

# Group 30: Moulting stage Penguin Monitoring System

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# Team Introduction

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# Problem Background

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## Critical Endangerment

African Penguins are on track to become **extinct by 2035** if current trends continue.

## The Moulting Challenge

They Undergo a 21-day catastrophic moult, during which they they shed and regrow their feathers

## Conservation Data Needs

- Conservation relies on monitoring physiological changes such as weight and health during moulting.
- Moulting is asynchronous→ system must monitor year-round.

## Individual Data Matters

With the population shrinking, tracking individual penguins is essential for targeted conservation strategies.



# Objectives

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## Smart Monitoring System

Implementation of an integrated system that automatically collects physiological data to track the moulting progression of individual penguins.

## Remote User Interface

Develop an interactive platform that allows researchers to remotely monitor and analyse moulting data in real time.

## Long-Term Data Storage

Implement a data storage system to retain individual penguin records, enabling the analysis of long-term health trends and supporting conservation strategies.





# System Overview

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## Mechanical subsystem

Scale Housing & Calibration as well as placement of all hardware components

## Electrical Subsystem

Integration of all hardware components and the packaging of collected individual penguin data that is transmitted to a remote server

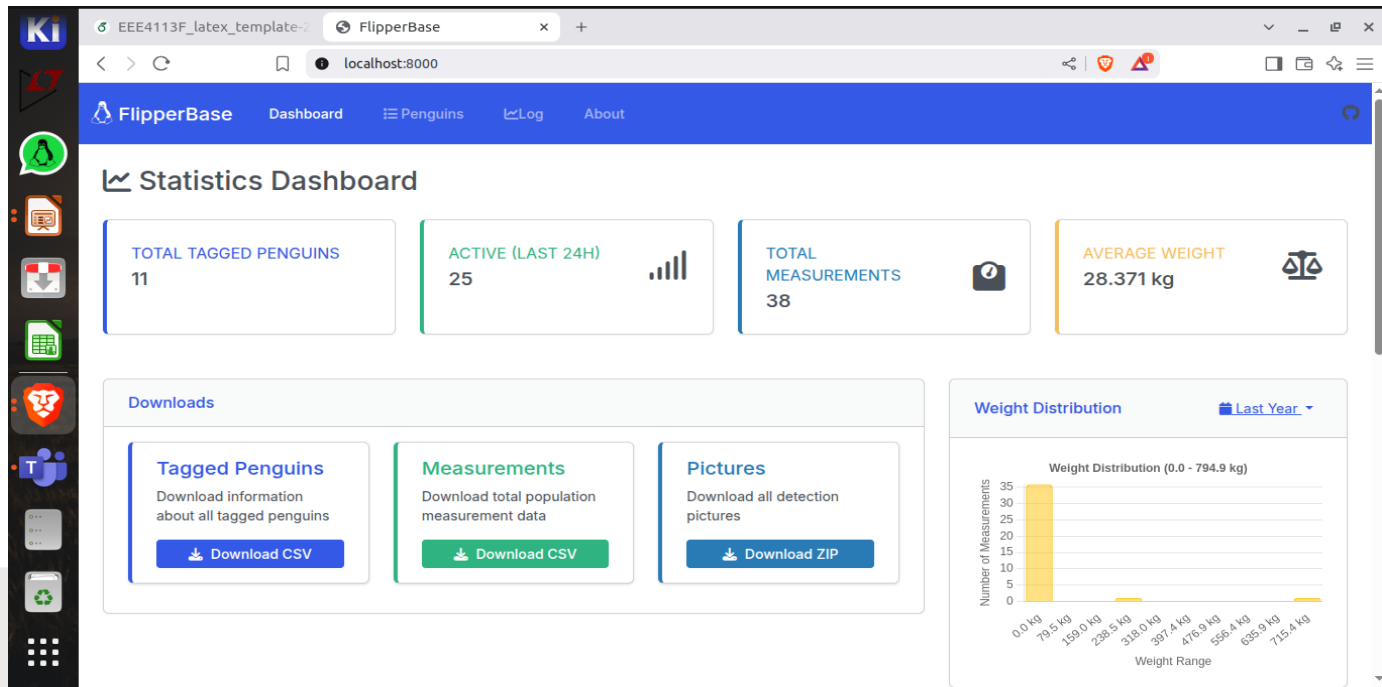
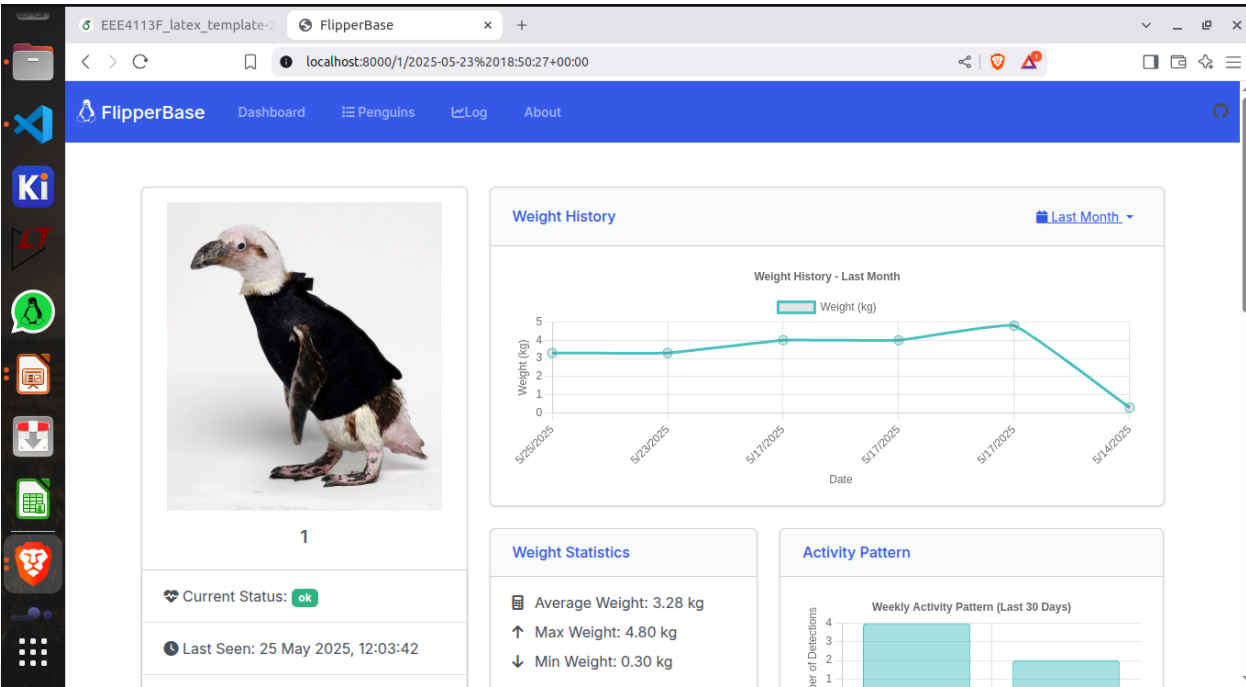
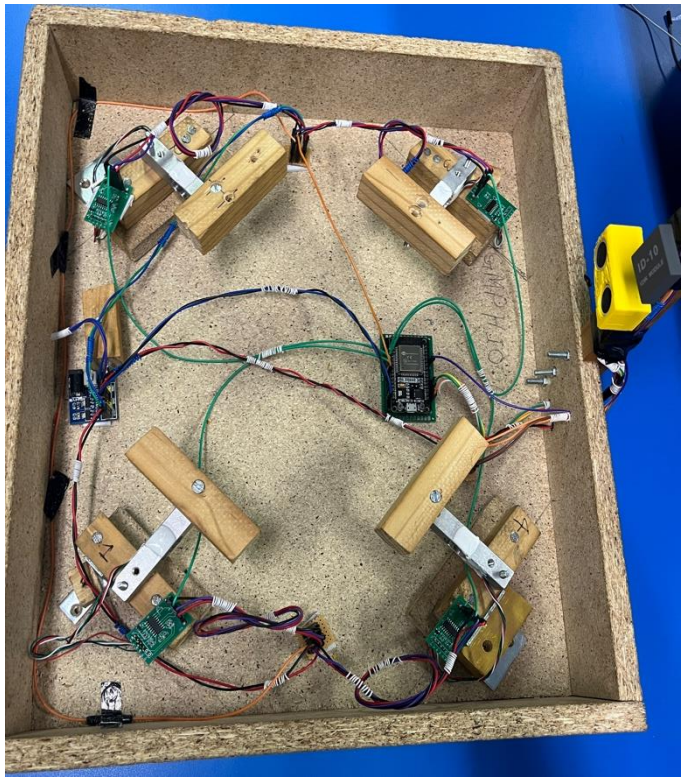
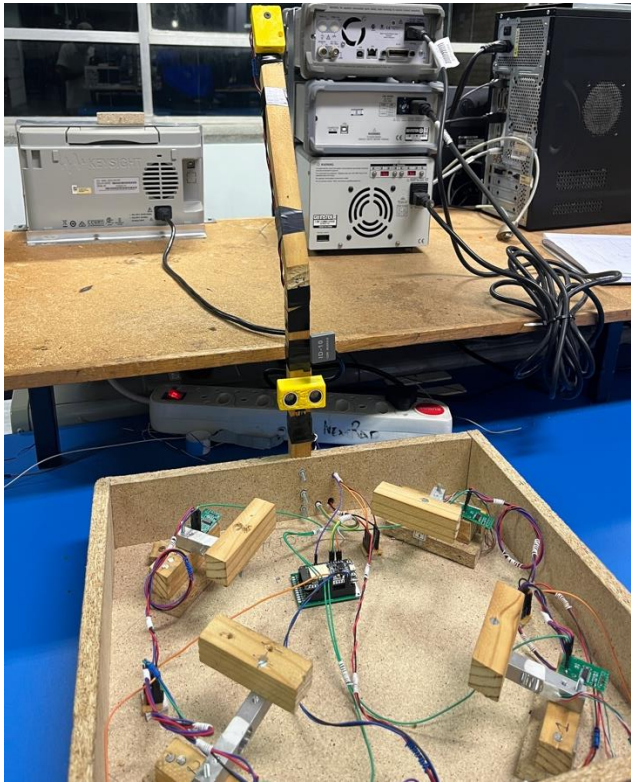
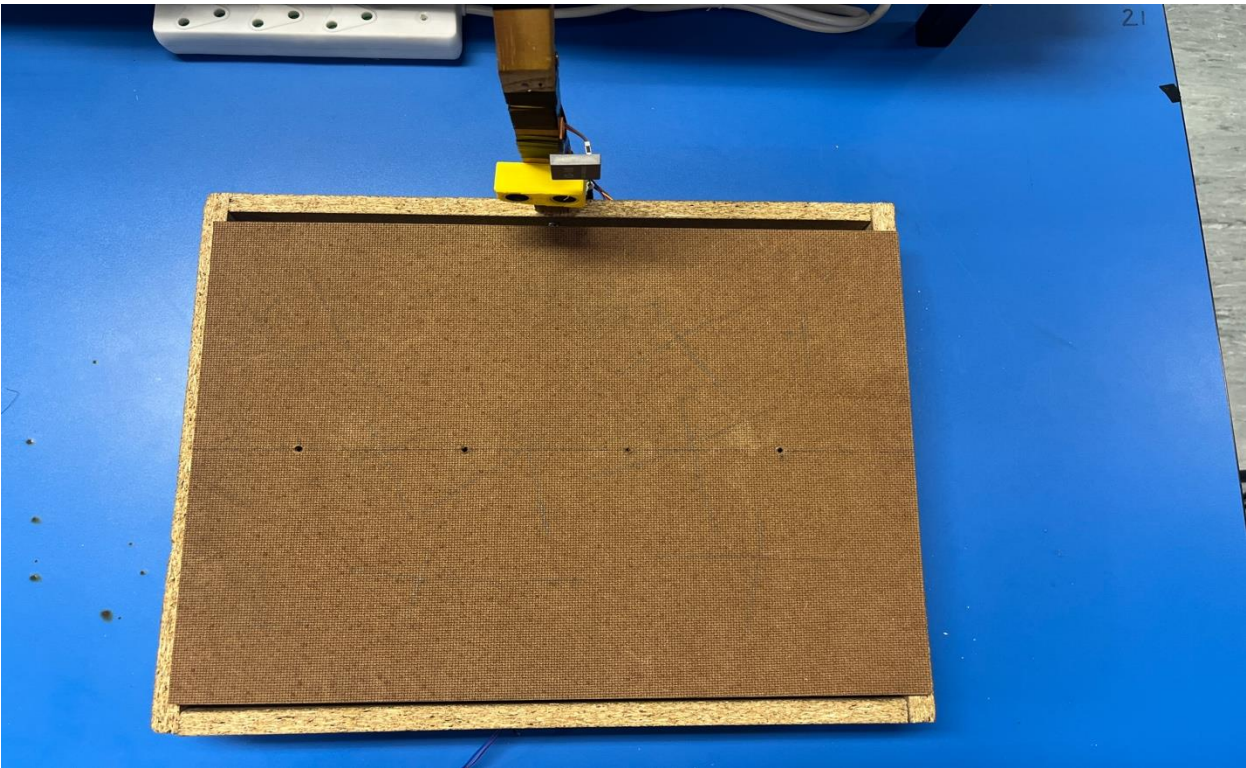
## User Interface & Data Storage

Involves creating a server and user interface that enables researchers to track moulting progression. Includes experiments in implementing machine learning models for penguin identification and moulting stage estimation.





# Final Solution





# Adaptability & Deployment Considerations

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- Designed for remote setup
- Non Invasive
- Scalability to other penguin colonies or bird species
- Low maintenance, solar/battery powered operation



# Conclusion & Future Work

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## Valuable Long-Term Insights

Enables collection of individual-level, long-term data — essential for analysing species health trends over time.

## Hybrid Identification Approach: Camera+RFID

Future enhancement: Integrate machine learning-based image recognition

## Ideal for Moulting Behaviour

Automated, non-invasive data collection suits moulting penguins' low mobility

## Key Requirements Met

- Works in remote environments
- Focuses on individual penguins
- Ensures non-invasive monitoring
- Supports year-round automated data gathering

