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Abstract

A ground control station (GCS) software is a control centre which facilitates the human control of Unmanned Aerial Vehicles (UAV), often running on a ground-based computer system. These softwares provide the facilities for planning and flying a mission with the help of an on-screen map where the user can place waypoints and see the progress of the mission. *Mission Planner* is an open-source GCS software framework which uses MAVLink protocols for communicating with the UAVs. The objective of this project was to learn about MAVLink and GCS-UAV communication and then use *Mission Planner* as the base to develop a custom prototype GCS software with additional features.

After doing an in-depth and comprehensive study on the *Mission Planner* source code and the MAVLink protocols, the initial goal was to understand the telemetry log generation mechanism used by the GCS software. Improving the operability and user interface of the software was the primary target of this project. Survey Grid generation panel was integrated with the Flight Planner panel to reduce complexity. An improved flexible polygon grid system was developed which replaced the original *Mission Planner* polygon grid system. This system allows the users to define and customize polygons for grid generation effortlessly. Integrating a custom external firmware in the SITL (Software in the Loop) Simulator panel and adding custom camera parameters were among the other features implemented in the prototype. Changes were also made to the theming system and splash screen to enhance user experience.

(a) Original Polygon Grid System   (b) Improved Flexible Polygon Grid System

Figure 1: The implemented flexible polygon grid system allows users to add a node in-between two vertices to extend the polygon into any desirable shape as compared to the original polygon grid system which allows vertex addition only between the first and last node, limiting software operability.