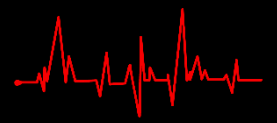
The Hope line



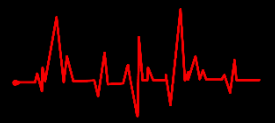
Team Members	
Name	**Department**
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RISHIKESH M	Electronics & Instrumentation

Mentor details	
Name	**Department**
Vijayanandh R	Aeronautical



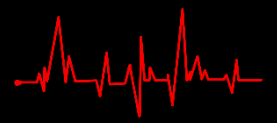
Problem statement

- The need of a quick transportation of medicine/blood for rural areas in case of an emergency.
- The need of a high speed drone which can deliver the medicine/blood products to the village.

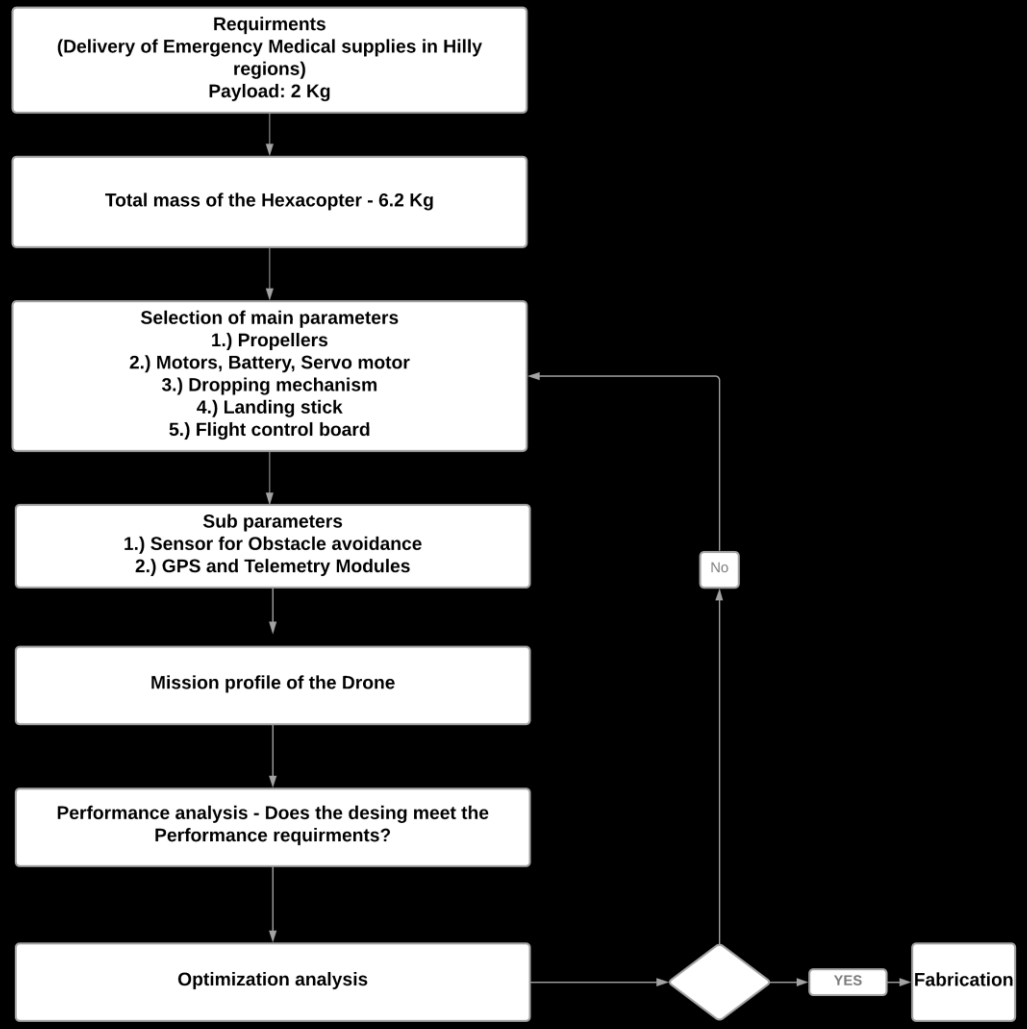


The solution

- A drone(hexacopter) is designed to transport the medicine/blood and essential things to rural areas within short period of time.
- The drone uses camera modules, IMU, Flight control board to navigate through the hilly regions.
- The payload is dropped and the drone is returned back to the base to recharge/next mission.

