

## Introduction

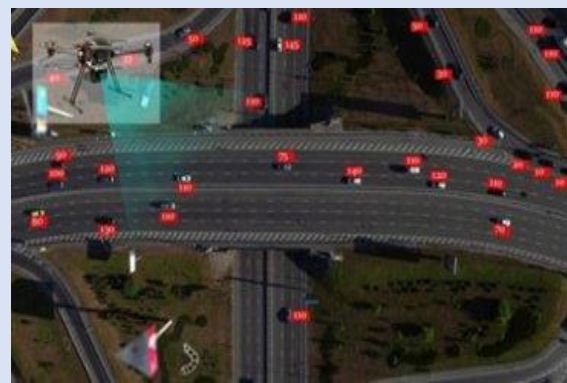
**What is UAV?** Unmanned Aerial Vehicles that are driven by remote technology without pilot



Unmanned Aerial Vehicles are operated by experts using Ground Control System.

**How is UAV operated**

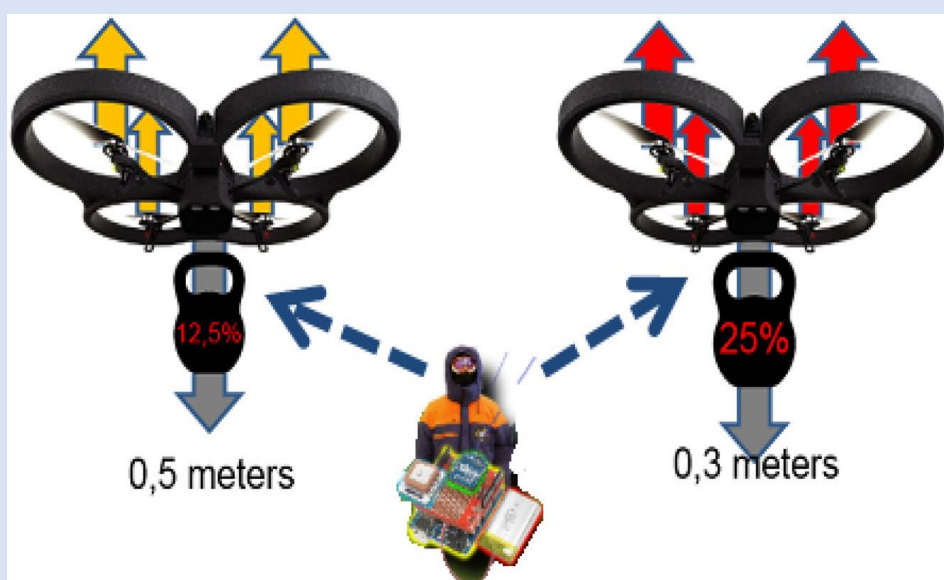
**UAVs Application** Agricultural production, Monitoring and tracking traffics, Medical and emergency services



**UAV-based Attacks** Jamming attack, Spoofing attack, Eavesdropping attack, Distributed Denial of Service (DDoS) attack, Replay attack, etc.

## Objectives

Find a solution to mitigate the security threat and provide countermeasure against the Depletion of Battery (DoB) attack.



