



# King Fahd University of Petroleum & Minerals

## Strategic UAV with Electronic Warfare Capabilities

Turki Aljamaan (ISE) - Abdulmajeed Alansari (EE) - Tariq Almuzaini (EE) - Abdulrahman Alkhatlan (AE)

### Introduction

#### Problem Statement:

Design and build an RF jammer attached to a UAV to jam an attacking drone.

#### Constraints:

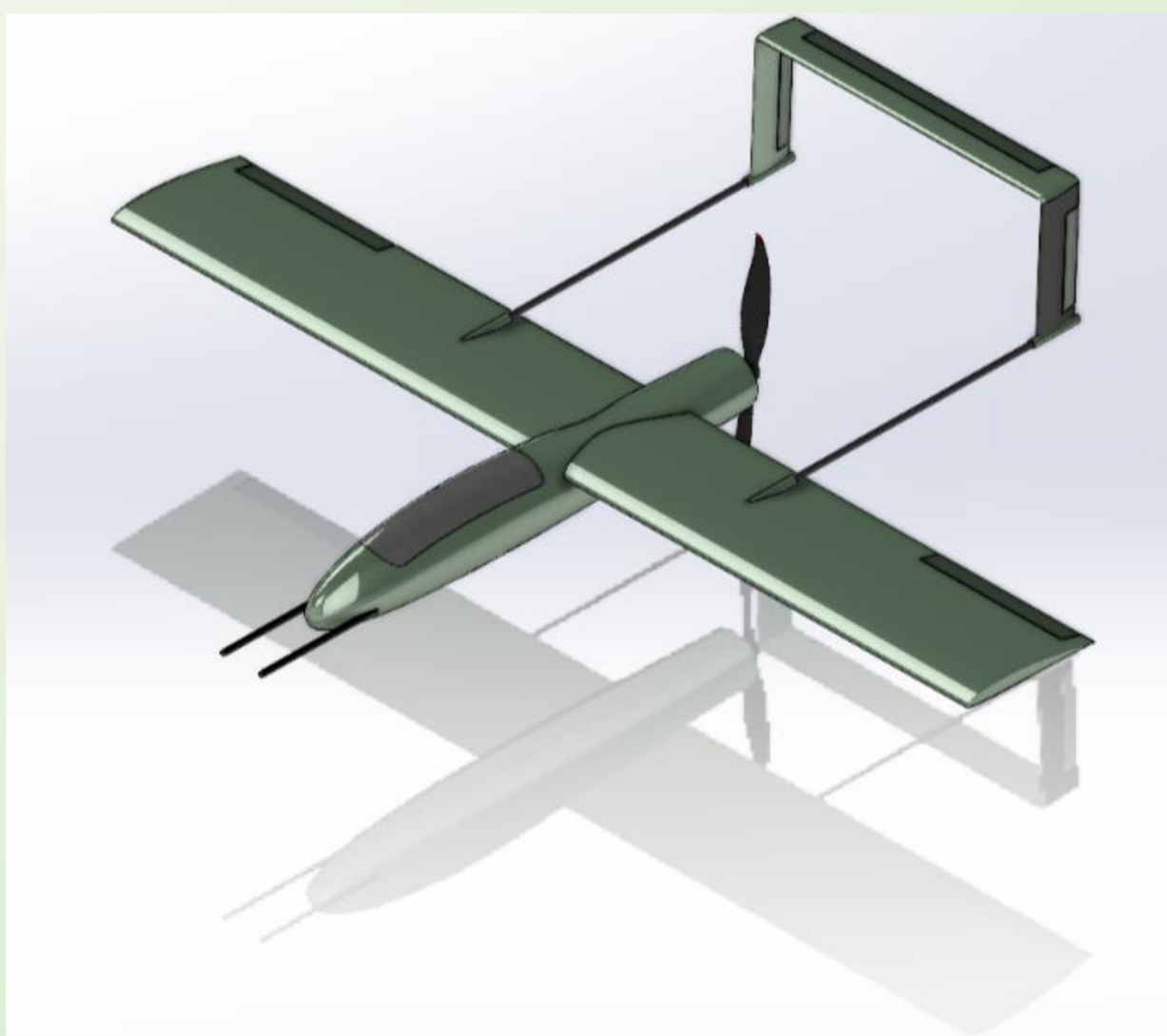
- Limitation in the usage of wireless power of 50 dBm from CST regulation
- Limitations in UAV Flight testing
- Ensuring safety standards to avoid any harmful interference and illegal usage
- Limitations in communication with the UAV while jamming
- Limitations in Jamming testing

#### Target Specifications:

- Fixed-wing UAV MTOW of 8kg.
- Range +10km.
- Altitude +1000m.
- Battery life of +30min.
- Jamming RF bandwidth of 2.400 – 2.483 GHz.
- Jamming Signal power does not exceed 15 dBm.

