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**DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING**

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## KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

### **Military Grade FPV Drone for enemy Recognition**

PROJECT PROPOSAL REFERENCE NO: 46S\_BE\_3990

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# CHAPTER 1.0

## INTRODUCTION AND OVERVIEW OF THE PROJECT

Unmanned aerial vehicles (UAVs) with cameras that can wirelessly send video feed to displays such as goggles, headsets, mobile devices, and other displays are known as FPV drones.

The user can record video or still photographs while having a first-person perspective of the drone's surroundings.

FPV drones can be remotely piloted or set up to fly on their own using flight plans that are controlled by software and make use of data from onboard sensors and GPS.

An FPV drone seems to the user to be similar to a flying telepresence robot, enabling virtual presence anywhere the device is capable of flight, frequently in places where a person could not safely enter physically.

Personal drones can enter tighter locations and withstand harsher circumstances than humans can, in addition to being able to fly.

A military-grade FPV (First Person View) drone is a specialized unmanned aerial vehicle (UAV) designed and built specifically for military applications. These drones are equipped with advanced features and technologies to enhance their performance and enable military personnel to gather critical intelligence, perform reconnaissance missions, and carry out various tasks on the battlefield.

Military-grade FPV drones are constructed with robust materials and feature ruggedized designs to withstand harsh environments and potential damage. They are built for durability and resilience, allowing them to operate effectively in challenging conditions.

One of the key features of these drones is their long-range capabilities. Military FPV drones can cover extensive distances, often using advanced communication systems such as satellite links to maintain a stable connection with the operator. This enables military personnel to deploy and control the drone from a safe location while still having real-time access to the drone's video feed.

These drones also have a high payload capacity, enabling them to carry advanced cameras, sensors, and even weapon systems. They are designed to gather high-quality imagery and provide enhanced surveillance capabilities. The cameras incorporated in military-grade FPV drones may include high-resolution cameras, infrared cameras for night vision, or specialized sensors for specific purposes, such as target acquisition or monitoring enemy movements.

To ensure the security of sensitive information, military FPV drones often employ encryption protocols to protect data transmission and prevent unauthorized access. These security measures are crucial, particularly when the drone is used for intelligence gathering or transmitting classified information.

Additionally, some military FPV drones have autonomous capabilities and advanced mission planning systems. They can execute pre-programmed missions or perform specific tasks without constant operator control. This autonomy allows the drone to operate independently, making it useful for complex operations or maintaining a persistent presence in a specific area.

It's important to recognize that military-grade FPV drones are typically subject to strict regulations and export/import restrictions due to their potential for military application. The development and use of these drones are primarily for military purposes, and their availability to civilians may be limited or restricted.

## **CHAPTER 2.0**

### **PROBLEM STATEMENT**

Soldiers are trained to protect our country, But during the high risk period and situations it becomes highly impossible and difficult to have an eye on enemy's activity also sometimes its tough to identify the enemy itself in harsh conditions when certain trespassers cross the borders illegally. So with the advancement in science and technology this problem can be solved by surveillance with a Military grade FPV drone.

## CHAPTER 3.0

### PROJECT OBJECTIVES AND SCOPE.

A drone can do surveillance operations by spending a lot of time hovering over a specific region. Drones are used for Assessment and Supervision to find the position of our soldiers and for communication

Evaluation and analysis of adversary movement

Drones can provide vital information on the movements, locations, and positions of strategic targets for command and control.

**Enhanced Situational Awareness:** One of the primary objectives of a military-grade FPV drone is to provide military personnel with real-time, high-quality video feed from the drone's camera. This enables operators to have an immersive and up-to-date understanding of the battlefield or operational environment, enhancing situational awareness.

**Intelligence, Surveillance, and Reconnaissance (ISR):** Military FPV drones are often used for intelligence gathering, surveillance, and reconnaissance missions. The objective is to develop a drone that can efficiently capture and transmit high-resolution imagery and video, allowing military personnel to gather valuable information about potential threats, enemy movements, or terrain conditions.