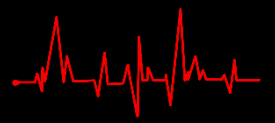


Design Process



Design

- For this application, a hexacopter is designed.
- The payload is 2 Kgs.
- The sensors, cameras, frame, batteries is around 4 Kgs
- The designed multi-rotos is capable of producing 11 Kgs of thrust.





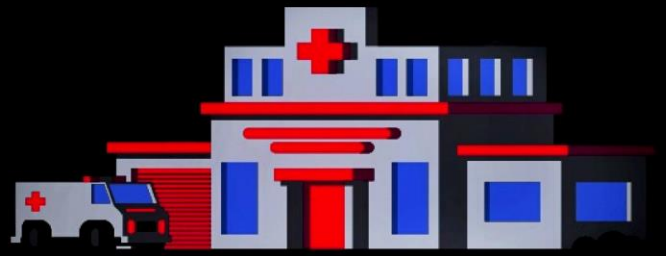


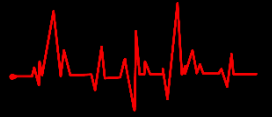




WORKING



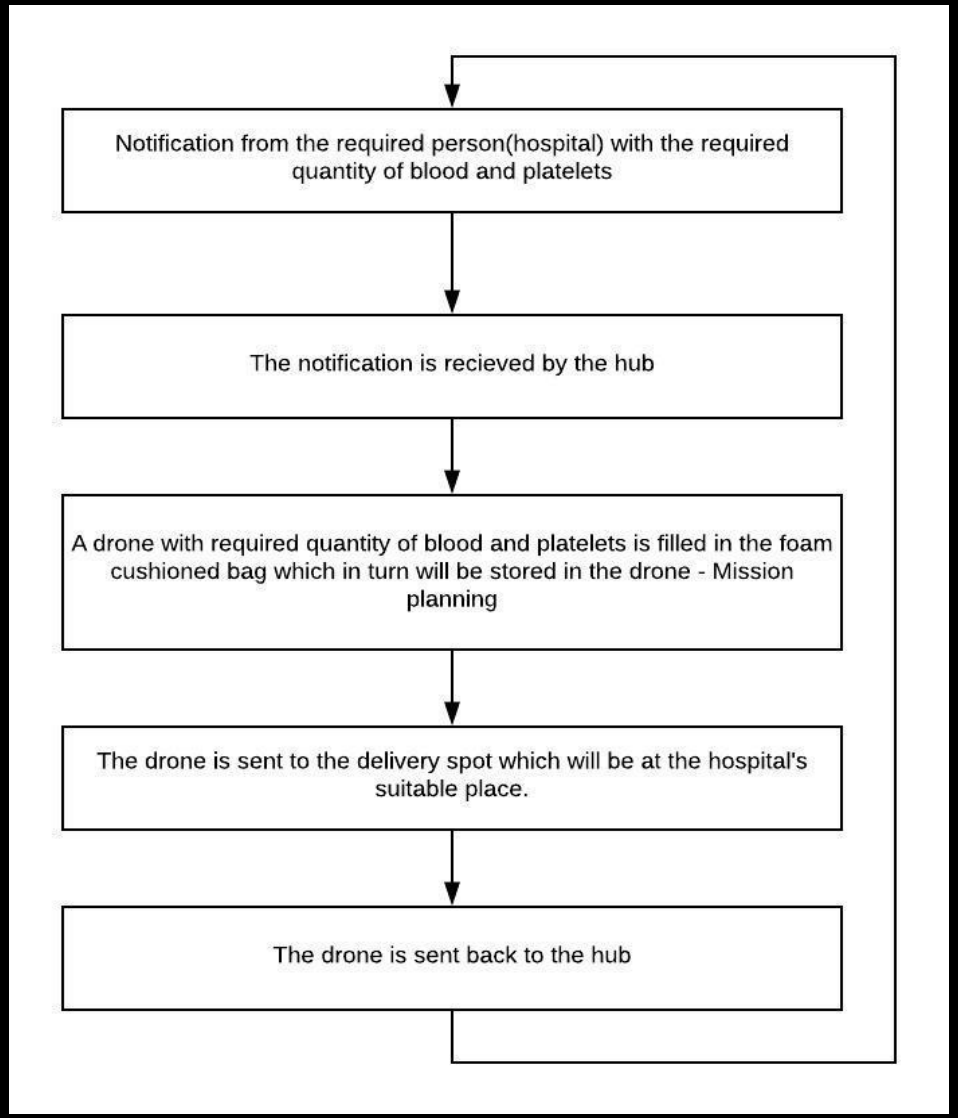




Drone features

- The drone is designed to carry 2 kilograms of payload.
- The drone uses a truss form to reduce mass and for less drag.
- When the drone is operated in the air, a bird repellent sound is used to avoid bird hits in the mid air.
- Maximum forward speed = 23 m/s.

The flow of mission

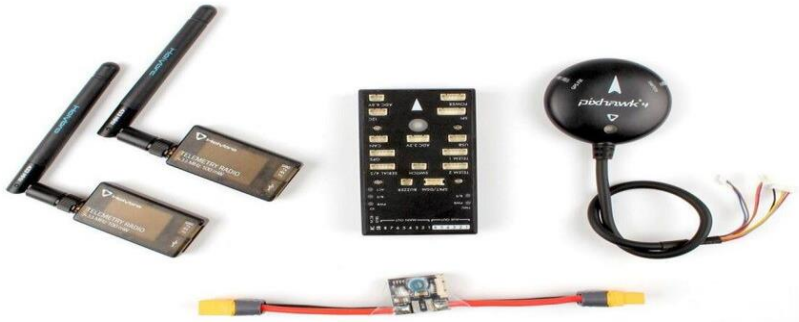


Components

S.no	Components	Specifications
1	Battery	13000 mAh
2	Flight control board	Pixhawk x4
3	On board computer	Raspberry pi
4	Motor	700 kV
5	Storage compartment	Insulated with cooling bag
6	ESC	60 A
7	companion computer	Intel aero
8	Propellers	10x6 inch
9	GPS & Telemetry	3 DR GPS and Telemetry module



