

Routine Diagnostic Inspection Drone

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Introduction

• Background

Industrial facilities use process equipment like pressure vessels, storage tanks, industrial chimneys, and gas scrubbers, which are crucial but prone to wear, corrosion, leaks or structural issues. Regular inspections are necessary but risky and costly due to the need for personnel to enter confined, hazardous spaces. Automated inspection devices have changed this by safely accessing these spaces and providing real-time data without human exposure to dangers. Our project focuses on developing a Routine Diagnostic Inspection Drone, designed to address the challenges of performing inspection in confined spaces efficiently and safely

• Objective of Project

To provide an inspection service for those process industrial equipment, that includes using a drone with many features to help it perform the inspection. This drone will help in automating the inspection process, improving safety, efficiency and reducing downtime and costs in industrial settings.

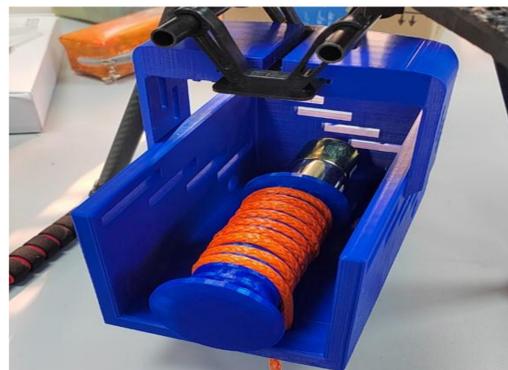
• Constraints

- Inspecting at high altitude, about (100 m).
- Materials withstanding different temperature variations.
- Payload capability of (6 kg).
- Signal loss.

• Specifications

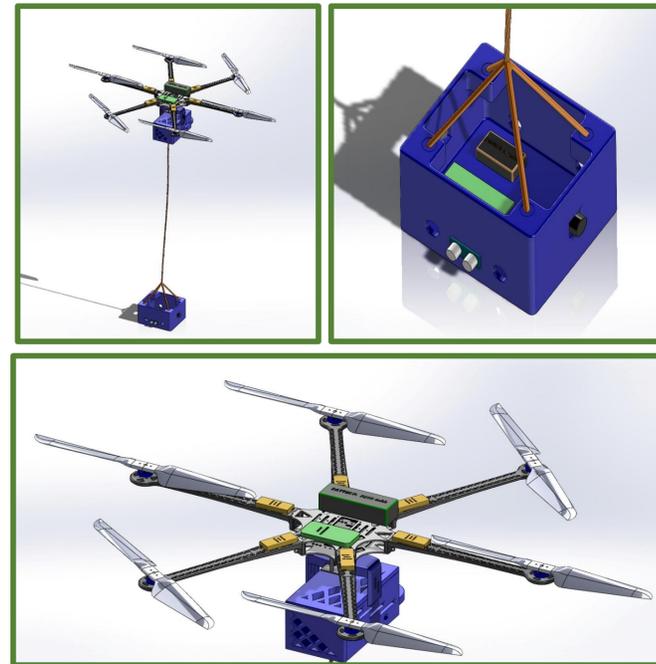
- Payload = 2.37914 kg.
- Thrust to Weight Ratio = 1.5.
- Flight Time = 6 min.
- Velocity = 3.1315 m/s.
- Thrust Coefficient = 1.06415.
- Power Coefficient = 0.1545.
- Rope Length = 2.5 m.
- Inspection Camera Resolution = Full HD / 1080p (1920 x 1080 pixels).

Assembly

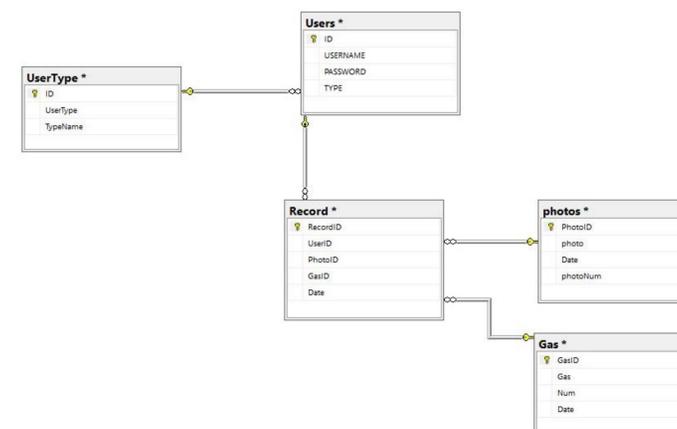


Prototype Design

• CAD Design



• Inspection System Design



The is the diagram for the database where it shows the relations between the tables, the user table have mainly the user id as primary key and username and hashed password where the type id is a foreign key for the UserType table, the UserType table specifies if the user is a normal user or admin for privileged access, the Record table have all the record all the keys for the related user by using the user id as a foreign key in it, the photo table have all the images for related record since we will have a data stream of photo per session, the same goes for the Gas table since it will give the gas present which may change over time.

Conclusion

The Routine Diagnostic Inspection Drone represents a breakthrough in industrial inspection, combining safety, efficiency, and advanced technology. Future developments could include enhanced AI for predictive maintenance, integration of more advanced sensors, and extended operational range to further improve inspection capabilities in diverse industrial environments. This innovation sets the stage for safer and more reliable inspections.