**Target Acquisition and Identification:** Military-grade FPV drones may have the objective of assisting in target acquisition and identification. Equipped with advanced cameras and sensors, these drones can provide precise imagery and data that help identify targets or potential threats, assisting in mission planning and execution.

## CHAPTER 4.0

### LITERATURE SURVEY AND THEORY.

#### 1. WebRTC [1]

The world uses Android extensively. The technology in android phones is widely used due to their spectacular multimedia applications, which are accompanied by compelling power usage, quick processors, and devices with high-resolution cameras. As a result, the technology in android phones has advanced to an unthinkable degree. Nowadays, everyone uploads everything to social media. Let us imagine a user wishes to send photos taken using a smartphone from the device to a laptop or desktop. No of the distance, a wireless connection like Bluetooth, cellular networks, or Wi-Fi is employed.

A review of research on the intermediate layers and android system is presented in this part. It also contains a thorough paraphrase of other studies that have previously been conducted on various p2p-enabled platforms. P2P Protocol for Mobile Phones [2], the JXTA Project [3], the JXME [4] Project, and Jupiter [5] are some of the works that are taken into account while discussing mobile p2p.

JXTA design has been continuing since late 2000. Because JXTA offers this functionality, designers may add peer-to-peer messaging using the most widely used XML message formats. The various

peer holdings are taken into account and afterwards carried up either privately or publicly through relays, which are reconnected to the mobile platform with a set number of low yet fixed outcomes. This also features a functional processor, useful memory, and along-lasting battery. The following JXTA project, JXTE for J2ME, is known as JXME [4], and it is added to the JXTA environment. According to how a mobile JXME peer may access the JXTA network's services, this project produced two variants of JXME proxies: one that is proxy-less and the other that is a proxy. The early draft needs the peer to be in a relay, and this serves as the JXM's beginning point, which explains the terms or functionality. As opposed to the version 2.0 of JXME, where a full proxy-less architecture is ensured and no functional relay is required to continue the connection, this approach is the most recent technology utilized in modern networks, apps that guarantee that all connections are made swiftly and without the need of proxies.

These methods are specifically not intended to match a real-time network. Since it not only renders the programs severely incompatible but also delays peer in the long term. These are only a few examples of the middleware used by peers in many fields. A peering and advancing middleware called "Jupiter" [5] enables intrinsic, and consequently heterogeneous, networks. This ensures the functionality and usability of devices on and according to multiple underlying platforms across the board.

Several peering software implementations combine the network and application layers for a seamless and improved user experience. Programming sockets is done for productive results.

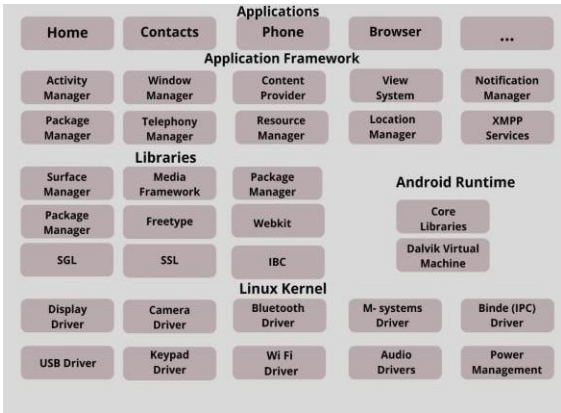


Fig: 1

## 2. Network Jamming [6]

It is the same as interfering with cell phone communications to jam any other radio communication. Through a cell tower or base station, a cell phone interacts with its service network to function. A



city is divided into smaller sections, or cells, by cell towers. The signal is passed from tower to tower as the user travels down the street.

Jamming any other radio communication is the same as interfering with cell phone communications. Through a cell tower or base station, a cell phone interacts with its service network to function. A city is divided into smaller sections, or cells, by cell towers. The signal is passed from tower to tower when a cell phone user travels down the street.

