

Aerial Drones: Missions with 5G and Starlink Support

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Abstract

In today's world, UAVs are increasingly vital in disaster scenarios. Our project outfits a **UAV** with a private **5G** network via a **USRP** and **Starlink**, enabling internet connectivity. It is able to **follow a person** using a phone app's coordinates, while also being able to **dodge obstacles** using our object detection and avoidance service. This enables internet access in disaster zones where towers may be down.

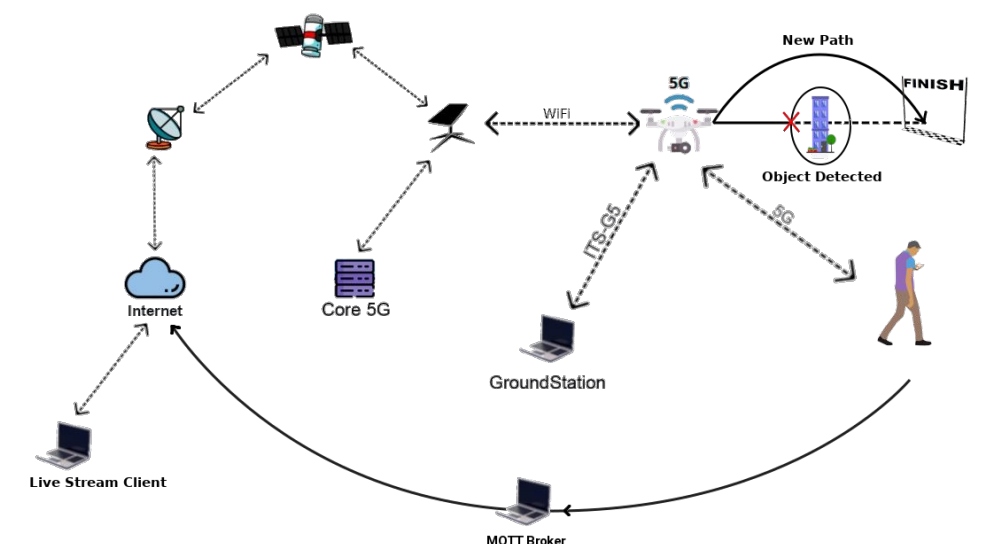


Fig 1- Project Overview

