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*“A Project”*

Prepared by Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Abstract**

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**Definitions**

|  |  |
| --- | --- |
| PFMS | Predictive Flight Management System |
| HLO | High Level Objectives |
| PMP | Project Management Plan |
| QUT | Queensland University of Technology |
| QUAV | QUT Uninhabited Aerial Vehicle |
| UAV | Uninhabited Aerial Vehicle |
| ARCAA | Australian Research Centre for Aerospace Automation |
| QUAS | QUT Uninhabited Aerial System |

# Introduction

This document defines the High Level Objectives (HLOs) of the PFMS project which were defined utilising the provided statement of work and with consultation with the project customer . It serves as a record of defined work to be completed and delivered to the customer. This document contains both mandatory and desired objectives.

## Scope

This document outlines the HLOs for the 2009 Unmanned Aerial Vehicle PFMS project.

## Background

QUT has been developing UAV technology in various forms since 1991. In the past, subsequent to receiving commands from an autonomous traffic controller, flight trajectory prediction has been performed by linear methods which ignore the dynamics of the aircraft, weather effects and successive waypoints. A PFMS allows for an Unmanned Aerial Vehicle (UAV) to have some level of intelligence to determine whether it will be capable of intercepting a demanded waypoint at a given time, whether to ignore waypoints that may/may not be invalid if there is a higher then expected latency in the system, and how to handle the difference between mandatory (mission) waypoints and the demanded waypoints from the traffic controller. In advanced stages of the project the PFMS may include concepts such as autonomous collision avoidance that is independent of the autonomous traffic controller.

This year the Australian Research Centre for Aerospace Automation (ARCAA) requires a PFMS for the Smart Skies QUT Unmanned Aerial System (QUAS) resulting in the PFMS project. This document outlines the HLOs of the PFMS project defined during consultation with .

# Reference Documents

## QUT Avionics Documents

|  |  |  |
| --- | --- | --- |
| RD/1 |  |  |

## Non-QUT Documents

|  |  |  |
| --- | --- | --- |
| None. |  |  |

In the event of any conflict between this document and any RD referenced herein, such conflict shall be notified to .

In the following text, RD/x identifies referenced documents, where "x" denotes the actual document.

# 05757517 Project Summary

The PFMS is a planned, and required, subsystem currently in development for the QUAS. The PFMS will provide insight into the performance of a UAS across a finite prediction horizon allowing for scrutiny of if commanded waypoints developed by the ATCo, for collision free paths, are achievable by the platform. The system also will provide a level of intelligence to ensure ATCo data is valid due to inherent system latency or corruption during communication. The PFMS is required by the QUAS to install another level of safety to autonomous system to ensure safe cooperation with other unmanned and manned aircraft in busy airspace. and conforms to the rules and regulations governing flight within the National Aerospace System (NAS).

Current QUT trajectory prediction algorithms calculate waypoint arrival times using displacement between the current waypoint and the platform velocity. Evidently, present systems ignore platform performance boundaries such as minimum (stall) and maximum velocities, minimum turn radius, climb and descent rates, and attitude rate constraints. The inclusion of vehicle dynamics during trajectory generation allows for trajectories which allow for platform constraints and increases prediction accuracy.

The purpose of the PFMS project is to develop an improved trajectory prediction engine with aircraft dynamics and constraint considerations. To ensure he system must be validated and installed onboard the QUAS. To achieve the projects aims literature was surveyed and revealed that

A general summary of where the student’s work fits in the context of the broader project.  The student’s aims (you may refer to relevant system requirements) should be outlined and also the required major milestones for the whole project.

(1 page)

## Methodology for delivering against milestones

Statements that provide a convincing argument that the methodology that is being followed by the student will result in a high probability that the milestones are met.  Ie. Explain how you will guarantee delivery. For example this section should include key outcomes from trade studies that have influenced the design methodology. It is most important to show reference to other published work and techniques were relevant. You should be able to demonstrate that you have broad understanding of the previous approaches (or industry best practice). Where applicable schematic or architecture diagrams should be included along with supporting text. Finally a justification as to why you believe that the methodology you have followed is sound should be included.

(6 pages)

## Statement of progress against milestones

Convince us that you have some track record already. Are you on plan? If not why not and what will you do about this?

If there is a difference in the original proposal and the current state of project, an explanation along with how to bring the project on track must be included in the report.

(1 page)

## Risks

Explain an unforeseen problems and how you addressed this.  Also identify possible risks to delivery for future work.

(1 page)

# Conclusions

(1 page)

# Lessons learnt and recommendations

(1 page)

# Appendices