Cell phone jammers obstruct the functioning of cell phones by emitting radio waves along the same mobile phone frequency ranges. This interferes with cell phone and tower communication to such an extent that it renders the phones useless. The network would merely appear out of range on the majority of retail phones.

Frequency division duplexing, or FDD, is a common technique used by most cell phones to send and receive communications from towers. Jamming devices can interfere with phone to tower frequencies or tower to phone frequencies in order to function.

Smaller handheld devices block all bands from 800 MHz to 1900 MHz within a 30-foot arc (9 meters). Larger, more expensive versions could obstruct the tower directly, whereas smaller devices typically adopt the former approach.

As the base station is situated, further away from the jammer than the mobile that is the only reason why it is easy to block the signals coming from base station to the device. The other way around is a little difficult to achieve as the signal activity is a lot stronger as they all originate in the cell phone itself.

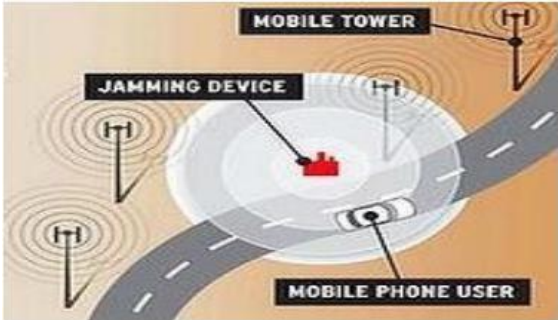


Fig:2

### 3. Image Recognition [7]

In this paper the image recognition using machine learning is explained. Image recognition is something that makes the work very much easier by doing the work in fraction of seconds. The particular reason behind the scene is the use of different algorithms. In this image recognition using machine learning, different types of algorithms can be used but specifically the main use is of CNN (convolutional neural network). CNN is an algorithm that works faster by using the dataset for gathering the information. This can be done for image recognition, video recognition used in medical images and many more. In CNN a  $3 \times 3$  matrix cell is placed over the part of the image and then the whole data is converted into 0's and 1's. This is being done to make the operation simpler and to convert the image into different slices or we can say layers. The network also determines which feature is important in order to find which object can be scanned and hence uses the feature accordingly. In addition, the network can have many silent features that can be implemented without the notice of the human eye and hence the efficiency as well as the work of the CNN can be further advanced and can be implemented over long years. In this research paper the results are also mentioned after testing the images. Over 100 images were tested in total and hence the numbers of rounds were increased on the basis of layering and scaling factors. To have more accurate results the layers numbers can be increased.

#### **4. Image Classification [8]**

As we know the growth of the data is increasing day by day in many industries such as e-commerce, healthcare and gaming, etc. As an example we can take Facebook it takes only few tagged images to classify your face by 98% accuracy. The technology is very useful for human image recognition. One of the major dominant approaches is using deep learning for this technology. As deep learning falls under artificial intelligence where it can think or act like a human. The major important part of this technology is image classification. So machine learning is always used for image classification. The machine has its own vision while doing the process of image classification. The major task of image classification is that images should be sorted or separated by specific sectors or groups to which the same type belongs. Image classification has become a challenge in machine vision. The challenge includes by the image cause of the size, color, and shapes. It requires the big data of labelled training images to be prepared for the condition of this image classification. So in this paper we are going to see about the neural network based tensor flow. The related work on this as the Neural network architecture as a method very useful for the image classification. It involves many complex images for the classification taking images of the same. In the study of this slowly the

system will improve the mist model. The open source database used for the training of the data set. The dataset of street use view had a improved than before because of the human eyes cannot differentiate it. This has discussed don image classification has that system based set of collection of the of convolutional neural network. There are face detection data set and benchmark where the art achieves about 80% detection rate with 50 false or negative .The research used decision tree as the technique for image classification of the images or the data set to be used for the same. The decision tree has many datasets which are located at the form of hierarchical way and classified in the same way. It must be done for calculating the membership for each of the classes that belong to the decision tree. The method requires the three main parts for the process as to first find the terminal nodes and second is to placement of class and third is the node breakup. This above method discussed is very easy simple and high rate of efficiency or accuracy of the system or image processing. For the rapidly expanding interest at the time, support vector machine active learning is discussed in this study. Additionally, it provided some fresh perspectives on spatial data from the sequential process in the experimentation with the image's spectral data.

