**Introduction**

We address the problem of patrolling a known target area, by a UAV having a limited visual range.

The goal is to cover all the accessible points of interest in the environment repeatedly over time, while achieving the tasks below:

- Maximizing the frequency of visiting the points in the target area.
- Detecting the maximum number of events occurring in the target area.
- Minimizing the event detection time.

Visiting the points can be accomplished with uniform or non-uniform frequency.

**Applications**

- Planetary Exploration
- Forest Monitoring
- Ocean Monitoring
- Military Surveillance
- Intruder Detection
- Search and Rescue Operations

**UAV Specifications**

The custom-built UAV, a quadrotor with a high degree of maneuverability, consists of the following components:

- 1120kv Brushless Motors (4)
- Electronic Speed Controllers 30A (4)
- 9x4.7 Propellers (4)
- 3-Cell LiPo Battery
- ATMega328 Microcontroller
- Sensors (Accelerometer, Gyroscope, and Magnetometer)

**UAV Stabilization**

A closed-loop PID controller is used to stabilize the UAV. The PID controller requires position feedback from the quadrotor to make the corresponding adjustments in the input signal. This feedback is received from three different sensors (accelerometer, gyroscope, and magnetometer). A Complementary Filter is used to fuse the output of sensors.

**Future Directions**

**Multi-UAV Systems:** Coordination and collaboration among multiple UAVs in the patrolling task.

**Uncertainty:** Investigating noisy sensors, action uncertainty, and unknown obstacles.

**Robustness:** Robustness to robot failure, communication failure, and message loss.

**Dynamic Environments:** UAVs’ ability to change their behavior over time in response to a changing environment with dynamic obstacles.

**References**