Components

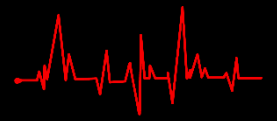




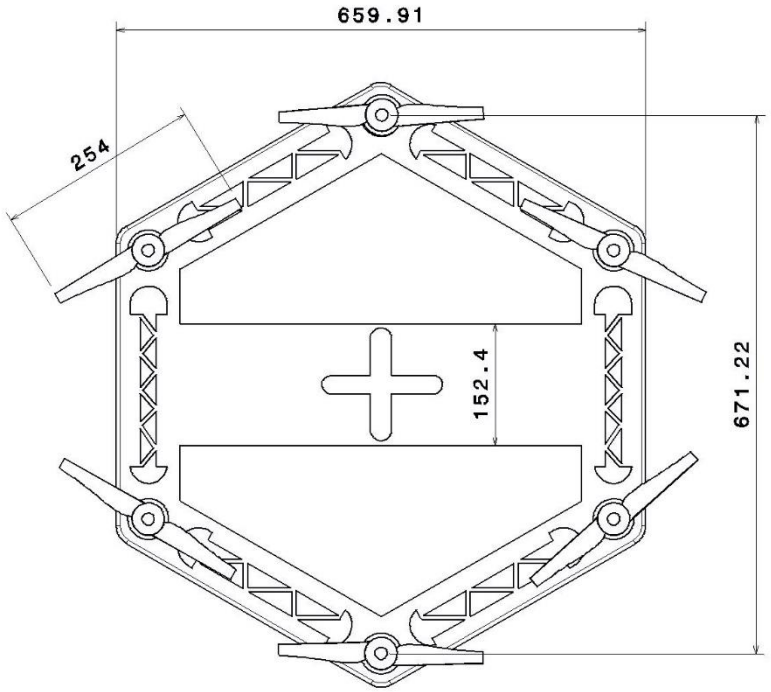


Total Weight

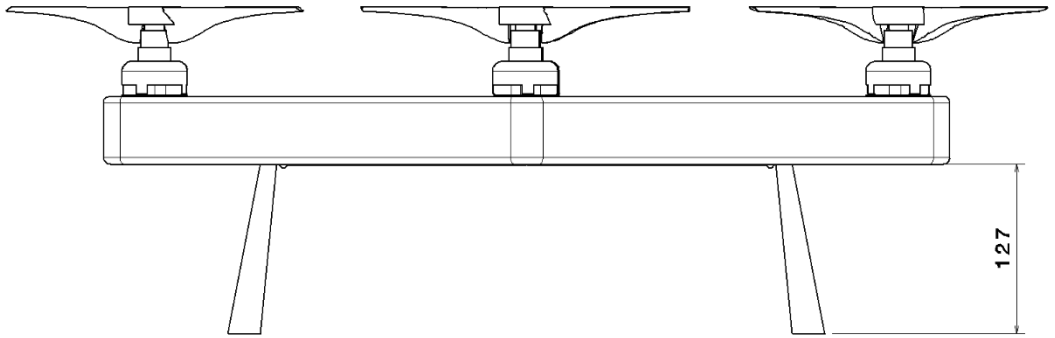
S.no	Components	quantity	Weight (g) / item	Total weight (g)
1	Frame	1	600	600
2	Battery	1	1600	1600
3	Servo Motor	1	400	400
