Autopilot: ArduPilot

600 parameters you can change from ground station

All open software can change inner loops

Three-year project

Goals:

- Vehicle flying inside mines

- No GPS, visual and other forms of navigation

- Wrote paper that describes requirements, and what is out there (literature survey)

Purpose is not redesign from scratch, specify what is required, use off-the-shelf platforms and software

**Project will end when vehicle can fly under basic autopilot in indoor environment from one point to another**

Some form of measurement to stay in centre of corridor

Keep away from walls and move along corridor

No SLAM, no hard-core sensing

CSIR wants platform that is compatible with what CSIR is doing at MSM

Compatible with software and hardware that will be required

Hardware-in-the-loop simulation in ESL compatible with off-the-shelf quad rotor and autopilot

Sustainable way

Possible to use Matlab directly for HIL with autopilot

ArduPilot interface via Ethernet?

As independent from custom hardware in ESL lab as possible

By the end of year have hardware with basic interaction with HIL

Next year HIL refinements and flight testing

Interface of ArduPilot vs Interface of Matlab HIL

HIL uses JSBSim

Do we need a piece of hardware to interface ArduPilot with Matlab HIL simulation?

PX4 software for PixHawk hardware

PX4 firmware into ArduPilot architecture

Can deploy ArduPilot onto PixHawk

Access to source code

Do we have access to change the control block diagrams inside the software?

Modular blocks in Ardupilot

PX4 DevGuide

Long term standardisation

ODroid

MAVLink, UAV CAN

How to write up thesis?

System engineering type approach

First capture requirements

Then do conceptual design of hardware and software components

Check interfaces

Select off the shelf hardware and software components that meet requirements

Decide what tests you are going to perform to verify that system meets requirements

Implement system

Perform tests

Been doing similar kind of process for other project

Start with User Statement of Requirements

Thesis will be structured to follow the system engineering process

Requirements should extend to future expansion options

Option to expand thrust capability

Option to expand processing power

Option to interface to differential GPS

Option to interface to smart sensors (LIDAR, Optical Sensors)

To do:

1. Verify that Ardupilot will be able to interface with Matlab HIL simulation

2. Check that you can customise the actuator mixing

3. Check that you can change the controller code and estimator code

4. Check that you can connect it all together

5. Check if you have enough processing power to do image processing for your

6. Send project proposal / requirements to Japie?