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# Bluetooth Drone

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**Abstract***: The drone is an electronic device used for live streaming and image collection. It is controlled by a KK2.1.5 board and can achieve vertical flight with stability. As technology advances, it becomes more affordable, allowing the public to design their own drones. The drone consists of a frame, flight control board, motors, electronic speed controllers, transmitter, receiver, Lippo battery, and camera. Drones offer significant advantages in terms of cost efficiency, accessibility, and time-saving, especially in situations where human intervention would be costly or dangerous. Ongoing advancements in drone technology, such as improved battery life, autonomous navigation, and swarm capabilities, are expected to further enhance their capabilities and integration into everyday life. The future of drones promises even greater potential in transforming industries like logistics, emergency response, and environmental monitoring.*

**Keywords:** drone

## I. INTRODUCTION

Drones are Bluetooth -controlled aircraft used for vertical flight, live streaming, and image capture. As technology advances, drones become more versatile and cost-effective, allowing the public to design their own drones. This project focuses on live streaming and image collection, as there is a growing demand for drones with diverse capabilities for civilian and military applications. The development of novel drones that can autonomously fly in different environments and perform missions has led to the invention of various types of drones with different sizes and weights. This review paper selects a ready-designed conceptual drone, including a frame, flight control board, motors, electronic speed controllers, transmitter, receiver, Lippo battery, and camera interfaced with the kit. The drone has been tested and verified, with tuning and calibration of the PID controller for stabilization on each axis. The drone is now stable and capable of capturing images, achieving the project's goal.

## II. LITERATURE SURVEY

Bluetooth drones, controlled through Bluetooth technology, are becoming popular among hobbyists and researchers in areas like entertainment, education, and robotics. They offer benefits such as low power use, easy integration, and connection with many devices like smartphones and tablets. However, they face challenges, including limited range and lower data rates. This survey reviews the growth, uses, technological progress, challenges, and future possibilities for Bluetooth-controlled drones. These drones, a type of UAV, typically use Bluetooth Low Energy (BLE) or Bluetooth Classic to communicate with devices. They are characterized by low latency, low power consumption, and affordability, making them suitable for smaller, hobbyist models. Due to their short-range communication, they are mostly used in educational contexts, entertainment, or as research prototypes. Often marketed as toys, these drones are user-friendly and ideal for beginners. Liu et al. (2014) discussed how Bluetooth allows smartphone control of drones, improving user interaction and engagement. Key findings show their popularity for recreational flying and aerial photography.

## III. METHODS

The working of a Bluetooth-controlled drone involves several key components and systems that interact with each other to ensure smooth operation. The project focuses on enhancing the drone's communication range, flight stability, power efficiency, data throughput, and security by leveraging Bluetooth technology. The Bluetooth drone typically operates by establishing a communication link between the drone and the user's device (usually a smartphone, tablet, or dedicated Bluetooth controller). Below is a detailed explanation of the working principle of the Bluetooth drone, including the key components, their functions, and how they interact to achieve the desired results.