4	Landing Gear	1	150	150
5	IMU	1	10	10
6	Motor	6	200	1200
7	Arduopilot	1	150	150
8	ESC	6	30	180
9	Propellers	6	10	60
10	Payload	1	2000	2000
11	Total Weight			6350



Dimensions



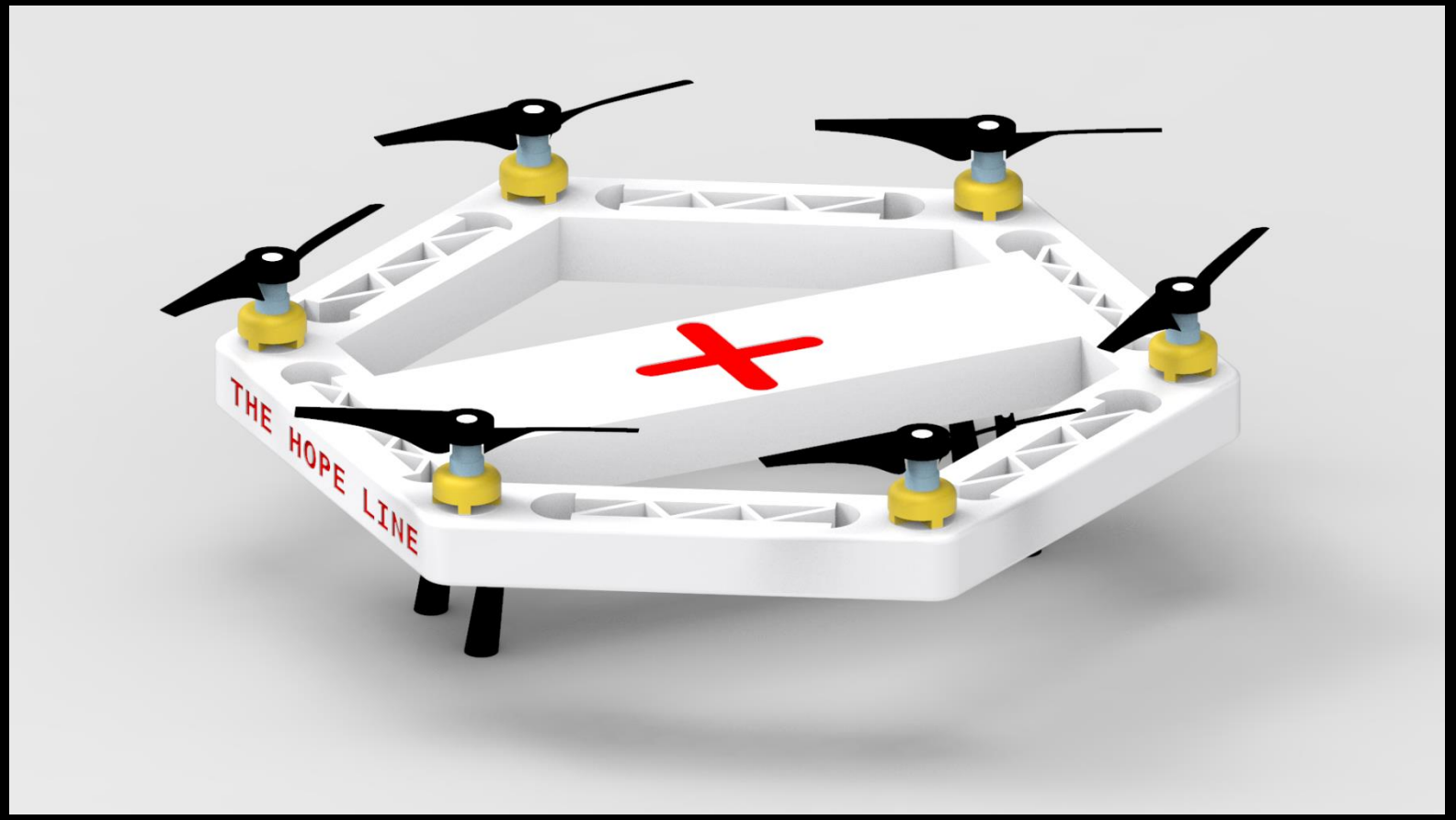
Hexacopter for Medical emergency supply
Top view
Scale: 1:5



