Anomaly Detection in the Drone System

Project Guide: Dr. Nilesh Raykar

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Overview

- Motivation
- Objective
- Literature review
- Implementation Phases

Introduction

A drone refers to any aerial vehicle that receives remote commands from a pilot or relies on software for autonomous flight. Many drones display features like cameras for collecting visual data and propellers for stabilizing their flight patterns. Sectors like videography, search and rescue, agriculture and transportation have adopted drone technology.

Motivation

- Preventing damage caused by failure of the drone system
- Increase in Drone Failure Incidents
- Failure resulting from the drone motor malfunction

Objective

Developing a system to prevent crash of the drone using knowledge of machine learning and sensor data to increase reliability and life cycle of the drone

Literary Review

Three failure modes of drones

Vibration-Based Fault Detection in Drone Using Artificial Intelligence

- Explanation about the three distinct failure modes faced in the drone motor
- The preventive measures to avoid the problems

- Development of a fault detection system based on the vibration of the multirotor arms using AI
- Details of ML technique used in the system

Literary Review

Anomaly Detection for Unmanned Aerial Sensor Data Using a Stacked Recurrent Autoencoder Method with Dynamic Thresholding
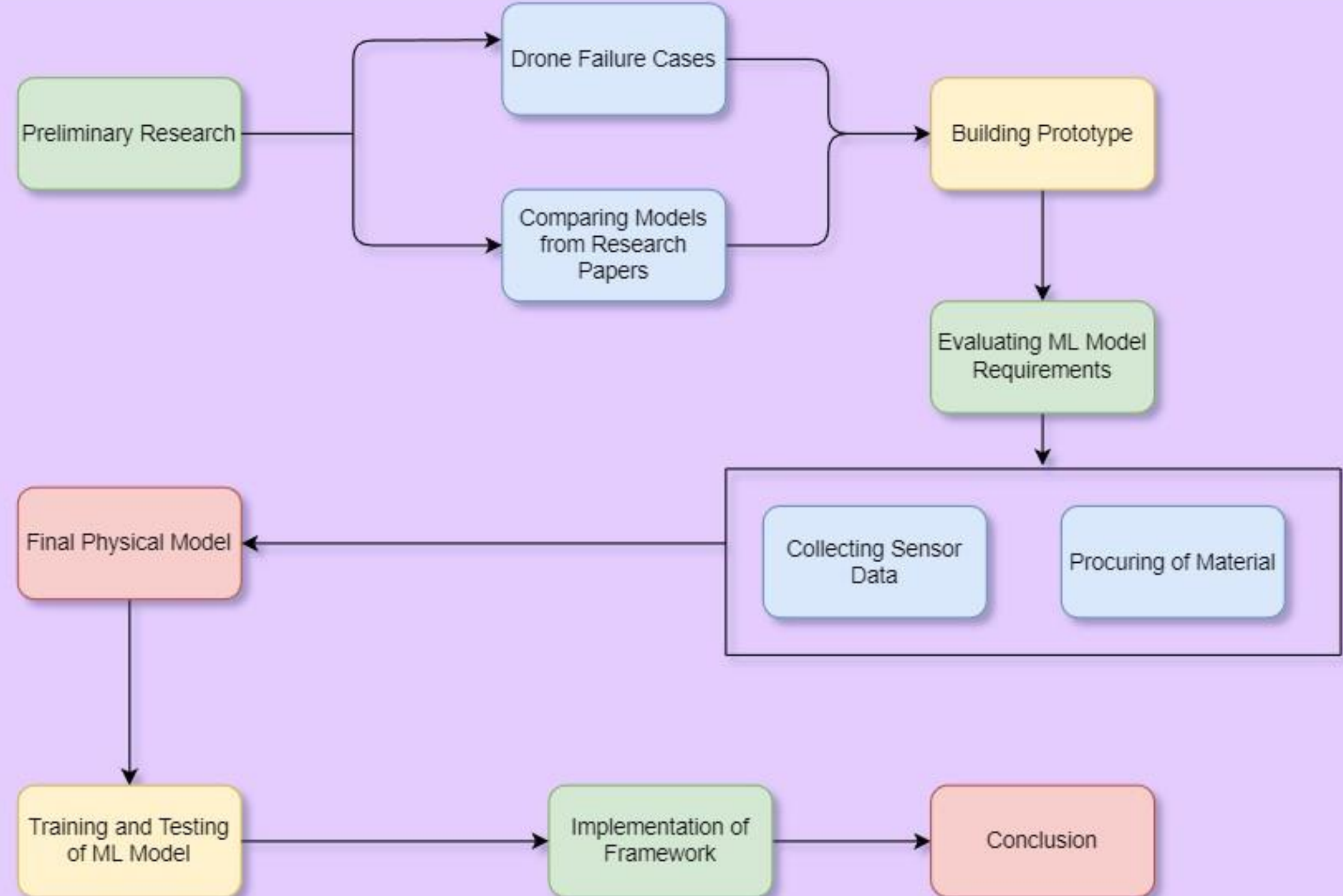
- The Sensor Data Using a Stacked Recurrent Autoencoder Method with Dynamic Thresholding and a weight loss function, to be applied to Unmanned Aerial Vehicle sensor data