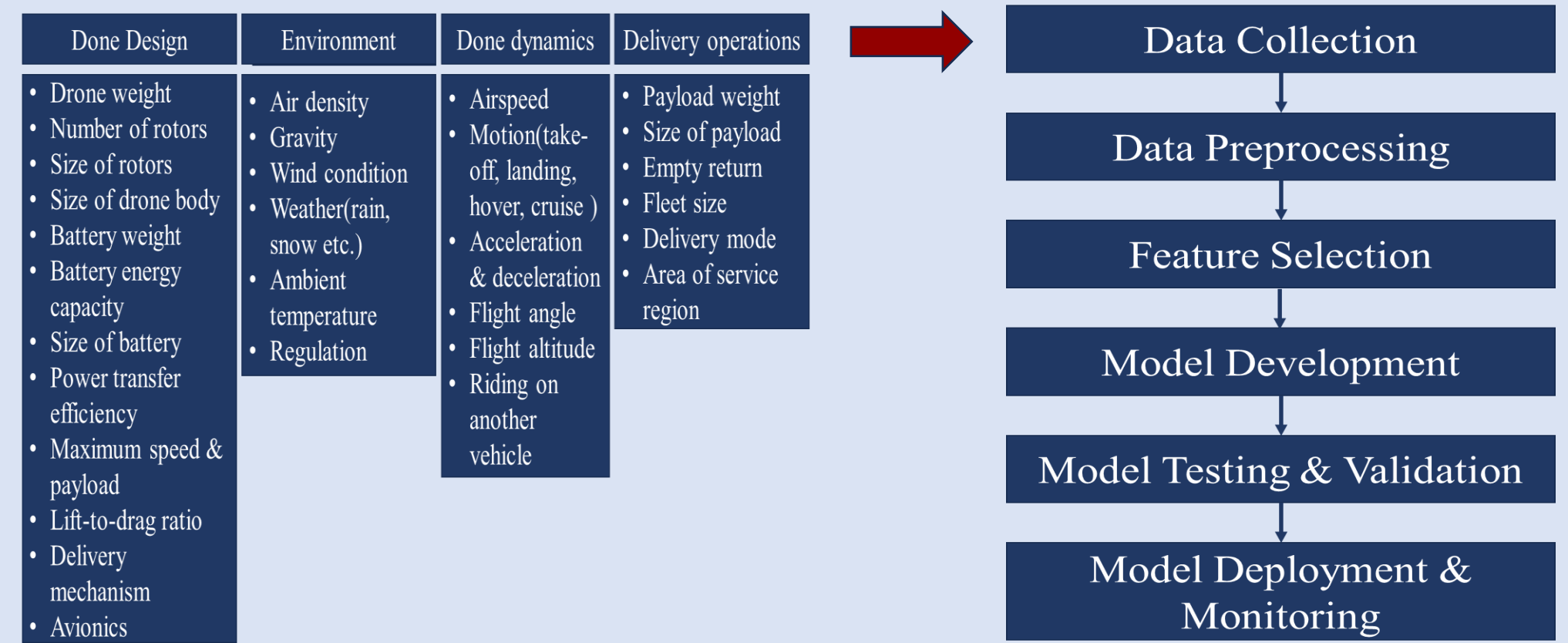
**DoB attack** is a security attack in which the energy of a device is depleted in processing unexpected/illegal operations.

**The Depletion of battery attack (DoB)**

- Can cause the mission failure and crash the drone.
- Compromises the battery's availability and its information integrity and confidentiality
- Can cause the replacement of the out of battery devices which increases the maintenance cost
- Resulting battery degradation and potentially an explosion
- Reduces battery life and may cause mission failure or even crash