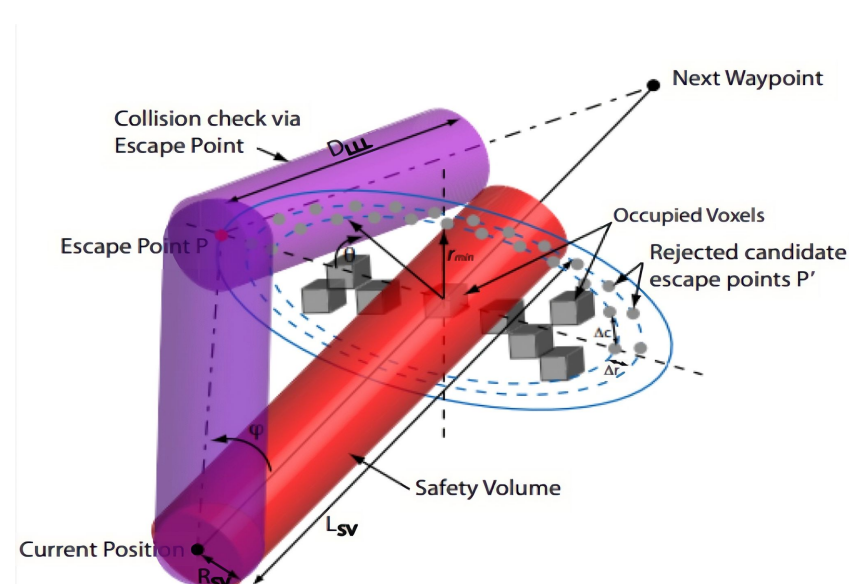


Fig 3- Escape Points Algorithm

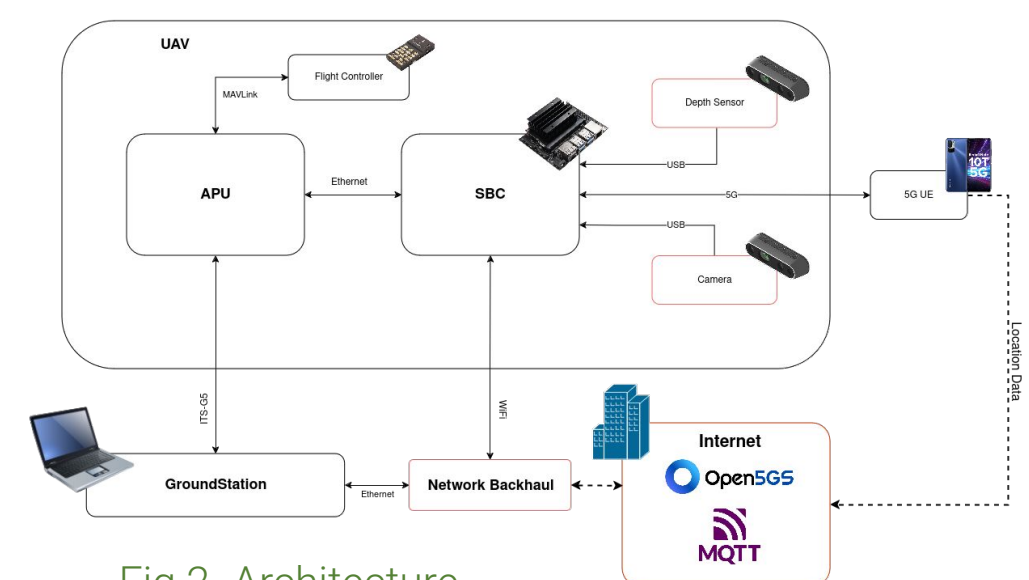


Fig 2- Architecture

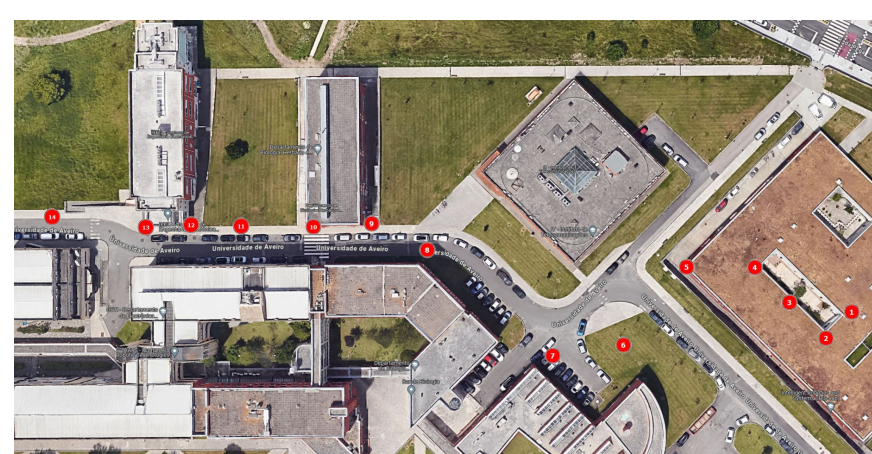


Fig 4- Test Points on Site

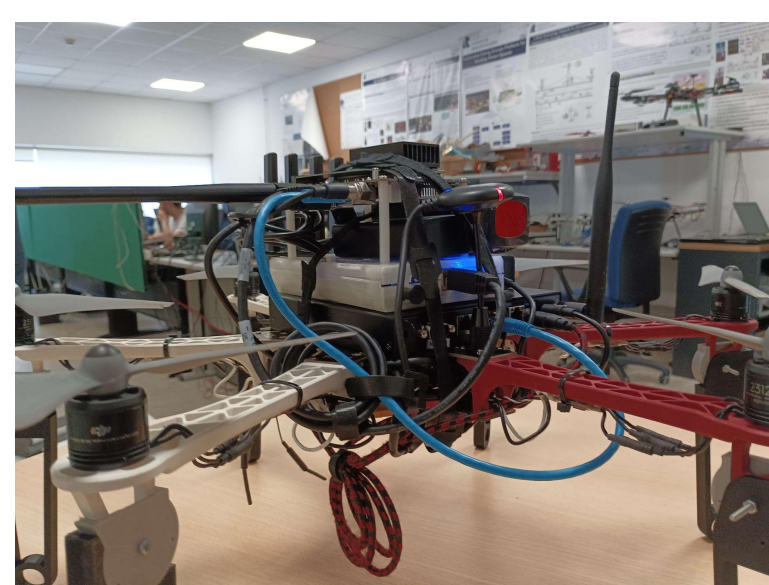
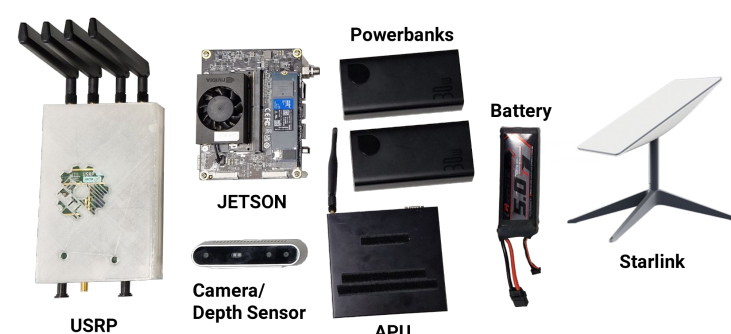


Fig 7- Drone with all the equipment

Object Avoidance

The UAV is equipped with an **Intel Realsense** camera for **obstacle avoidance**. It analyzes distances using a **circle mask centered on the UAV**, adjusting left or right until finding a safe escape point. Once detected, it instructs the APU to **dodge