It requires three components or approaches, the first of which is the Euclidean distance, which computes a portion of the spatial component. The second approach uses the spatial entropy and is based on the parson window. The outcome indicates that both images have a high resolution in terms of their ability to consistently produce the effects of the image of the aforementioned samples from the dataset.. Based on the journal it has fast classification by boosting the fuzzy classification .The result gave much better classification of the images as on accuracy and the testing process that gave a short period of time of the interval of the image classification where it produces 30% short compared to the previous one of the image of the same processing of the image. These were the method we talked about in the journal of the image classification as we can conclude by saying that the research has been done of image classification by using the tensor flow . It has three main objectives as said that which has been achieved as the overall research. It has been concluded the deep learning neural network becomes the main agenda for this part of researches the 905 percent of accuracy towards the five different types of flow as flower types had been trained model and python programming language has been used as the overall process of this research from the part it came together from the framework part of the image and it was used from start until end.

## **5. Military autonomous drones (UAVs), [9]**

This research paper examines the potential uses of military autonomous drones (UAVs) and their implications. It focuses on the advantages and the challenges that come with the usage of this technology. It highlights the current capabilities of autonomous drones, such as their ability to carry out surveillance missions and the potential for them to be used in combat situations. It also discusses the ethical considerations associated with the use of autonomous drones, such as the potential for them to be used for targeted killings. The paper also explores the various issues that need to be addressed in order to ensure safe and responsible use of this technology, such as how to maintain control over unmanned aerial vehicles, how to protect civilian populations, and how to ensure compliance with international law. Finally, the paper points to the need for further research and development in this field in order to ensure that military autonomous drones are used in a responsible and ethical manner.

### 6. Image transmission signal and flight control signal reclassification [10]

This research paper introduces a new UAV signal identification technique based on reclassification and separation of image transmission signal and flight control signal. This technique is capable of accurately classifying UAV signals and is more efficient than existing methods. The paper also reports on the performance of the proposed technique in terms of classification accuracy and time efficiency. The experiments' findings demonstrate that the suggested strategy performs better than the current ones in terms of precision and timeliness. The paper also suggests that the proposed technique could be used for real-time UAV signal identification.

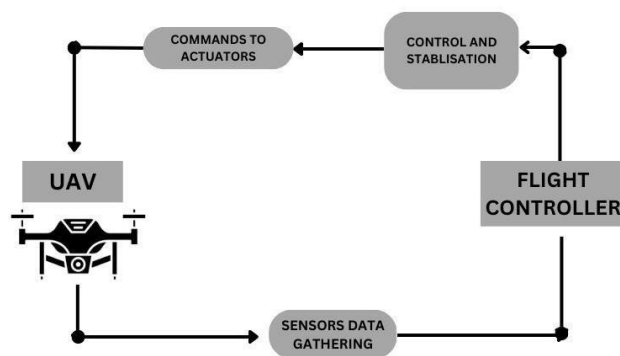


Fig :3

1. A novel UAV signal identification technique based on reclassification and separation of image transmission signal and flight control signal is proposed.
2. The proposed technique is effective in reducing the interference between UAV signals and

improving recognition accuracy.

3. The reclassification and separation-based UAV signal identification technique is able to achieve higher recognition accuracy than traditional methods.
4. Tests reveal that the suggested method, with a recognition rate of up to 97.4%, can achieve higher recognition accuracy than conventional methods., with a recognition rate of up to 97.4%.
5. The proposed method is also suitable for other signal recognition tasks, such as radar signal recognition.