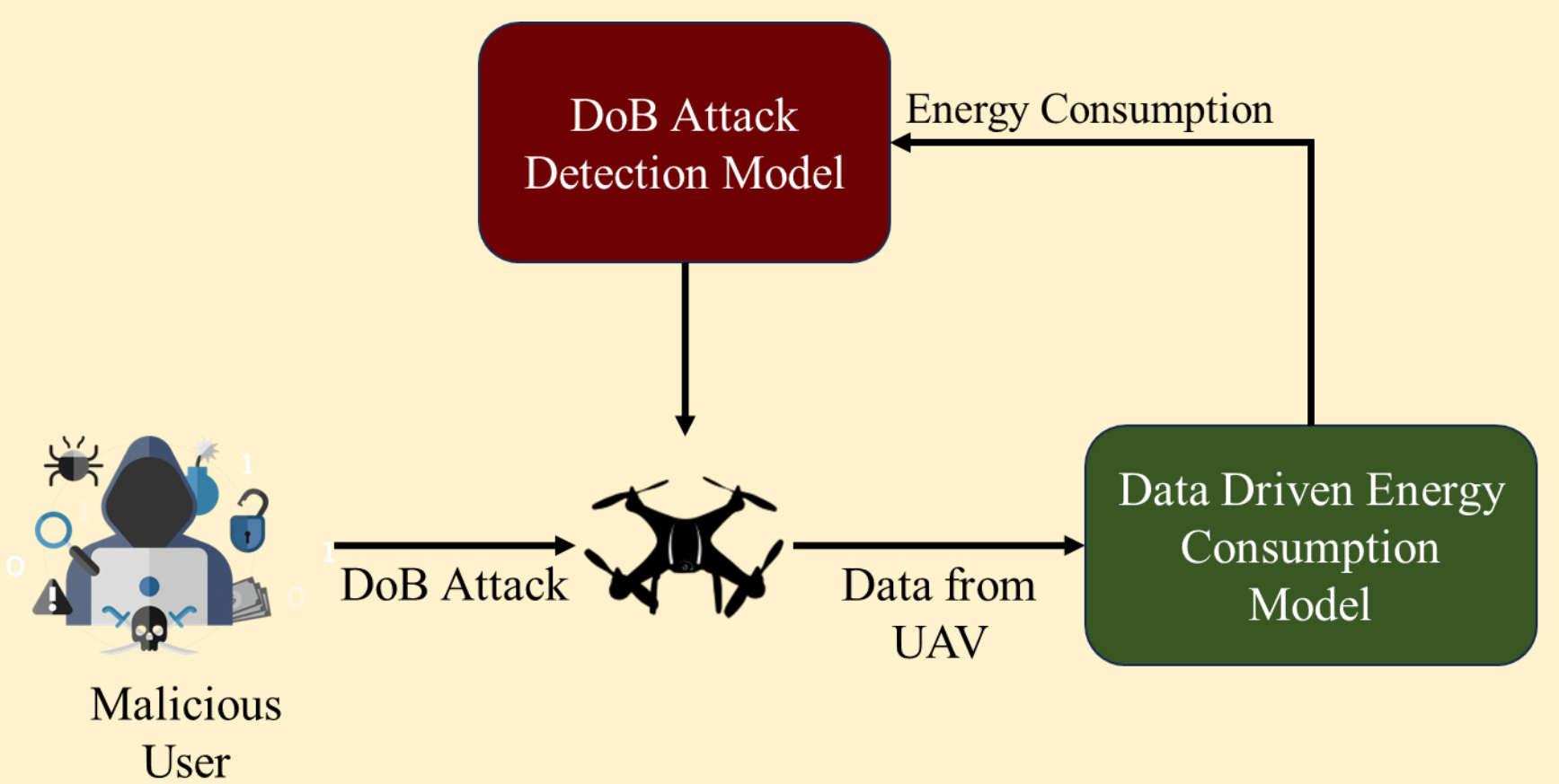
## Proposed Solution

Develop Energy consumption model

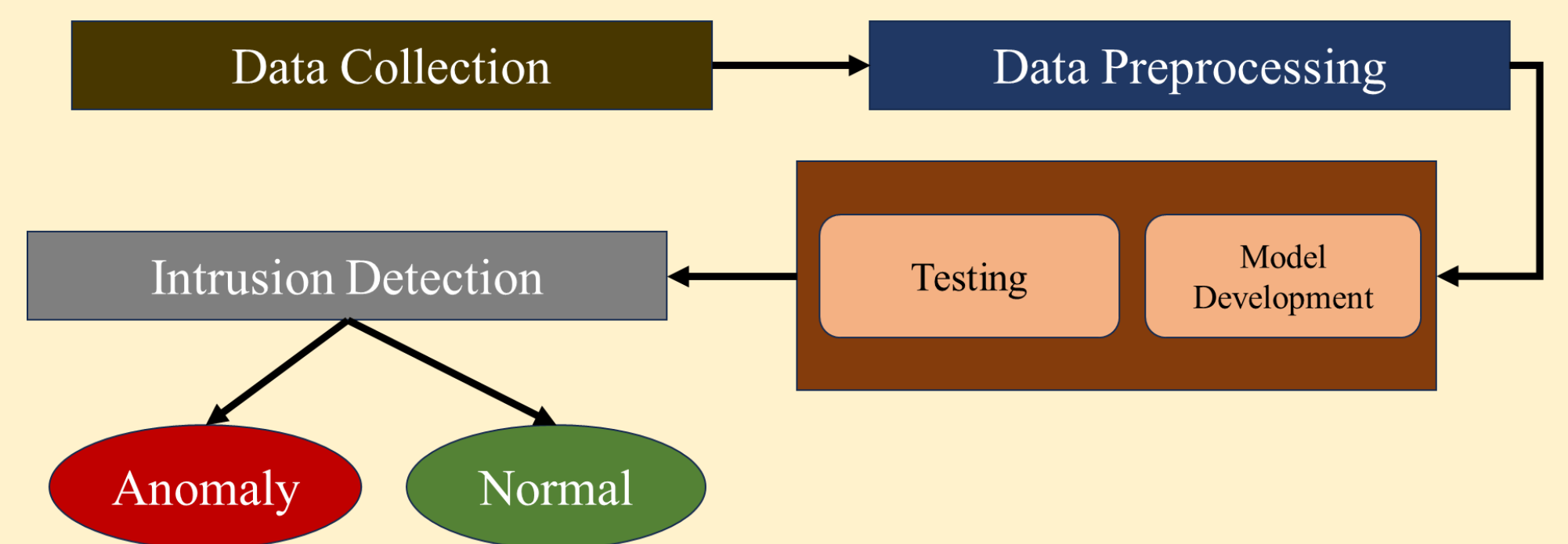


- Collect relevant data from UAV
- Clean and preprocess the collected data.
- Identify the most relevant features that are likely to influence energy consumption
- Select machine learning algorithm, train the model, and evaluate its performance.
- Fine-tune the model, test it, and validate its accuracy.
- Deploy the model for real-time energy consumption prediction and monitor its performance.