Anomaly Detection in Drones with Machine Learning Algorithms

- Detecting anomaly in drone using individual as well as combined sensor data
- Detects state the drone is in using an ensemble of ML models

Project Plan for Predictive Maintainance of Drone

Preliminary Research → Drone Failure Cases / Comparing Models from Research Papers → Building Prototype → Evaluating ML Model Requirements → Collecting Sensor Data / Procuring of Material → Final Physical Model → Training and Testing of ML Model → Implementation of Framework → Conclusion

Implementation

Phase 1

- Preliminary Research

Phase 2

- Procurement of sensors and microcontroller
- Completing the prototype

Phase 3

- Collecting the data
- Designing the machine learning model

Implementation

Phase 4

- Training and hyper-parameter tuning of the developed machine learning model
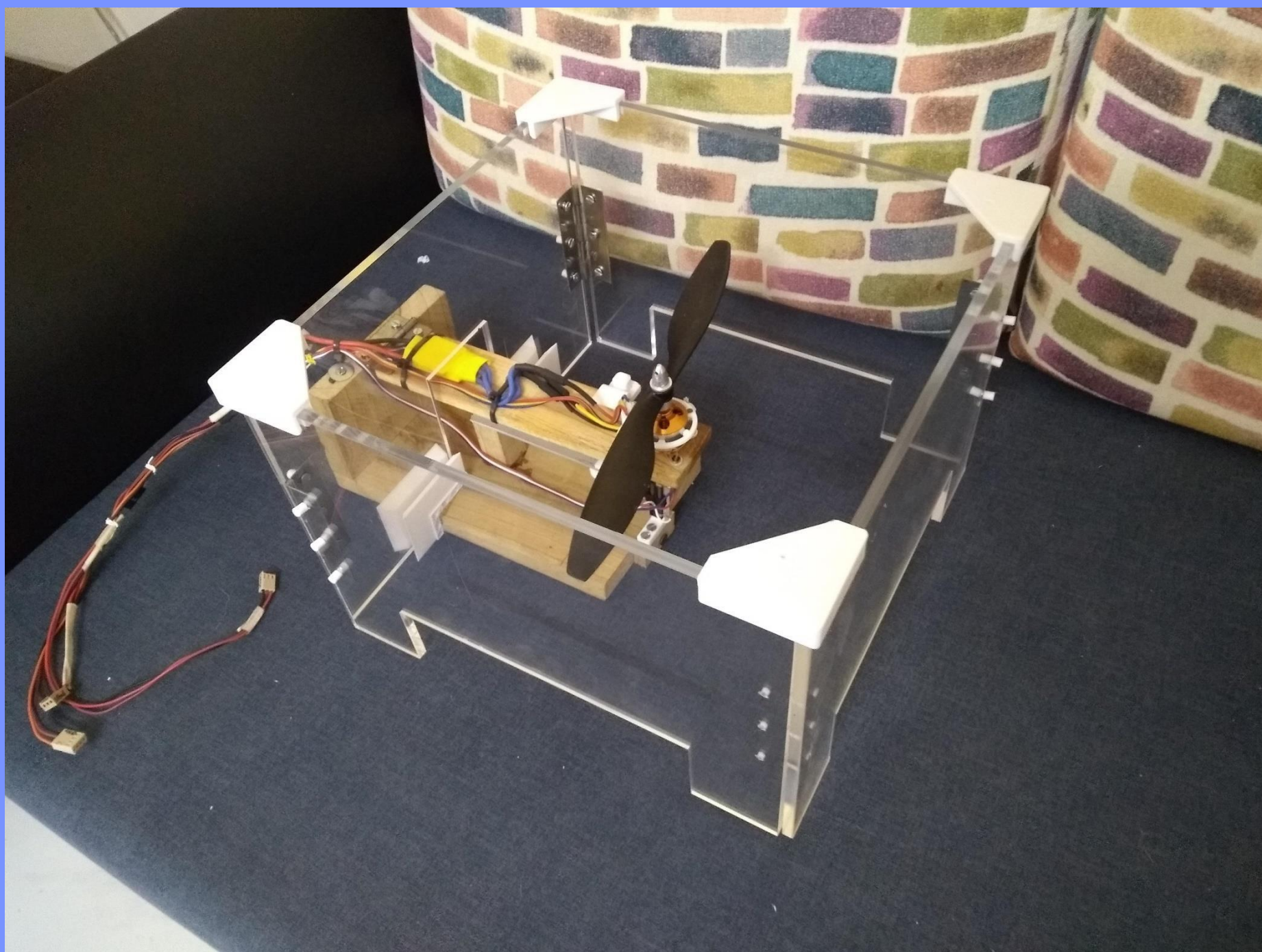
Phase 5

