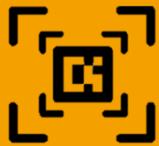
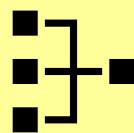


FALCON

Vision-Based Dynamic Landing System
for UAVs on Moving Platforms



Real-time localization
and trajectory prediction
for automated drone landings



Control and filter algorithms
for swift yet precise maneuvers
regardless of adverse conditions



Problem Statement

Most drones today can only land on static surfaces. However, real-world applications like maritime search-and-rescue, autonomous deliveries, or military deployments often require landing on moving platforms (e.g., a boat, ground vehicle, or even another drone). This pose challenges like uncertain platform trajectory, variable environmental conditions, and the need for continuous visual feedback.



FALCON

Our vision-based drone landing system explores autonomous robotics to create **reusable and modular** software components with the intention of being **real-time and easily extensible**. FALCON presents users with a **python-based GUI** that abstracts the backend complex algorithms. Users can **adapt FALCON's capabilities into any drone, fine tune parameters and simulate in real time**.

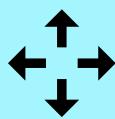
Features and Capabilities



1. Real-time marker
recognition &
distortion handling



6. Front End GUI for
Users to interface
with FALCON



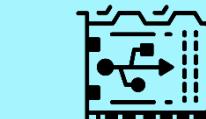
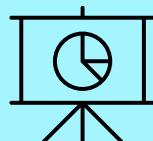
2. Motion approx.
using marker frame
sequences



7. Configurable PID
control parameters



3. Sensor fusion
using Inertial
Measurement Unit



4. PID-based Control
logic and algorithm
with noise filtering



5. Marker loss
recovery logic using
estimated trajectory



9. Fail-safe landing
mode and warning
system



10. Software test
harness using
simulated mock data

Software Engineering Practices

Version Control: All code tracked on GitHub using Issues, Pull Requests, Branches, milestone labels, tags, assignees.

Documentation: Inline code comments, README docs, architecture diagrams.

Modular Design: Separation of Concerns (SoC) across sensors, vision, control, and UI.

Testing: Unit tests and integration tests using mocked sensor and tag data.

CI/CD: GitHub Actions for continuous integration with basic testing pipeline

Tech Stack



Project By:

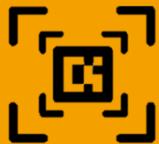
Joel Ku and Kenneth Wong Cun Wi

FALCON for Users:

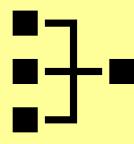
[HTTPS://GITHUB.COM/KUROKISHI592/FALCON.GIT](https://github.com/kurokishi592/FALCON.git)

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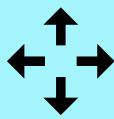
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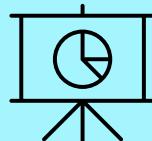
2. Motion approx.
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sequences



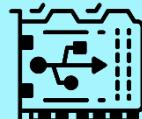
7. Configurable PID
control parameters



3. Sensor fusion
using Inertial
Measurement Unit



8. Logging/replay for
debugging &
visualization



4. PID-based Control
logic and algorithm
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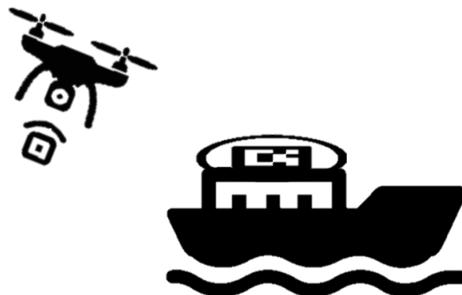
Project By:
Joel Ku and Kenneth Wong Cun Wi

FALCON for Users:

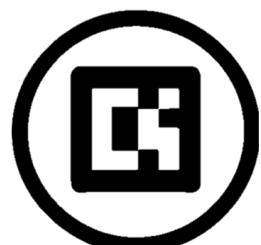
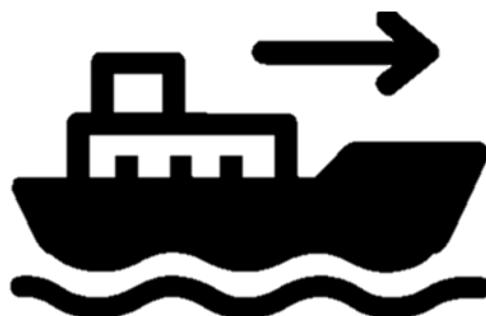
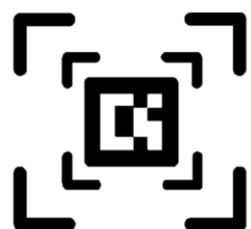
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About



Problem Statement

Features

Tech Stack

User Interface

Evaluation