## **7. Intelligent and Fully Automatic Drone Based on Raspberry Pi and Android [11]**

This paper presents the development of an intelligent, autonomous and cost-effective drone, called Vagadrone, that is based on Raspberry Pi and Android. The drone is equipped with numerous sensors and components such as a camera, a GPS module, an ultrasonic ranger and a wireless communication module that enables the communication between the drone and the pilot's device. The drone is capable of performing various tasks such as taking pictures and videos, capturing aerial images and mapping areas. The pilot can control the drone remotely using an Android application. The paper also presents the application of Artificial Intelligence (AI) techniques to enable the autonomous navigation of the drone. The AI techniques used include the use of fuzzy logic rules, hierarchical decision-making and path planning algorithms. The results of the tests performed on the drone indicate its capabilities in terms of autonomous navigation, exploration, and surveillance. This paper presents the development of the Vagadrone, an autonomous, intelligent and cost-effective drone based on Raspberry Pi and Android. The drone is equipped with multiple sensors, including a camera, a GPS module, an ultrasonic ranger and a wireless communication module, and is capable of performing various tasks such as aerial image capturing, mapping and remote piloting. Artificial Intelligence (AI) techniques, including fuzzy.

1. VAGADRONE is an intelligent and fully automatic drone system based on Raspberry Pi and Android.
2. VAGADRONE is capable of autonomous navigation, object detection and avoidance, and human-machine interaction.
3. The system is composed of a Raspberry Pi 3, an Arducopter 3.6, an Android device, and several sensors.
4. The Raspberry Pi is used as the main controller and the Arducopter is used as the flight controller.

5. The Android device is used for monitoring and control of the drone.
6. The system is equipped with an ultrasonic sensor for obstacle avoidance and a camera for object detection.
7. The flight of VAGADRONE is controlled by the autonomous navigation system, which uses the GPS and the inertial measurement unit (IMU) sensors.
8. The flight can be manually controlled using a remote control.
9. The object detection and avoidance system uses image processing algorithms to detect obstacles and to avoid them.
10. The system also includes a human-machine interface, which is used to control the drone's flight and provide feedback to the user.

## CHAPTER 5.0

### METHODOLOGY

One of the more recognizable project management methodologies, Agile is best suited for projects that are iterative and incremental. It's a type of process where demands and solutions evolve through the collaborative effort of self-organizing and cross-functional teams and their customers. Originally created for software development, it was established as a response to the inadequacies of the Waterfall method (info on it later below), the processes of which did not meet the demands of the highly competitive and constant movement of the software industry.

Agile project management stems from the values and principles of the Agile Manifesto. A declaration cemented in 2001 by 13 industry leaders, its purpose is to uncover better ways of developing software by providing a clear and measurable structure that fosters iterative development, team collaboration, and change recognition.

Made up of four fundamental values and 12 key principles, here's what they are:

- **Values:**

- ❖ Individuals and interactions over processes and tools
- ❖ Working software over comprehensive documentation
- ❖ Customer collaboration over contract negotiation
- ❖ Responding to change over following a plan
- **Principles:**
  - ❖ Customer satisfaction through early and continuous software delivery
  - ❖ Accommodate changing requirements throughout the development process
  - ❖ Frequent delivery of working software
  - ❖ Collaboration between the business stakeholders and developers throughout the project
  - ❖ Support, trust, and motivate the people involved
  - ❖ Enable face-to-face interactions
  - ❖ Working software is the primary measure of progress
  - ❖ Agile processes to support a consistent development pace
  - ❖ Attention to technical detail and design enhances agility
- **Simplicity**

Self-organizing teams encourage great architecture, requirements, and designs. Regular reflections on how to become more effective. Because of its adaptiveness, the Agile methodology is commonly used to deliver more complex projects. It uses six main deliverables to track progress and create the product which are the product vision statement, product roadmap, product backlog, release plan, Sprint backlog, and increment. With these features, it establishes itself as a methodology that places an emphasis on collaboration, flexibility, continuous improvement, and high-quality results.

## CHAPTER 6.0

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