- Assessing the designed framework

PROJECT WORK SCHEDULE

Project Name Predictive Maintenance of Drone system
Project Manager Avdhoot Lendhe
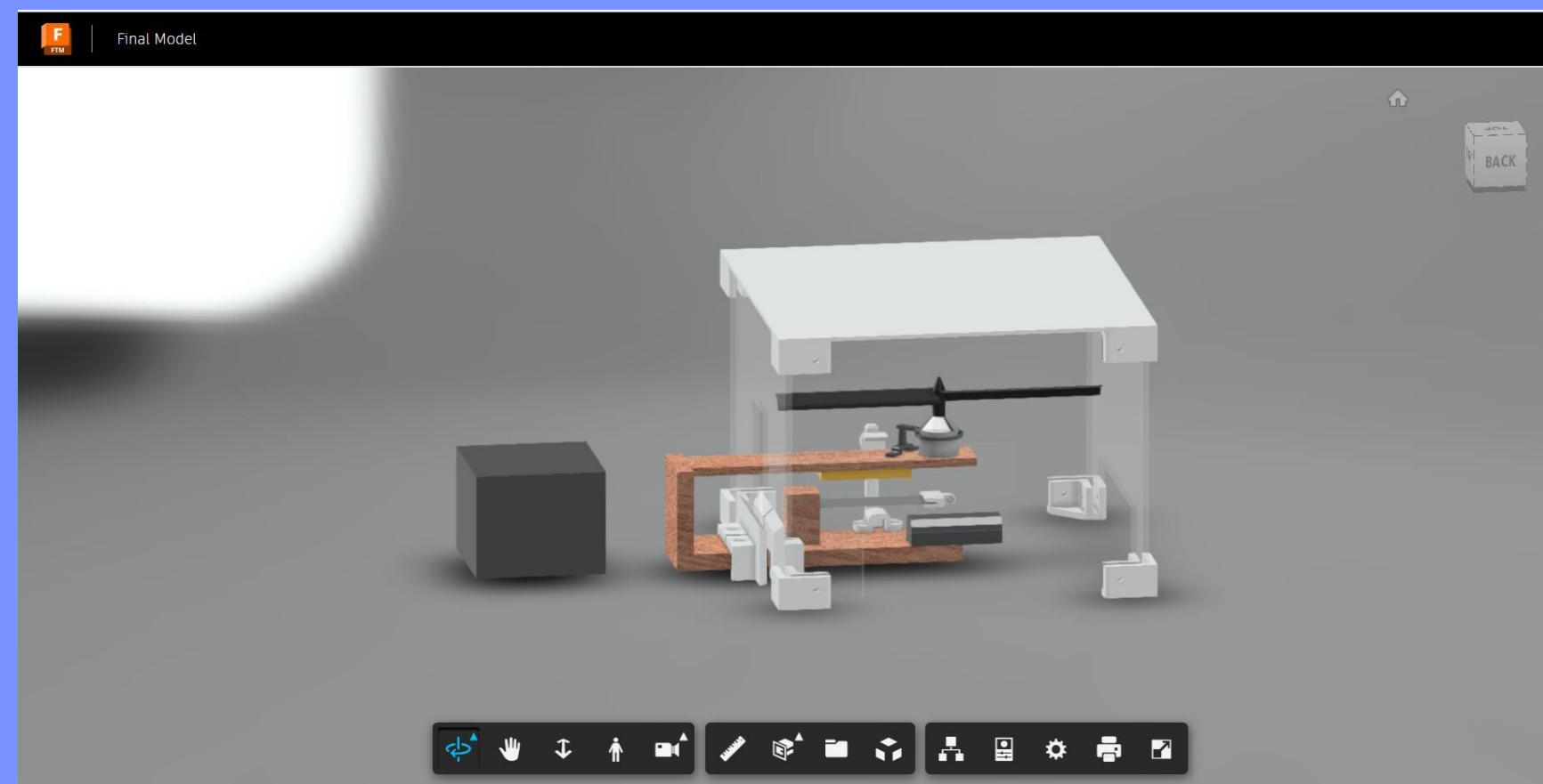**Project Members** Siddhant Sarnobat Ganesh Kele Avdhoot Lendhe

Start Month September
End Month December
Overall Progress 15%

Tasks	Responsible	Start	End	Days	Status
16-03-2016					
Project Concept Design		01-Sep	04-Sep	3	**Complete**
Agree on objectives		04-Sep	05-Sep	1	**Complete**
Initiation					
Literature Review	.	07-Sep	12-Sep	5	**Complete**
Draft Scope and Objectives		12-Sep	13-Sep	1	**Complete**
Project Cost Estimation		14-Sep	15-Sep	1	**Complete**
Hardward Reqs.		19-Sep	24-Sep	5	**In progress**
Sensor Testing		21-Sep	27-Sep	6	**In progress**
Prototype Completion		28-Sep	10-Oct	12	**In progress**
Development					
Collecting Data		11-Oct	11-Nov	31	Not started
Developing ML Model		12-Nov	22-Nov	10	Not started
Hyper-Parameter Tuning		22-Nov	25-Nov	3	Not started
Testing		25-Nov	30-Nov	5	Not started
Framework Complete		01-Dec	14-Dec	13	Not started
Execution					
Hardware Config.		15-Jan	20-Jan	5	Not started
System Testing		15-Jan	20-Jan	5	Not started
Framework Implementation		15-Jan	20-Jan	5	Not started
Documentation					
Paper Writing		20-Jan	30-Jan	10	Not started
Editing and Publishing		01-Feb	05-Feb	5	Not started

Work Progress

Physical Model

Autodesk Model of Setup

Thank You