GUJARAT TECHNOLOGICAL UNIVERSITY

(GTU)

G H PATEL COLLEGE OF

ENGINEERING AND TECHNOLOGY

affiliated with GTU

A Project Report on

IOT BASED DRONE

Prepared as a part of the requirements for the subject of

DESIGN ENGINEERING – I A(3130005)

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(Mechatronics Branch)

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Abstract

Unmanned aerial vehicles (UAVs) have enormous potential in enabling new applications in various areas, ranging from military, security, medicine, and surveillance to trafficmonitoring applications.

Also Emerging Field of IOT boost the technology of automation.

UAVs equipped with cameras, sensors, and GPS receivers in delivering Internet of Things (IoT) services from great heights, creating an airborne domain of the IoT and Aerial robotics.

Here we discussed the Basics of "IoT based Drone" . How we came up with the idea of "Iot based drone" Advantages, Drawback of it .

Then we try to optimize the cost , efficiency of drone compare to commercial drone uses some methods . Then after we connected our prototype drone to internet .

INTRODUCTION

INTRODUCTION ABOUT TEAM MEMBERS

We all four are mechatronics engineering sem-3 students. We all are interested and eager to know anything related to drones. We all share our research with each other. We believe in getting knowledge as much as possible. We often discuss about our ideas related to current automobile affairs. We do online research on the various kinds of drones. We always ask for information and interact with any drone person whom we meet. And we are excited about design engineering as it gives us knowledge about drones.

INTRODUCTION TO FACULTY GUIDE

Mr. Ajay M. Patel is very encouraging. He has a wide range of knowledge in almost every area related to Robotics and Automation. He helps student by sharing his knowledge and his knowledge is really beneficial. He is a learned man and resourceful.

UNDERSTANDING ABOUT DESIGN THINKING

A primary purpose of design thinking is to summarize and synthesis the research on design thinking to better understand its characteristics and processes as well as the difference between novice and expert design thinker. It is very important for upcoming engineers like us to develop critical thinking skills, working and managing a team, completing work on or before time, enhancing the way to look at things, approaching and

facing problems with different point of view etc. Design thinking helps us enhance and improve our skills.

IMPORTANCE OF DESIGN THINKING

Introduction of this project is very important in lives of beginners like us. This project makes us aware about how things work in actual world. Firstly, a team is chosen by us, we have to work in that team throughout the project which obviously improves our management and team-working skills. This project helps us to develop critical thinking skills, the way we approach towards a problem also become more simplified and distinct. Throughout our project we constantly solve and fix different kind of problems, hence enhance problem facing and solving capability. Secondly, communication skills also improve. With help of this project, we got a good knowledge about designing which would be helpful in future. Also it helps to apply the findings from the literature regarding the application of design thinking to our education system.
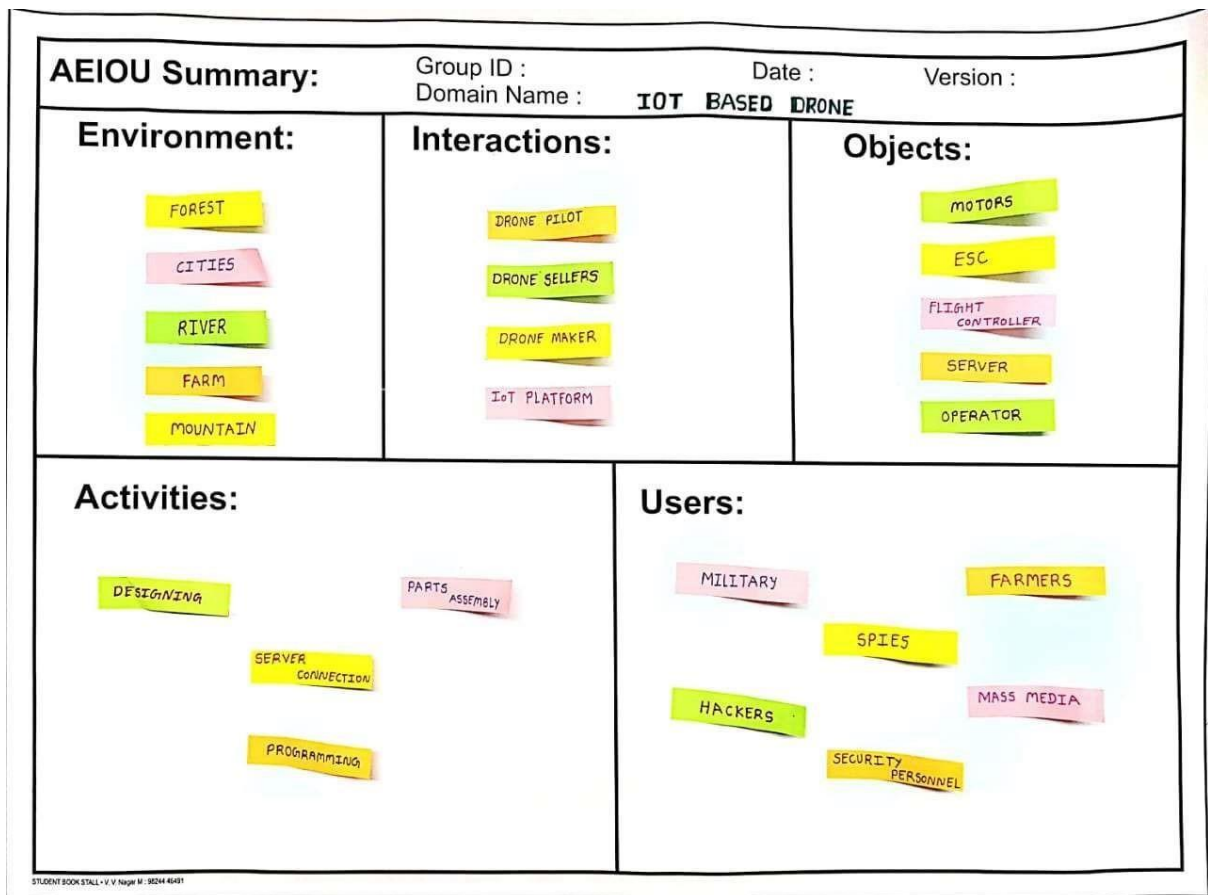
IOT BASED DRONE

