

# System Overview

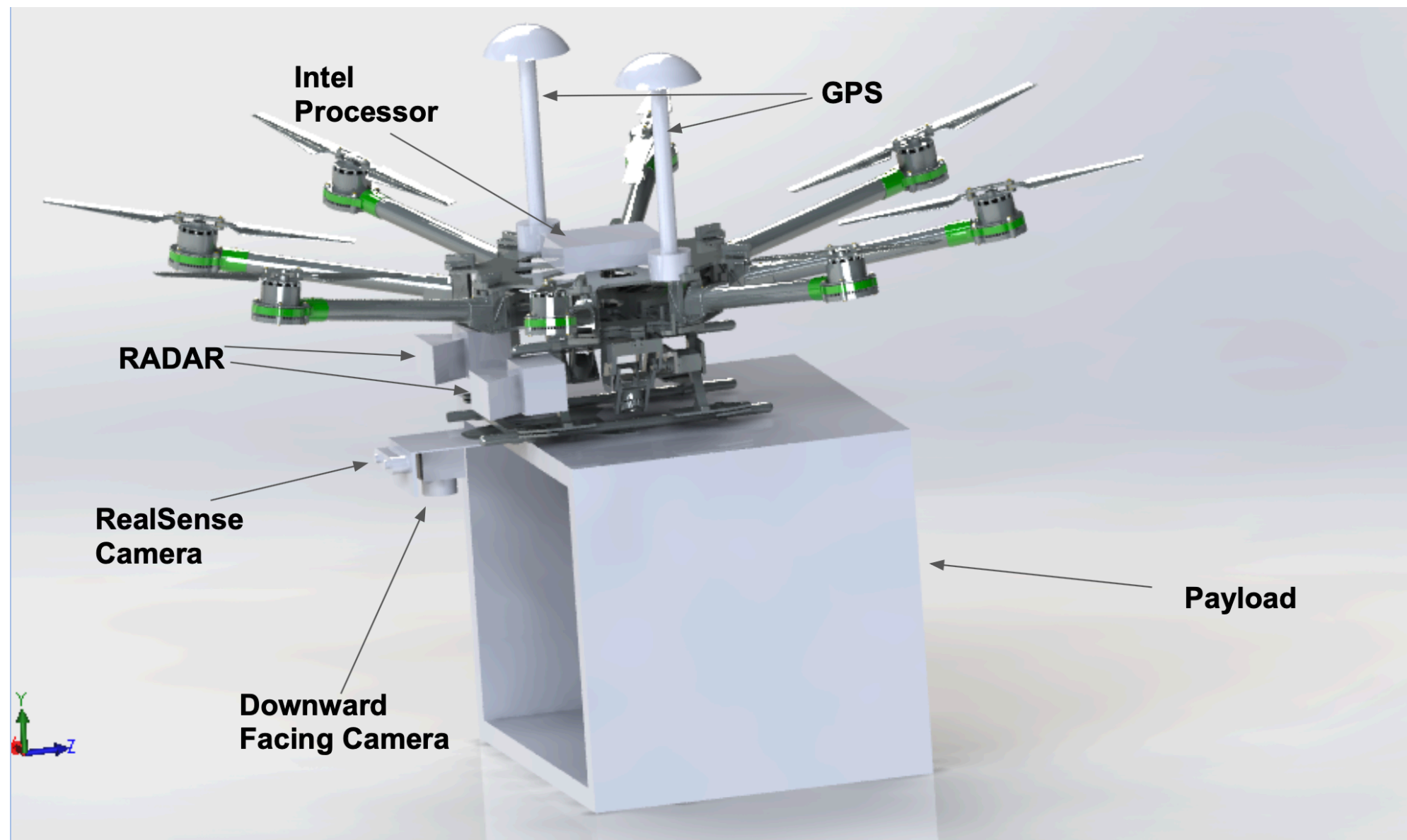


# Objective and Motivation

*Development of a UAV capable of autonomous flight in a previously unexplored environment carrying a payload, SLAM based navigation through a typical urban setting with high rise buildings and other objects as obstacles.*

## Key Milestones -

- State Estimation through monocular camera and improvements through Inertial Measurement Unit and RTK GPS
- Detection of landmarks and obstacles to manoeuvre around, also serve as waypoints for navigation
- 3D Outdoor Mapping through VoxBlox/Octomap and devising a path planning algorithm
- Control strategy incorporating the dynamic effects of payload, minimum snap trajectory control.
- Mechanism for payload attachment and final delivery



*Hardware Assembly Overview*

The drone propelled by a PixHawk flight controller which manages the necessary low-level flight commands to execute any desired viable motion. The VINS module is a monocular camera (BlueFox) and IMU (Xsens) equipped with a structured light stereo camera for point cloud registration. The mono-cam and IMU together provide accurate odometry information of the flight online. This is further fused

with a RTK GPS for improved accuracy. An Intel NUC, a mini-pc with desktop class performance, serves as the brain of the drone, connecting all the aforementioned devices. The entire system and all modules are powered through a 24V LiPo battery, through necessary power distribution boards and voltage regulators. Estimated flight time for the entire system comes around 30 minutes