### Prototype design

- Twin Tail Boom Pusher UAV.
- Electrically powered.
- 6kg MTOW.
- Max Speed 90 km/h.
- Range 30 km.
- Composite Structure.



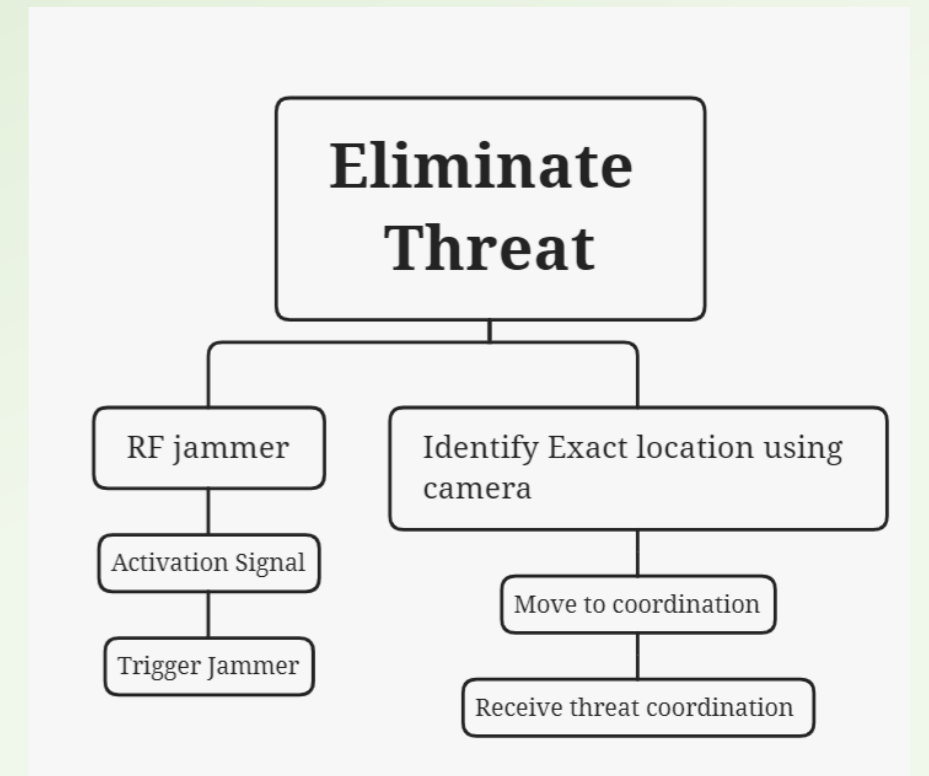
### How it works

Our project will be using and relying on signal frequency modulation, as well as some random signal processing techniques to generate the noisy signal, in addition, it will also include some choosing of antenna parameters.

Additionally, our project incorporates principles of aerodynamics and aircraft flight dynamics, as they are fundamental to the design and operation of the electrical fixed-wing UAV. These physics concepts play a crucial role in the UAV's stability, control, and overall flight performance.

### Function of product

The inclusion of an RF jammer on the UAV introduces a unique functionality. The RF jammer serves as a powerful tool for disrupting or blocking communications of threats within its range which could be served as a military tool. This technology can be employed in various scenarios, such as countering drone threats or preventing unauthorized RF transmissions in sensitive areas.

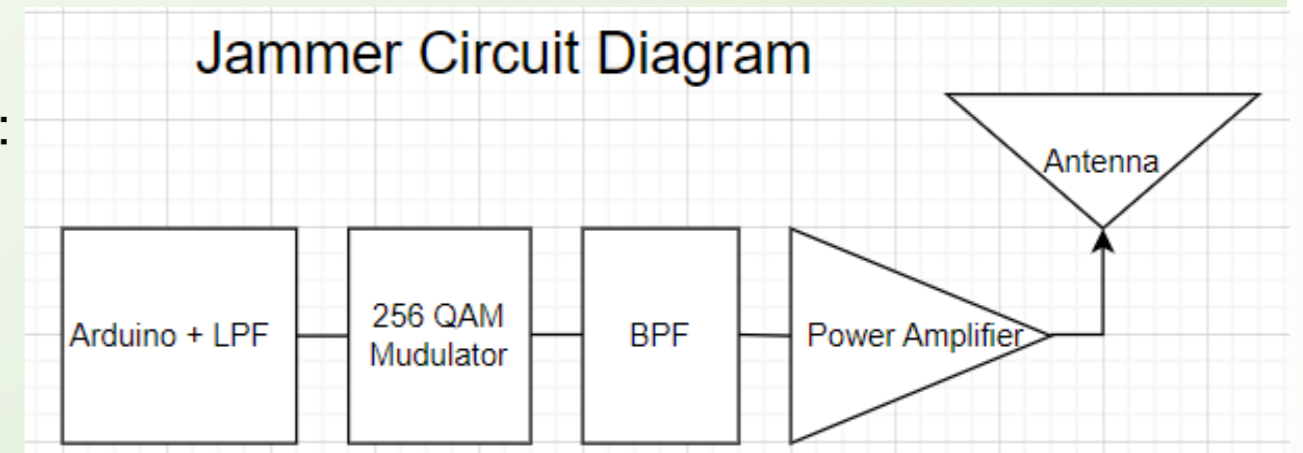


### Jamming Circuit

#### Jammer Circuit Diagram

Jamming circuit components:

- 1- Arduino Uno.
- 2- 256 QAM Modulator.
- 3- Bandpass Filter.
- 4- Power Amplifier
- 5- Antenna

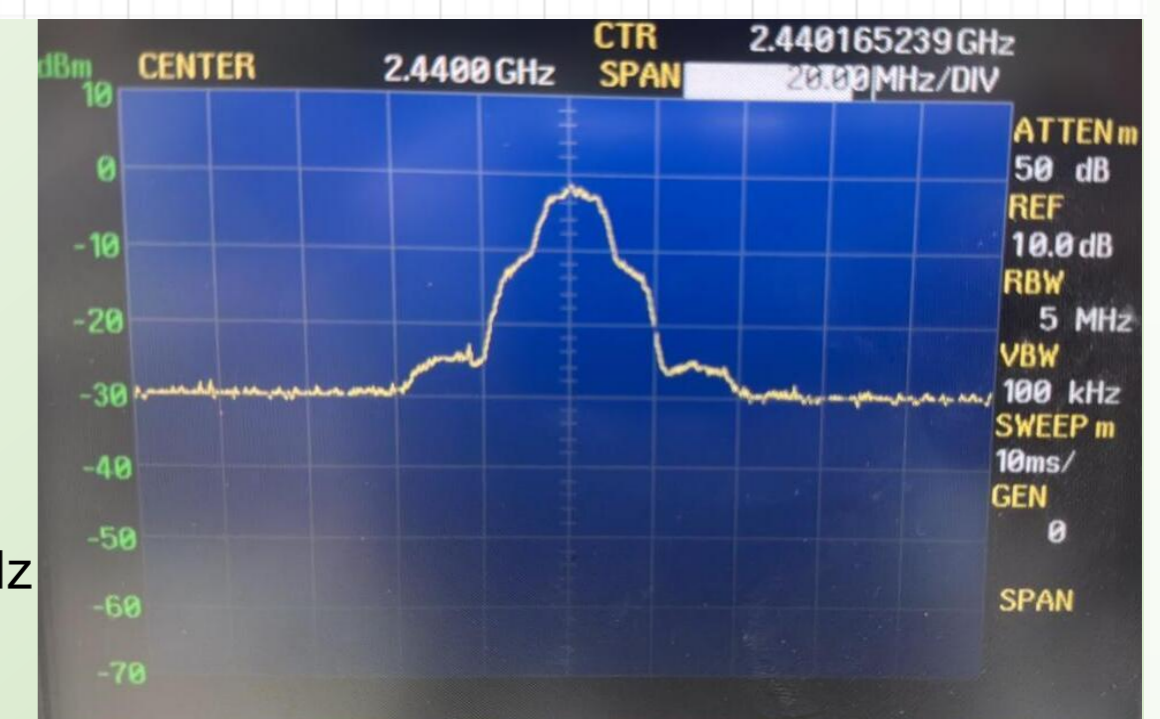


Setup:

Input Signal Bandwidth: 10 MHz.  
Carrier Frequency: 2.44 GHz.

Results:

Output Signal power: -3 dBm.  
Output Signal Bandwidth: 80 MHz.  
Output Center Frequency: 2.44 GHz



### Project impact

#### 1. Economic Impact:

Addressing a New Problem with Commercial Prospects:

Facilitating New Technologies and Products

Regional Economic Impact

#### 2. Societal Impact:

Solving Societal Problems and Enabling Opportunities

Improving Security, Crime, and Terrorism Prevention

#### 3. Environmental Impact:

Reducing Non-Renewable Resource Use

Promoting Sustainable Production and Consumption

Decreasing Environmental Pollution

### Conclusion

In conclusion, The project involves the design and creation of a Tactical Fixed-Wing UAV system that counter UAV threats by using Radio Frequency Jammer.

The proposed business involves the development and deployment of a Tactical Fixed-Wing UAV system equipped with RF jamming capabilities for countering drone threats in the KSA defence sector. The integration of RF jamming technology into a Tactical Fixed-Wing UAV provides a unique advantage by combining the strengths of ground anti-drone systems and long-range missiles.