

Temasek Defence Systems Institute

SIM-1 UAS: A Framework for Rapid Prototyping of MATLAB Developed Flight Test Codes

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Motivation

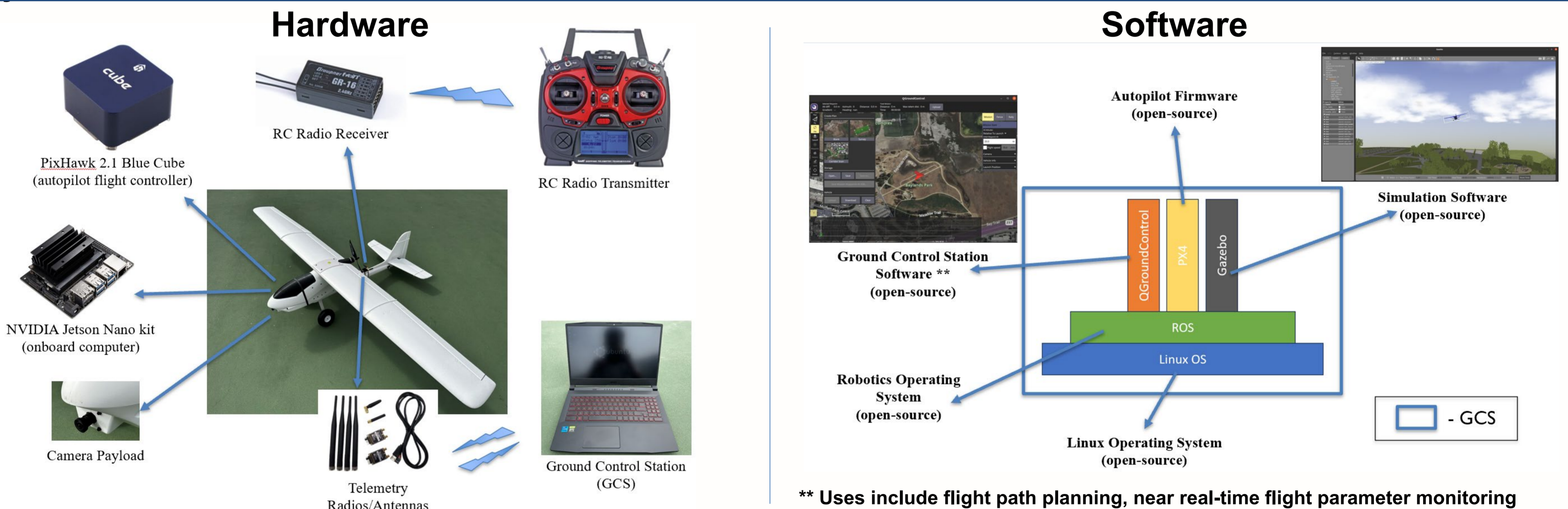
- Unmanned Aerial System (UAS) like the ScanEagle has been used extensively in military and research.
- Despite their low cost, the utility of these UAS for research and specialised use is limited due to proprietary hardware and software.
- SIM-1 UAS which uses open-source hardware and software aims to bridge this gap.



Problem Statement

- How can a low-cost, COTS UAS (e.g. the SIM-1 UAS) be best utilised for:
 - Education in the form of supporting coursework and lab work?
 - Research in flight testing novel sensing and control algorithm?