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to computer interaction.

The definition of the Internet of things has evolved due to the Convergence of multiple technologies, real- time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of Things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", covering devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers.

Drones — also known as unmanned aerial vehicles (UAVs) — are rapidly expanding their capabilities beyond military surveillance applications. UAVs are being developed for

parcel delivery to the customer's doorstep, internet provision, disaster surveillance and assistance, and a whole range of hobbyist activities. They play a role in the Internet of Things because they are critically dependent on sensors, antennas and embedded software to provide two-way communications for remote control and monitoring. Drone simulation will be critical in achieving industry estimates, which predict that the drone market could be valued at $82 billion and employ more than 100,000 people by 2025.

AEIOU Summary: Group ID :   Date :   Version :
Domain Name : **IOT BASED DRONE**

Environment:
- FOREST
- CITIES
- RIVER
- FARM
- MOUNTAIN

Interactions:
- DRONE PILOT
- DRONE SELLERS
- DRONE MAKER
- IoT PLATFORM

Objects:
- MOTORS
- ESC
- FLIGHT CONTROLLER
- SERVER
- OPERATOR

Activities:
- DESIGNING
- PARTS ASSEMBLY
- SERVER CONNECTION
- PROGRAMMING

Users:
- MILITARY
- FARMERS
- SPIES
- HACKERS
- MASS MEDIA
- SECURITY PERSONNEL

ENVIRONMENT : FOREST , CITIES , RIVER , FARM , MOUNTAIN

INTERACTION : DRONE PILOT , DRONE SELLER , DRONE MAKER , IOT PLATFORM

OBJECT : ESC , MOTOR , OPERATOR

ACTIVITIES : DESIGNING . PARTS ASSEMBLING , PROGRAMMING

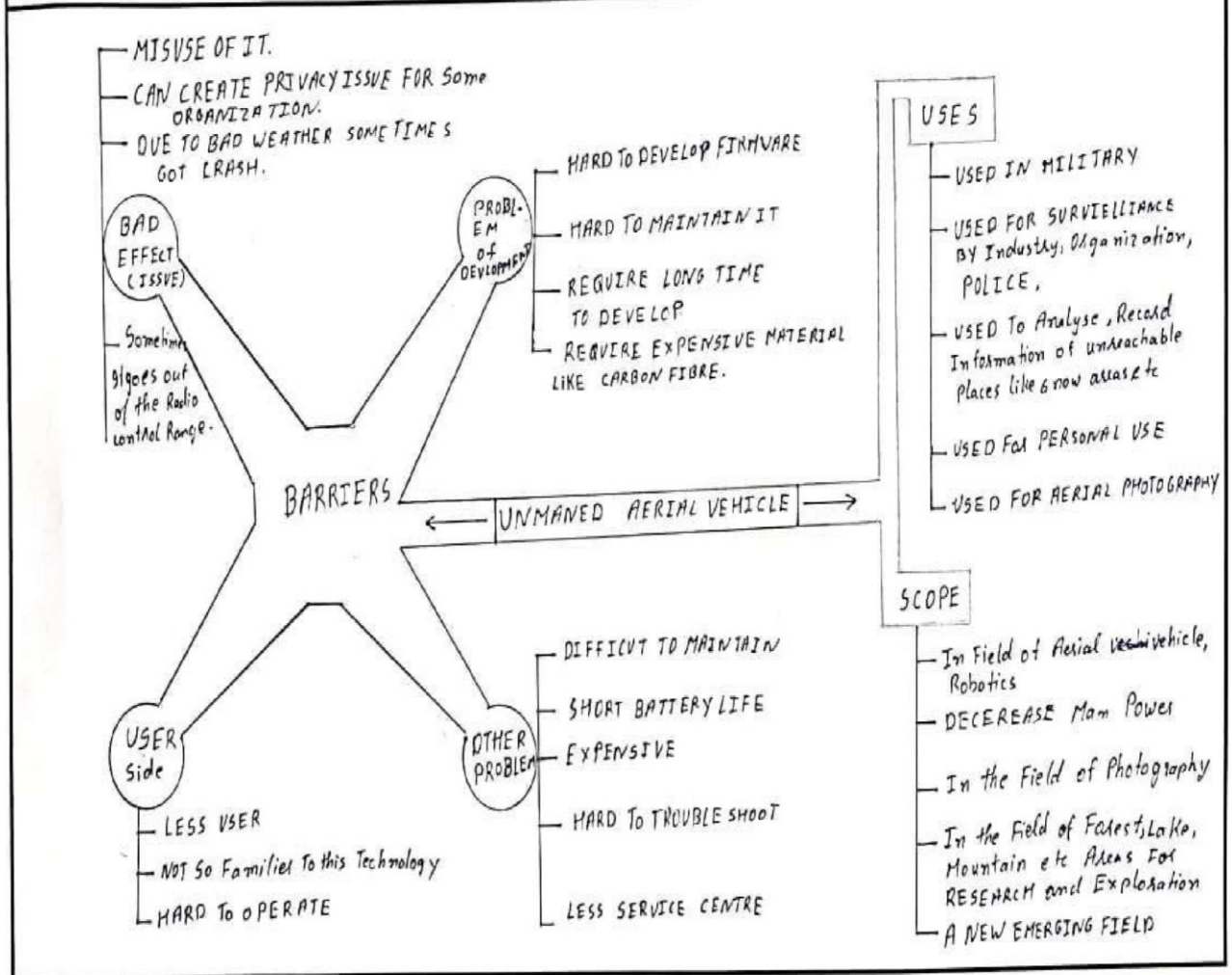USER : MILITARY , SPIES , FARMERS , PHOTOGRAPHER
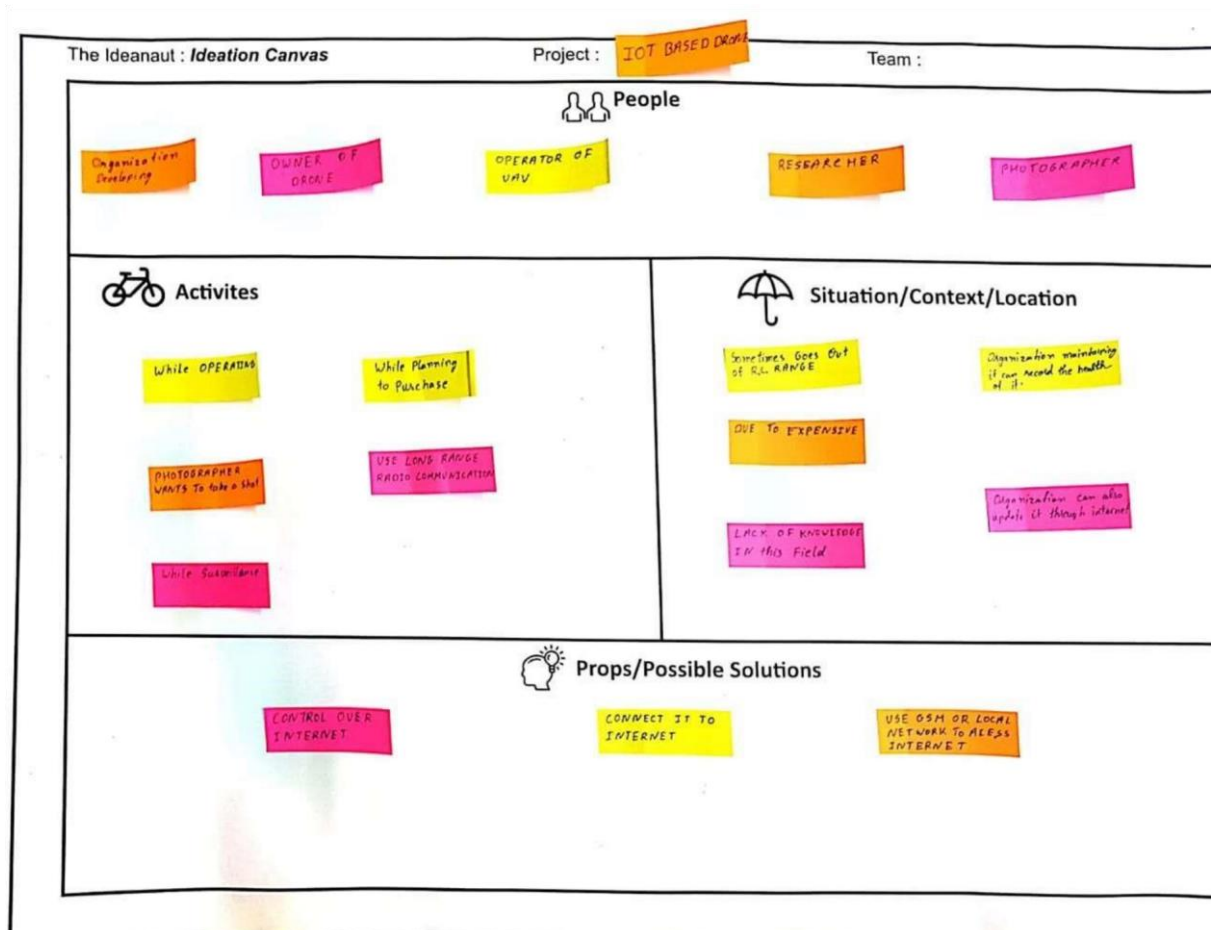
Mind Mapping Canvas