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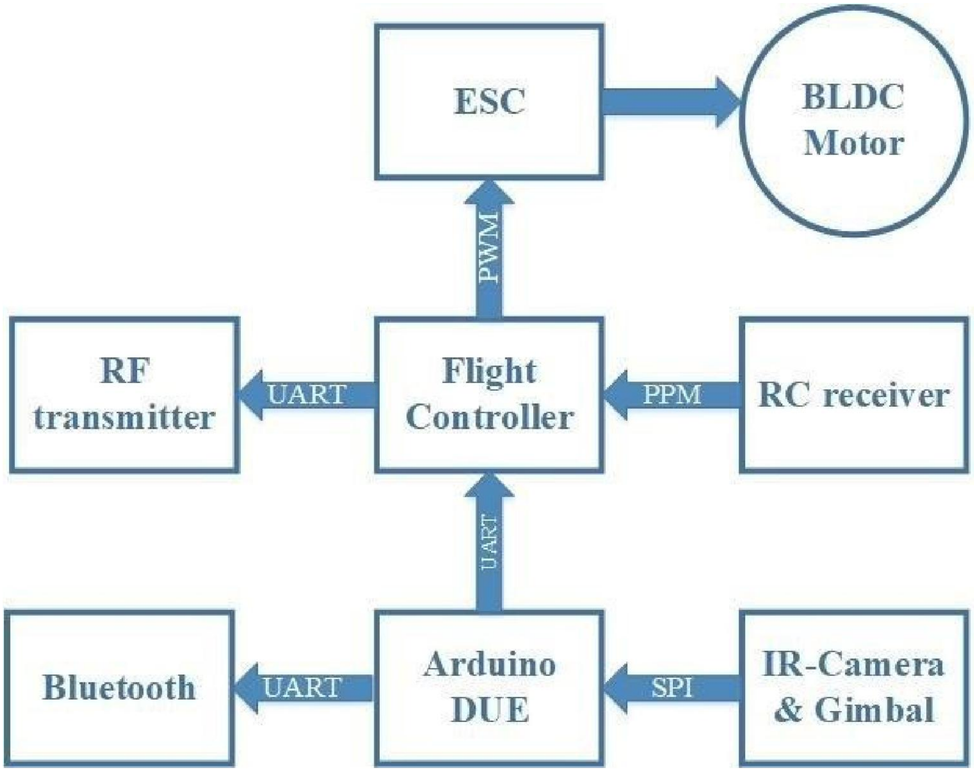
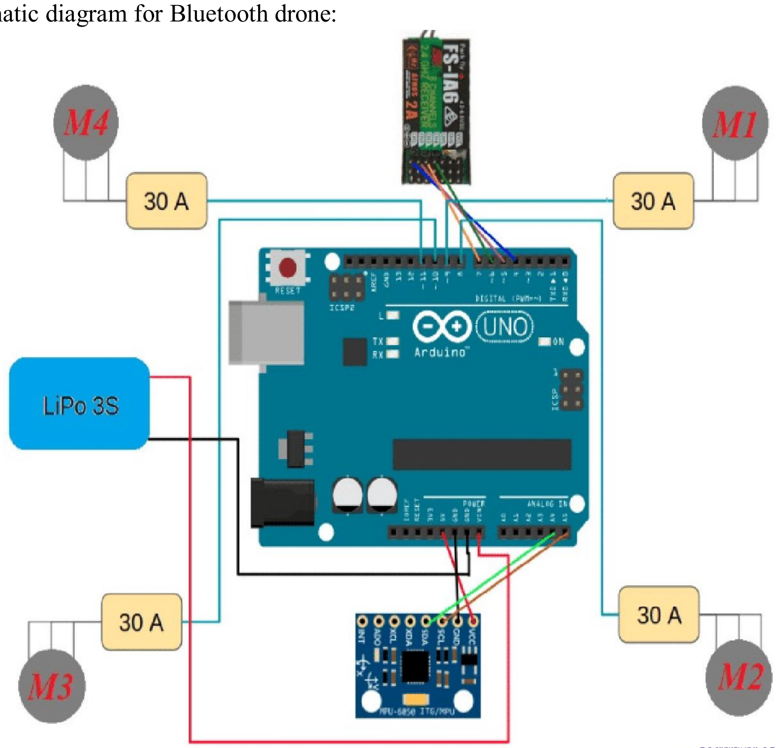



BLOCK DIAGRAM

Following is the schematic diagram for Bluetooth drone:




SCHEMATIC DIAGRAM

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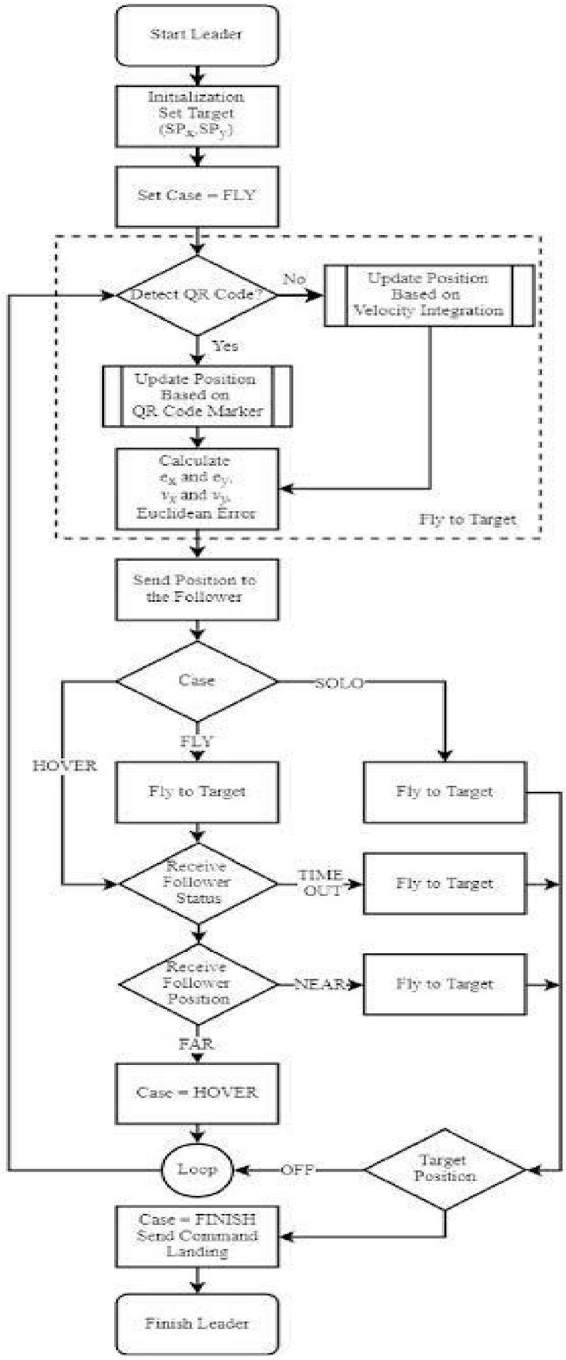
FLOWCHART:




**ALGORITHM:**

```
#include <SPI.h> #include <nRF24L01.h> #include <RF24.h>
/*Create a unique pipe out. The receiver has to wear the same unique code*/
const uint64_t pipeOut = 0xE8E8F0F0E1LL; //IMPORTANT: The same as in the receiver!!!
RF24 radio (7, 8);
```

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```
// The sizeof this struct should not exceed 32 bytes
// This gives us up to 32 8 bits channals struct MyData {
byte throttle; byte yaw; byte pitch; byte roll; byte AUX1; byte AUX2;
};
MyData data;
void resetData()
{
//This are the start values of each channal
// Throttle is 0 in order to stop the motors
//127 is the middle value of the 10ADC.
data.throttle = 0;
data.yaw = 127;
data.pitch = 127;
data.roll = 127;
data.AUX1 = 0;
data.AUX2 = 0;
}
void setup()
{
//Start everything up radio.begin(); radio.setAutoAck(false);
radio.setDataRate(RF24_250KBPS); radio.openWritingPipe(pipeOut); resetData();
}
//
// Returns a corrected value for a joystick position that takes into account
// the values of the outer extents and the middle of the joystick range.
int mapJoystickValues(int val, int lower, int middle, int upper, bool reverse)
{
val = constrain(val, lower, upper);
if ( val < middle )
val = map(val, lower, middle, 0, 128); else
val = map(val, middle, upper, 128, 255); return ( reverse ? 255 - val : val );
}
void loop()
{
// The calibration numbers used here should be measured
// for your joysticks till they send the correct values.
data.throttle = mapJoystickValues( analogRead(A1), 13, 524, 1015, true );
data.yaw = mapJoystickValues( analogRead(A0),  1, 505, 1020, true );
data.pitch    = mapJoystickValues( analogRead(A3), 12, 544, 1021, true );
data.roll  = mapJoystickValues( analogRead(A2), 34, 522, 1020, true ); data.AUX1= digitalRead(4);
data.AUX2          = digitalRead(2);
radio.write(&data,  sizeof(MyData));
}
```

## IV. CONCLUSION

The Bluetooth-controlled drone using Arduino represents an accessible and versatile project that integrates wireless communication with robotics. The conclusions drawn from such a project typically include:



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1. Effective Wireless Control: The use of Bluetooth for communication provides a reliable and simple way to control the drone. Bluetooth modules like HC-05 or HC-06 paired with an Arduino can offer a seamless connection for remote control.
2. Cost-Effectiveness: Arduino is a low-cost and widely available microcontroller platform, which makes it an excellent choice for hobbyists and those new to robotics and drone technology. The integration of Bluetooth modules with Arduino significantly reduces the overall cost of building a drone.
3. Learning and Development: Building a Bluetooth-controlled drone with Arduino provides a great learning experience in areas like electronics, programming, and wireless communication. It helps in understanding the fundamentals of drone flight control, sensor integration, and Arduino programming.
4. Flight Stability and Control: The basic flight controls can be implemented through Bluetooth, but challenges such as flight stability, responsiveness, and battery management can become evident as the drone's complexity increases. Fine-tuning these aspects is essential for smoother flight control.
5. Limitations: The range of Bluetooth control can be limited compared to other wireless technologies like Wi-Fi or RF, which may impact the drone's range of operation. Bluetooth-based control systems may not support high-speed or long-distance communication.

## REFERENCES

Here are some references that can help you further explore the topic of Bluetooth-controlled drones using Arduino and their future scope:

1. Books and Tutorials:
   - Arduino Robotics by John-David Warren, Josh Adams, and Harald Molle. This book offers a comprehensive guide to building robotics projects with Arduino, including drones.
   - Programming Arduino: Getting Started with Sketches by Simon Monk. This book provides a good introduction to Arduino programming and working with Bluetooth modules.
   - Arduino Drone by Syed Omar Faruk Towaha. This book provides insights into building drones with Arduino and the necessary components, including wireless communication.

2. Research Papers:
   - "Design and Development of a Bluetooth Controlled Drone" by various researchers in journals or conference proceedings focusing on drone technology, wireless communication, and Arduino-based applications.
   - IEEE Xplore: https://ieeexplore.ieee.org/ - A database for academic papers and articles on drone technologies, including Bluetooth communication, microcontrollers, and autonomous drone control systems.

3. Forums and Communities:
   - Arduino Forum: https://forum.arduino.cc/ - The Arduino community forum has many discussions on drones and Bluetooth projects, where you can get advice and feedback.
   - RC Groups: https://www.rcgroups.com/ - A community dedicated to RC (radio control) and drone enthusiasts, with various discussions and guides on Bluetooth drones.
   - Stack Overflow: https://stackoverflow.com/ - For more technical or programming-related questions about Arduino and Bluetooth implementation, Stack Overflow is a valuable resource.

4. YouTube Channels:
   - Drone Bot Workshop: Drone Bot Workshop YouTube - A channel that provides tutorials on Arduino and robotics, including drone projects.
   - Great Scott! Great Scott! YouTube - This channel focuses on electronics projects, and you can find related drone and Arduino content here.
   - Paul McWhorter: Paul McWhorter YouTube - A channel with many beginner-level Arduino tutorials, including drone-related projects.