TEAM
038

# VTOL Fuel-Powered UAV for Surveillance

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## Background

Aligned with Saudi Arabia's Vision 2030, which highlights the importance of enhancing security and surveillance capabilities through advanced technologies, our VTOL UAV project aims to create a system that is:

- **Reliable**
- **Efficient**
- **Sustainable**
- **Cost-effective**

**The projects constraint:**

- With weight less than 26 kg
- Batterie-power more than 5000 mAh
- AI recognition distance capable of more than (20 – 40 m)

**With these specifications:**

- Flight time more than 90 min
- Communication range in 2 km radius
- Dimensions less than 1.5 x 2 m

**Project Impact:**

- The VTOL UAV improves real-time monitoring and quick threat response.
- The project advances local technology development and contributes to the national economy.
- The UAV's hybrid system reduces environmental impact with lower emissions while rising flighting time.

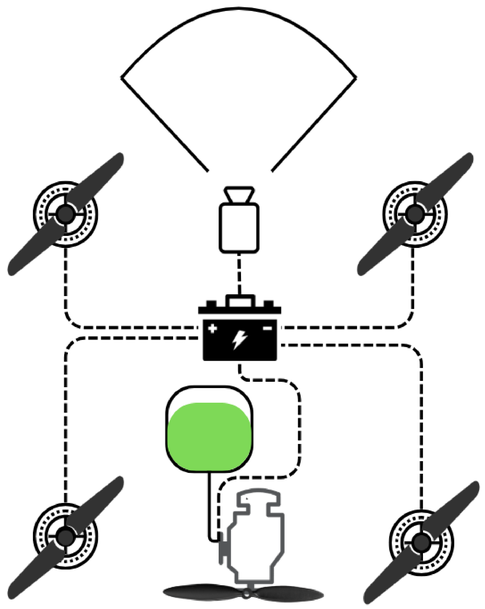
## Objective

Our project integrates a hybrid power system in a VTOL UAV, utilizing both battery-powered motors for vertical takeoff and landing and a gasoline engine for sustained forward flights while offering an AI recognition camera.

The system operates under two primary conditions:

- During vertical takeoff and landing, the electric motors draw power from two 6S LiPo batteries, ensuring stable lift and landing.
- Once in forward cruise mode, the UAV transitions to rely on the 31cc gasoline engine, conserving battery energy and extending flighting time.

## Results



## Prototype

- Scaled down the size of the UAV from 2.5 meters length of the wings to 2 meters.
- Used PA6-CF (Nylon Carbon Fiber) for the fuselage to withstand the heat coming from the fuel engine.
- Integrated advanced manufacturing techniques including 3D printing and laser cutting.


- Integrated an AI-Recognition for the camera to distinguish between objects and persons.

## Conclusions

- VTOL UAV with hybrid propulsion for up to 90 minutes of surveillance
- AI-driven object recognition with 10-second response time for real-time monitoring
- Fuel consumption: less than 1 L/hr for extended operational efficiency
- Payload capacity: 5 kg for versatile equipment use
- Contributing to Saudi Vision 2030 with local innovation and technological growth