and notifies the ground station for mission adjustments**. After evasion, it **resumes its original trajectory**.

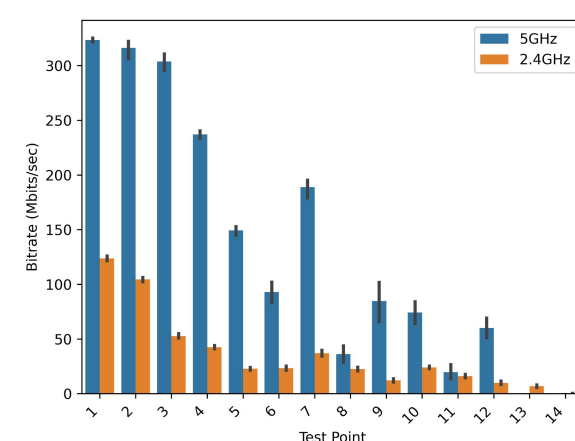


Fig 5- Backhaul WiFi bitrate values

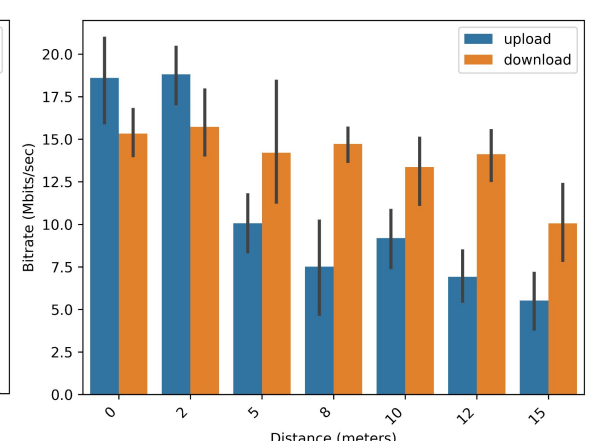


Fig 6- 5G Results between UE and the UPF container

Conclusion

The project successfully demonstrates the feasibility of using **UAVs** equipped with **5G** and **Starlink** for enhanced connectivity and **autonomous operations**. Future work will focus on scaling the system and further improving the algorithms for better performance in diverse environments.



Video