Group ID

Domain Name

Date   **Version**

— MISUSE OF IT.

— CAN CREATE PRIVACY ISSUE FOR Some
ORGANIZATION.

— DUE TO BAD WEATHER SOME TIMES
GOT CRASH.

BAD EFFECT (ISSUE)

— Sometime gigoes out of the Radio control Range.

PROBL-EM of DEVLOPMENT

— HARD TO DEVELOP FIRMWARE

— HARD TO MAINTAIN IT

— REQUIRE LONG TIME TO DEVELOP

— REQUIRE EXPENSIVE MATERIAL LIKE CARBON FIBRE.

BARRIERS

UNMANED AERIAL VEHICLE →

USER Side

— LESS USER

— NOT So Families To this Technology

— HARD To OPERATE

OTHER PROBLEM

— DIFFICUT TO MAINTAIN

— SHORT BATTERY LIFE

— EXPENSIVE

— HARD To TROUBLE SHOOT

— LESS SERVICE CENTRE

USES

— USED IN MILITARY

— USED FOR SURVIELLIANCE BY Industry, Organization, POLICE.

— USED To Analyse, Record Information of unreachable Places like snow avvas etc

— USED For PERSONAL USE

— USED FOR AERIAL PHOTOGRAPHY

SCOPE

— In Field of Aerial vehicle, Robotics

— DECEREASE Man Power

— In the Field of Photography

— In the Field of Farest, Lake, Mountain etc Areas For RESEARCH and Exploration

— A NEW EMERGING FIELD

Mind Mapping

Design For

Design By

Date

Version

USER		STAKEHOLDERS	
MILITARY RESEARCHER		Manufacturing Company SOCIETY	
PHOTOGRAPHER DESIGNER		ORGANIZATION Domain of this UAV	

ACTIVITIES

IN MILITARY OPERATION — In Form of Surviellance for Security

In RESEARCH OPERATION — To explore the unreachable place like High mountain, caves etc

In Quick of DELIVERY — Quick DELIVERY of MEDICAL Supplies

To maintain and monitor uptodate. — If there is an upot update on the firmware If it will be iot based Developer can directly connect to it with user permission.