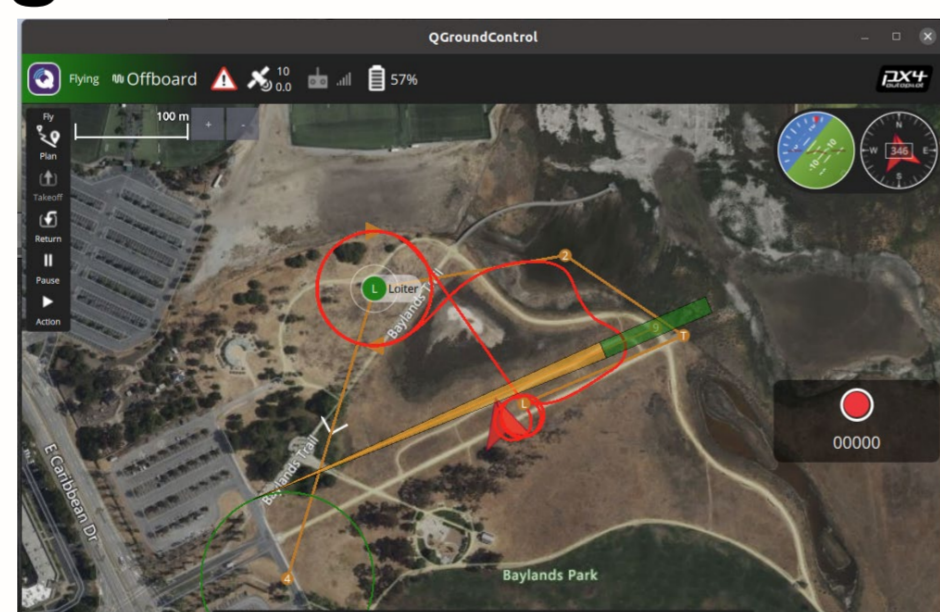
System Overview



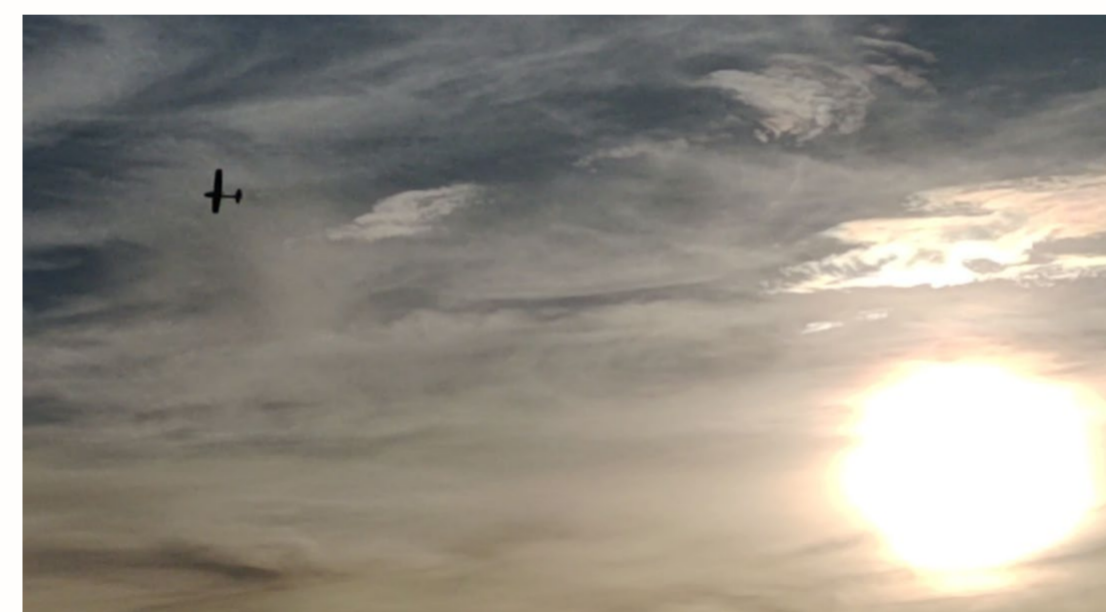
Testing Results

Virtual Flying

- Basic waypoint following
- Loiter flights
- Autonomous flying
- Manual flying



Actual Flying



3D plot:



- Successfully implemented MATLAB-developed flight test codes to divert SIM-1 from its original flight path.
 - An avenue for MATLAB codes to influence SIM-1 UAS's flight in other ways.

Benefits of Research

- SIM-1 UAS provided an accessible platform for education and research works.
- Research also provided a framework where students could utilise, to test MATLAB developed GNC algorithms from software end to hardware end.

Future Works

- Vision-based algorithm such as object detection capabilities.
- Concurrent operations and interaction of multiple SIM-1 UASs.