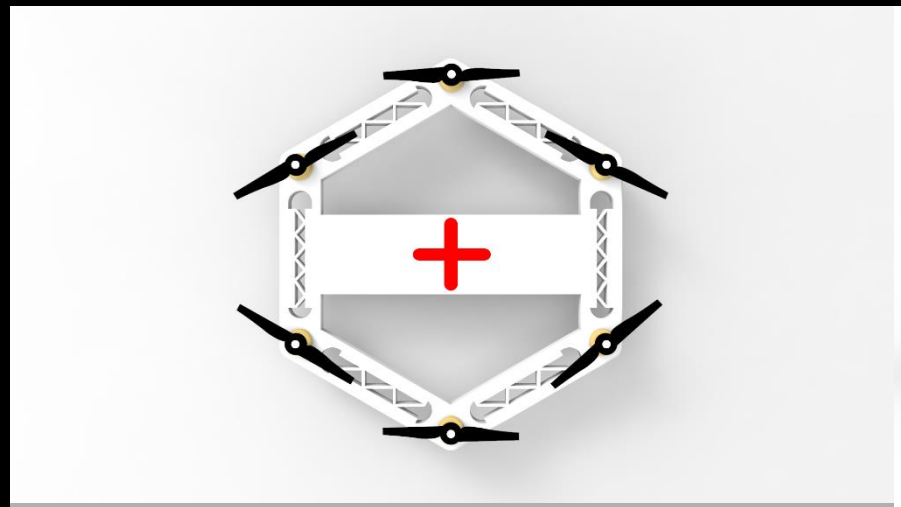
Hexacopter for Medical emergency supplies
Front view
Scale: 1:3