STORY BOARDING

HAPPY   While seeing the UAV. It is quiet not normal in society. It is an amazing in the field of Robotics. It encourage us to Develop and to know the science behind it.

HAPPY   I have seen drones attached with camera taking pictures or Recoding video. The picture or video gives a a whole new perper perspective of seeing like a bird see from sky. It also used in aerial photogsoph.

SAD   Some times we see people having troubleshoot the drones. So sometimes the Owner call the techinion or send to service centre which takes times to solve.
But if the Drones are IoT based it will be connected to Internet to th Developer server so if any problem occur if he be directly informed to Owner/user so they can solve it.

SAD   Sometimes it can be create a privacy issue like flying over the restricted area or can be destructive like flying over the airpart area thus crashing to a plane or a bird etc.

Empathy canvas

The Ideanaut : *Ideation Canvas*   Project : IOT BASED DRONE   Team :

People

Organization developing   OWNER OF DRONE   OPERATOR OF UAV   RESEARCHER   PHOTOGRAPHER

Activites

While OPERATING   While Planning to Purchase

PHOTOGRAPHER WANTS To take a Shot   USE LONG RANGE RADIO COMMUNICATION

While Surveillance

Situation/Context/Location

Sometimes Goes Out of R.L RANGE   Organization maintaining it can record the health of it.

DUE TO EXPENSIVE

Organization can also update it through Internet

LACK OF KNOWLEDGE IN this Field

Props/Possible Solutions

CONTROL OVER INTERNET   CONNECT IT TO INTERNET   USE GSM OR LOCAL NETWORK TO ALESS INTERNET

Ideation canvas : Here we try to solve the problem and also can see extra function and feature added in due to the Iot .

ADVANTAGES

These are rather obvious. You may not need to establish a wireless network, but rather use a readymade one. Options are many. Let's elaborate on some of them.

1. Use a satellite phone. These are not very heavy and may be carried with ease by a midsized drone. If the satellite phone operator provides Internet access then you have IoT drone that can fly anywhere under the blue sky having the satellite network has coverage where the drone is flying.

2. Use a terrestrial cell phone network. As in the previous point, but this time a cell phone, rather than a satellite phone. Having the operator provide Internet access, you have an IoT drone ready to fly. Now you may fly wherever there is coverage. If the operator is in one state – you may fly in one state. If the terrestrial cell phone operator supports roaming you might well extend your range

3. Use local Wi-Fi networks. As long as you have access to these networks, wherever they are, you may connect your drone using a WiFi LAN card on board to these networks. You may fly in a city, in a small region or have you.

4. Use some other wireless technology that connects to the Internet, like Bluetooth for example. Yes, the range may be shorter, or ever larger that Wi-Fi.

5. You get cheap network access , you pay for the access to it and the device on board. You get almost worldwide coverage using a satellite phone.

6. Your drone may extract information from the Internet directly, not passing through your base station or the IoT server.

7. Your drone may post information directly to the Internet, not passing through your base station or the IoT server, having the places where the drone tries to post information allow robots to post.

8. Your base station needs to be connected to the Internet, but you don't always need a dedicated base station. You may use an improvised base station – your smart phone, your desktop computer, you name it.

Drawbacks of an IoT Drone

Most of the denoted drawbacks are true for all IoT devices, not only to drones. Internet is not a safe place and when a device is connected to the Internet it may be hacked. If this device can do harm then it is not a good idea to connect it to the Internet. The drone is a dangerous device, it may do a lot of damage if used improperly and enabling a potential access to it from an offender through the Internet is a drawback. Some countermeasures are always possible like super strong encryption and protection of the IoT server, the base station and the drone computer from attacks, but the risk is there and it is crucial. Another drawback is that some drones may need stable connections. The Internet is not so stable and has downtimes. On the other hand there are no networks with guaranteed coverage or with 0% downtime. A gap in communication due to the network infrastructure or the Internet connection may lead to catastrophic results in some scenarios.

