

# Real-Time Static Obstacle Avoidance Outdoors

## ABSTRACTS

This project expands the horizon of autonomous navigation for unmanned aerial vehicles in the dimensions of state estimation, mapping, planning and control, all in outdoor urban environments.

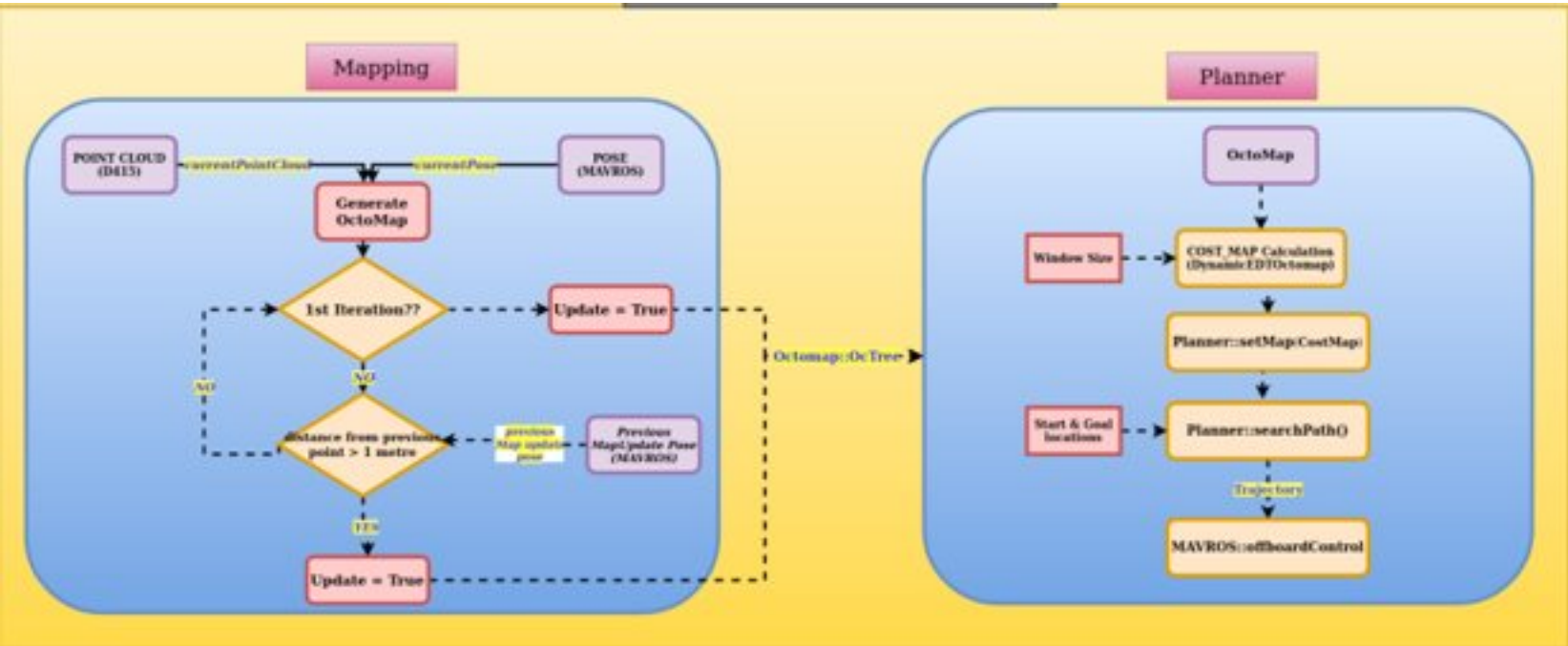
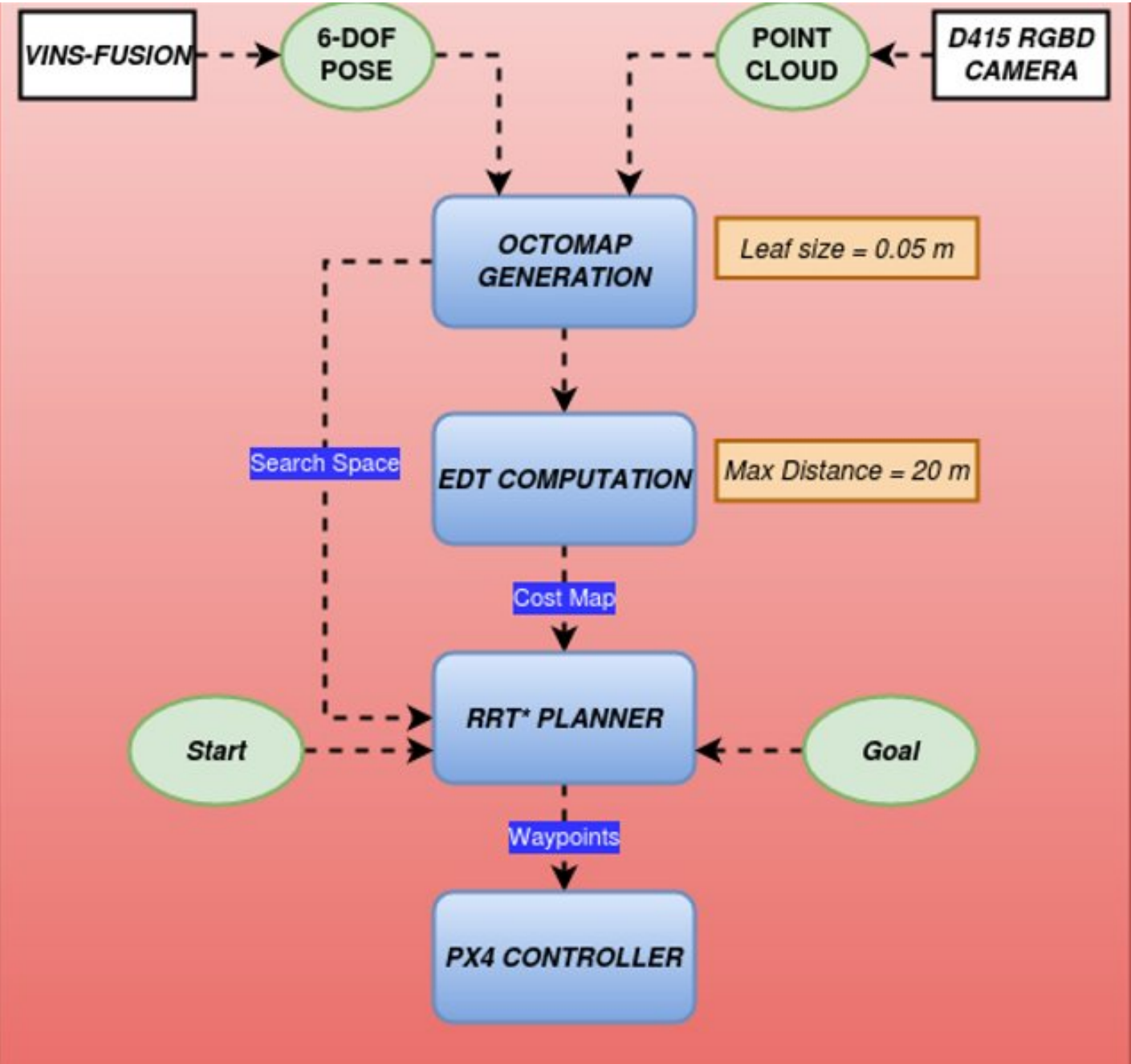


Above are some of our Quadrotors developed/extended at the RRC, and equipped with RGB Cameras, Depth Cameras, RTK GPS, 6-DOF IMUs. The central theme is to develop systems that use low-cost low-compute sensors to perform the above stated tasks with reasonable accuracy and can run on computers on-board the vehicle.

## OBSTACLE AVOIDANCE

An overview of the methodologies developed for outdoor obstacle avoidance -

1. Map Available (Known Environment)
2. Map Unavailable (Unknown Environment)



These 2 methods of obstacle avoidance, in principle differ on the amount of information available pre-flight. Method 1 - for a known, mapped environment, a planner extracts waypoints too reach a certain goal that are passed to the drone. Method 2 - is the more general method in which any environment can be navigated by building a map and computing waypoints on-the-fly.