All the dimensions are in mm

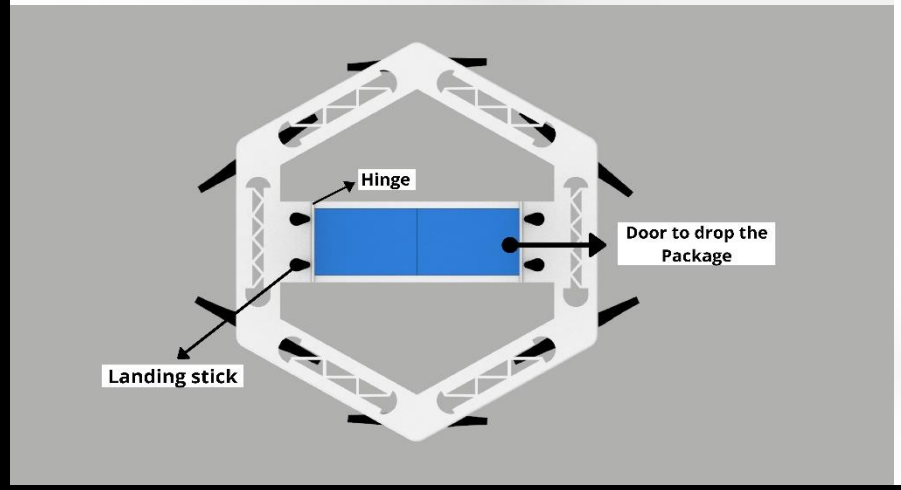
CAD Model



Multi view





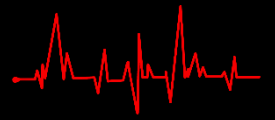




Formulas used

$$Rate of Climb = \sqrt{\frac{2mg_0}{\rho C_D A}} * \sqrt{TR - 1}$$

$$MFS = \sqrt{\frac{2mg_0}{\rho C_D A}} * TR * \sqrt[4]{1 - {}^{1}/_{TR^2}}$$



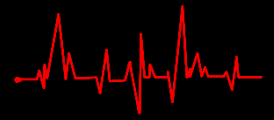
Calculations

Speed parameters

Rate of climb (m/s)	16.49
Maximum forward speed (m/s)	23.62

Power calculations

Current draw	53.75
Minimum flight time (minutes)	2.41



Tech Stack



Flight control board (**Pixhawk 4**)



companion computer (Intel aero)

- PX4 supports obstacle avoidance in Mission mode, using avoidance software running on a separate companion computer.
- PX4 and Intel aero are communicated via USART.
- PX4 communicates with the obstacle avoidance software using an implementation of the MAVLink Path Planning Protocol.

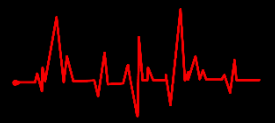
Components specification

Camera (RS200) :

- Operating Range (Min-Max) : 0.5m - 3.5m
- Depth Resolution and FPS : 480 x 360 @ 60fps
- Depth Field of View : H: 59, V: 46, D: 70.
- Weight : 65g.

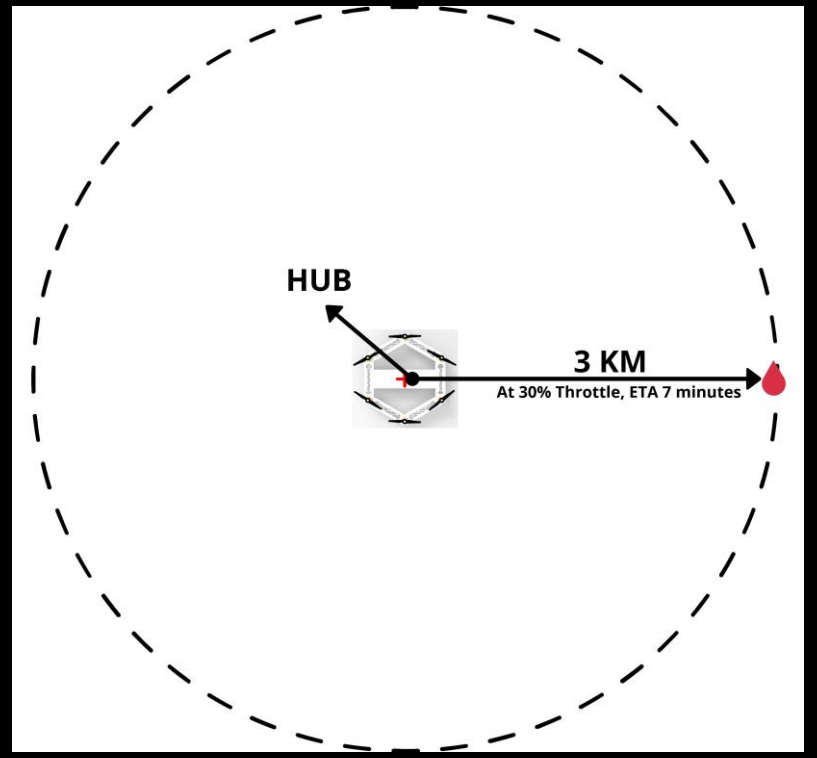
Intel aero :

- Embedded Storage32 GB
- DC Input Voltage Supported5 - 20V
- Ram : 4GB



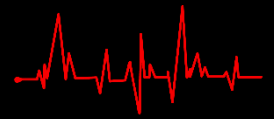
Outline





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Thank You

