UNMESH MASHRUWALA
Innovation Cell
IIT BOMBAY

The Surgical Recon Mission :

Overview:

Date : _ 2:15 am _.__ 27th Sep _ 2016_ __
Place : 3 Km from LoC, PoK

India prepared itself to rage a surgical strike against the suspected militants in Pakistani-administered Kashmir in response to the immoral URI attack. The mission was to destroy the terror camps, the suspected terrorists, their guides and handlers. 25 Army commandos were dropped in the enemy territories by the Army's Dhruv Advanced Light Helicopters. The Army Commandos had to advance for about three Kilometers in the enemy territory which was under high surveillance. The Indian Army plans to deactivate these surveillance systems with the help of drones which navigate through the poorly surveillanced regions and reach out to the control center where it decodes the encrypted key to hack into their systems and deactivate it.
The mission was conducted in the Dense terrains with very low signals, and hence the drone has to be autonomous in its mission.

Problem Statement:

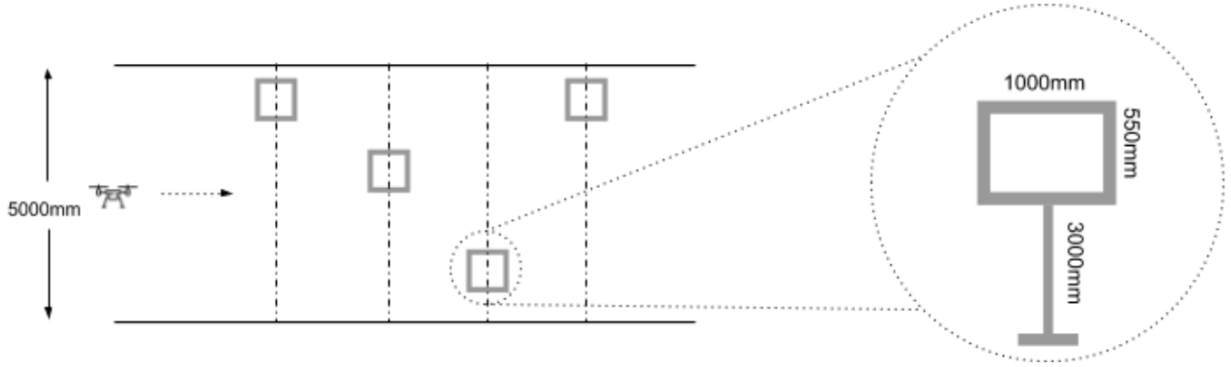
The objective of the problem statement is to come up with an autonomous drone with minimum payload capacity of 2 kg, which is capable of traveling in a static environment avoiding any collision with the obstacles in its path.

Environment Specification:

You are given six rectangular gates in the simulation world placed in an aisle.
The drone will travel along a straight aisle. The aisle will have 6 gates which the drone has to pass through. The gates can be placed anywhere in the aisle but will stay perpendicular to the aisle.

Gate Specification:

The gate will be a rectangular frame 550 x 1000 mm (L x B). The gate will be mounted on a frame at the height of 3000mm



Top view of the Aisle *Front view of the Frame*

Mission:

The drone has to take off from its launchpad, detect these rectangular gates and navigate through them without any collision. The decryption kit weighs 2kg, so your drone should be capable of lifting this payload.

There is a wall placed at the end of the sixth frame with 3 pictures on it. Each of these pictures have a letter printed on it. You are required to detect those letters and compare with your database and land in front of the correct one to accomplish the mission. You are supposed to complete the whole mission within 5 minutes to deactivate these surveillance systems and help Indian Army to successfully execute their mission!

You are required to design the workflow, algorithms and simulate this entire mission. For simulation, we suggest you to use Gazebo as your simulation platform and PX4-SITL Firmware. More on PX4-SITL in a separate doc which will be shared with you soon..