VENN DIAGRAM OF DRONE

For Prototyping
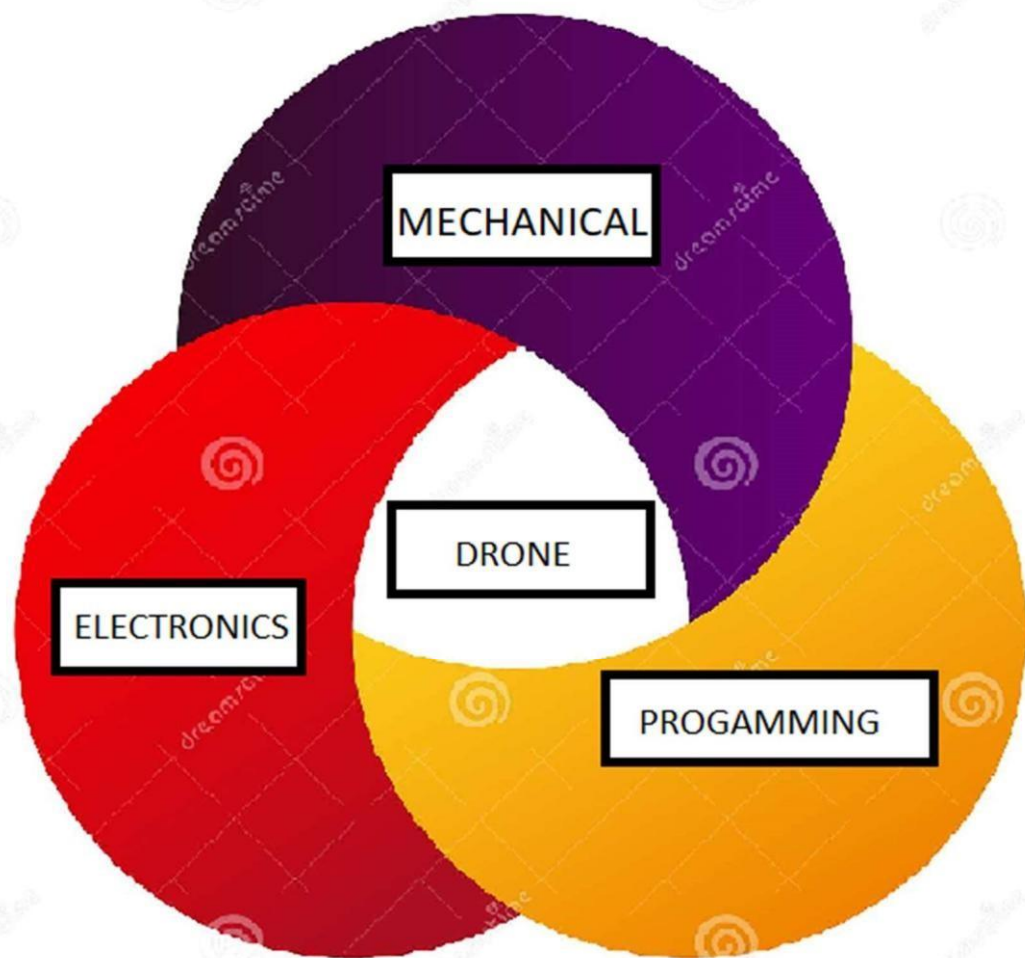
- ➢ MECHANICAL PARTS
  - PLASTIC FRAME
  - PROPELLERS
  - SCREWS, NUTS, WASHERS

- ➢ ELECTRONICS
  - BRUSHLESS   MOTORS
  - ☐ ELECTRONIC SPEED CONTROLLER
  - MICRO-CONTROLLERS
  - IMU SENSOR
  - MAGNETOMETER
  - SENSOR
  - BAROMETER SENSOR
  - GYROSCOPE SENSOR
  - ACCELEROMETER SENSOR
  - BATTERY

  ☐
- ➢ PROGRAMMING
  - C++ LANGUAGE
  - ARDUINO IDE
  - (JAVA) for APP DEVELOPMENT
  - JavaScript for Web development

PHASE OF PROTOTYPING

1) Firstly we brush up the basic .
2) Then we went for designing in the 3d software .
3) Parallel to that one of our member search for the component needed .
4) Then we collected the results and have a Group discussion on further process
5) Then we clear the doubts and went for collecting the parts to assemble.
6) There are many a times happen where something went wrong due to which we apply trial error method to solve it.
7) The programming part was one of the toughest part face by our team .
8) There a lot to know in programming before implementing.
9) So as a result we break our project into major steps
10)   1) Make a commercial drone . 2) Make a Iot platform .
          3) Connect drone to Internet.

And we started to work on first step. After few months our prototype is ready .

REFERENCE

1) https://www.engpaper.com/drone-design.html
2) https://nodemcu.readthedocs.io/en/dev-esp32/
3) https://www.ncbi.nlm.nih.gov/m/pubmed/30453646/