Protecting Critical Infrastructure from UAV Threats- Developing an Integrated Multi-Sensor System for UAV Detections

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Unmanned Aerial Vehicle (UAVs) (*drones*) can pose a threat to critical infrastructure through accidental or intentional crashes or by delivering damaging payloads to substation components.

264 substations in Connecticut

Cost ~ $600

Payload: 13.23 lbs. (6 kg)

Cost ~ $6,000
Investigate existing products and technologies for detecting UAVs.

- Development of UAV test facility integrating multiple types of sensors and UAVs.
- Set up commercial UAV detection products (RADAR, LiDAR, Radio Frequency) at a pilot substation.
- Evaluate the effectiveness of sensors during various weather conditions, UAV flight scenarios, environment settings, and determine the benefits of combining multiple sensor types into a detection system.
- Development of a gateway to integrate multiple sensors and maximize performance.
- Perform an economic cost-benefit analysis for investments in securing substations against UAV threats.
No. of substations

Proximity to forest edge:
- 50m
- 100m
- 150m
- >150m

Substation seen in a LiDAR point cloud.
Economic Analysis

Determine if it is worthwhile to invest in UAV detection systems. Find the equipment option with the best return on investment.

Cost-Benefit Analysis: Economic evaluation technique that quantifies and compares the benefits and costs of different investment options.

Selection of investment option:
- RADAR
- LiDAR
- Radio-frequency
- Fencing

Identification and evaluation of benefits and costs:
- Benefits: Economic gains
- Costs: Economic losses

Decision making:
Implement net present value (NPV) method to evaluate UAV detection system and select the best investment option.
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