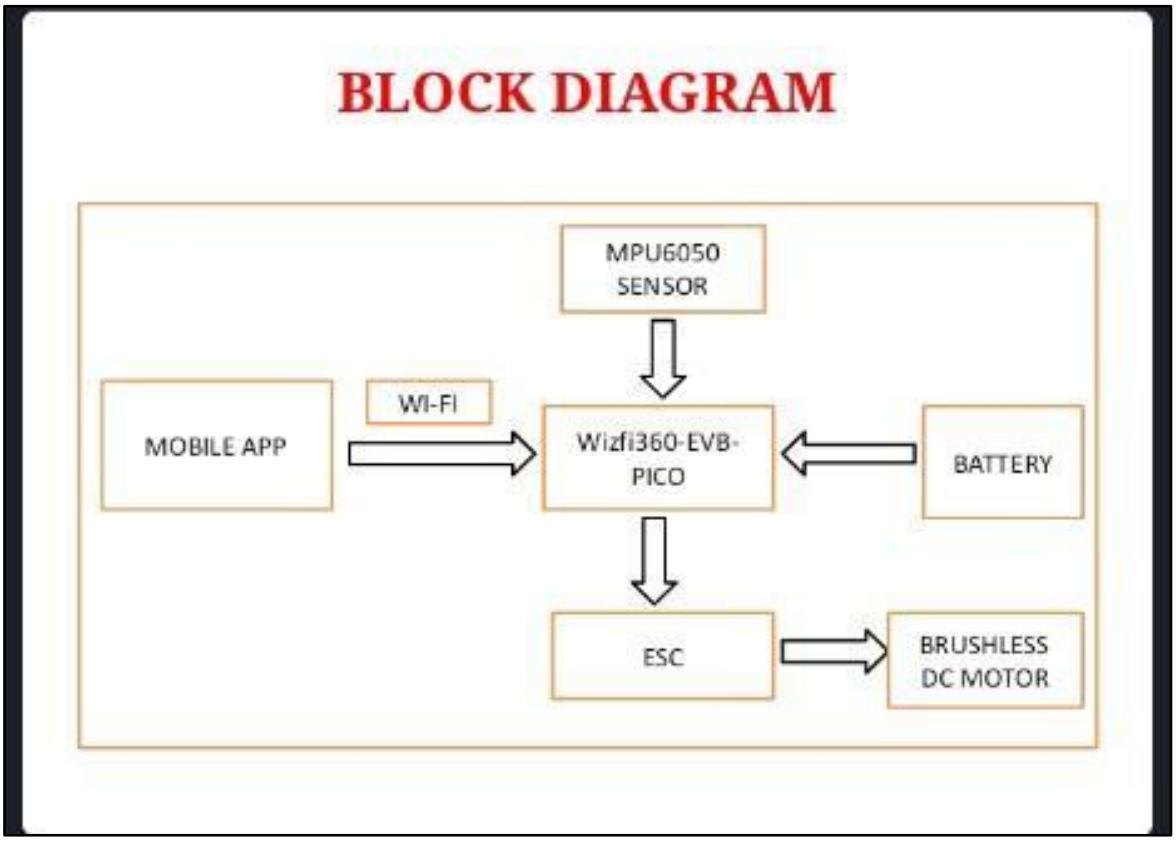
ANDROID DRONE CONTROLLER APP





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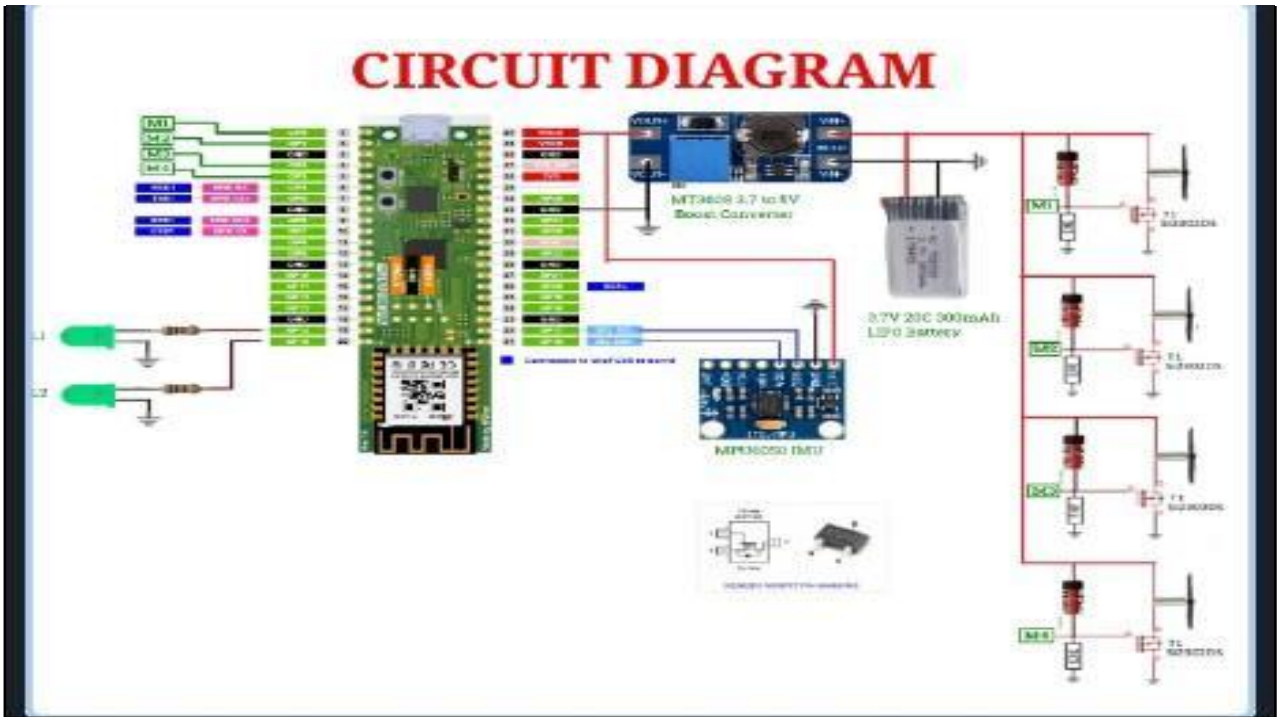

VII. CONCLUSION

This paper has presented the development surveillance drone system based on Internet of Things (IoT).The proposed system consists of the integration of mechanical, electrical and electronic interfacing and mobile application software system. Based on the results obtained, the drone system shows a promising flying distance with camera acts as the "eye" of the drone to perform the surveillance task. Thus, in this research the surveillance drone system based Internet of Things (Io) platform able to improve the security system especially in the industrial area. Surveillance drone based IoT able to provide coverage view better than traditional surveillance camera. However, further studies should be conducted on the proposed system to increase the robustness as well as enhancing real-time application using surveillance drone system based IoT.

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