## Depletion of Battery attack detection



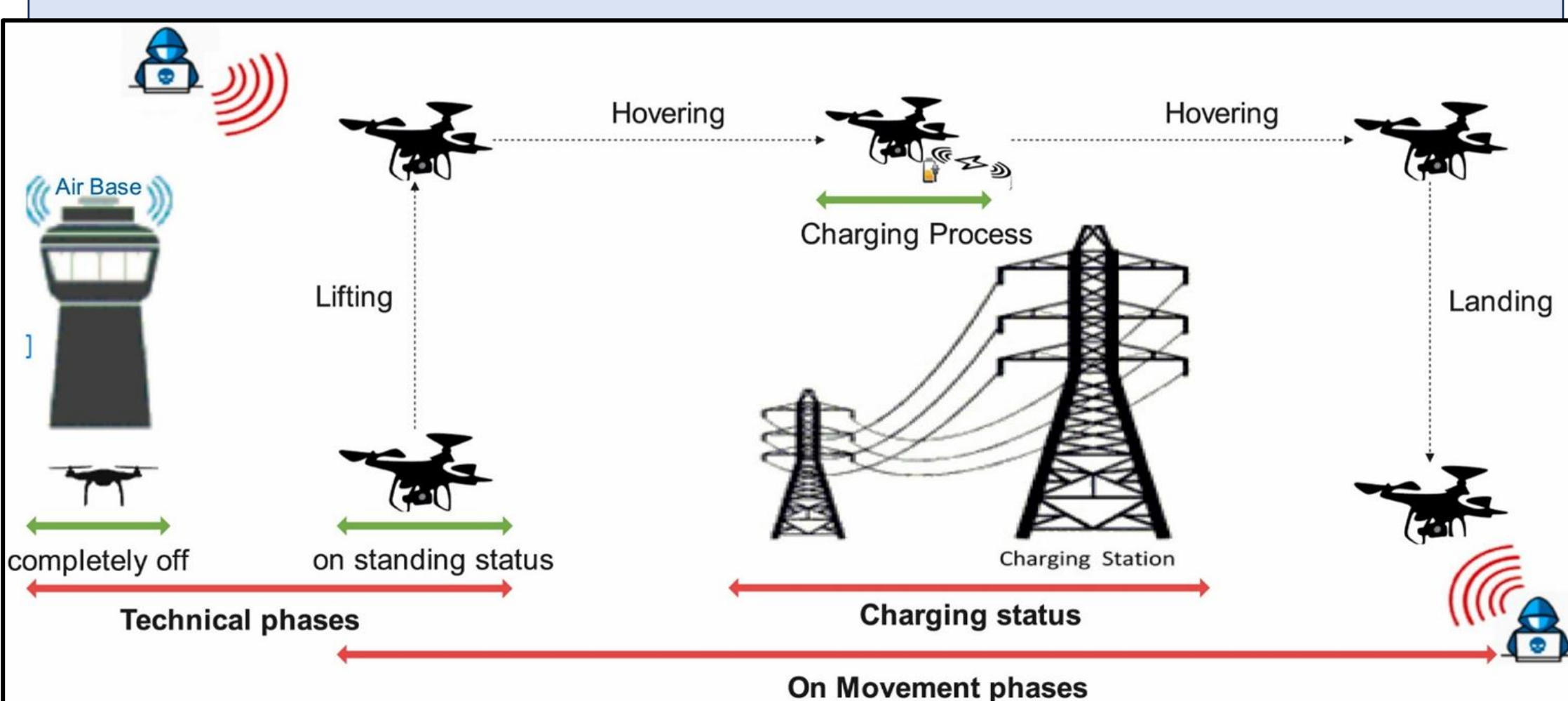
Proposed model for DoB attack detection in UAV operation



Workflow diagram for the proposed DoB attack detection on UAV using AI

- Collect data from different industrial partners. Alternatively, we will use existing available dataset or dataset developed by simulation.
- Pre-process all the data that required for modelling purposes.
- Select machine learning algorithm, train the model and validate the model
- Evaluate the performance of the model using performance matrix.
- Detect anomalous based on the input features.

**After identifying the source of attack, we will activate the safe operating mode and isolate the malicious node to secure the UAV.**



Different UAVs operations and process status