

1. **Title of the project**

Design And Fabrication of Semi-Automated Sewer System

2. **Name of the College & Department**

AMC Engineering College, Department of Mechatronics

3. **Name of the Students & Guide(s):**

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4. **KEYWORDS**

Excavator, Fabrication, Object Detection, Open-Source, Motor, Shaft, Actuator.

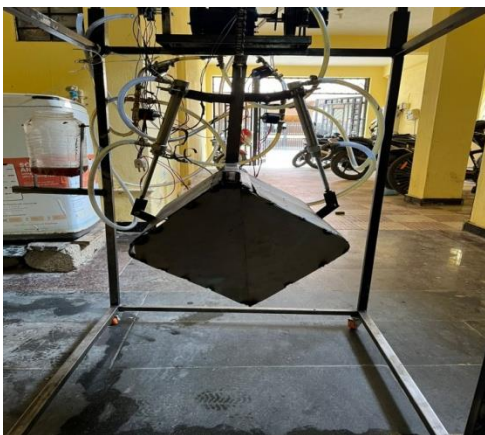
5. INTRODUCTION / BACKGROUND

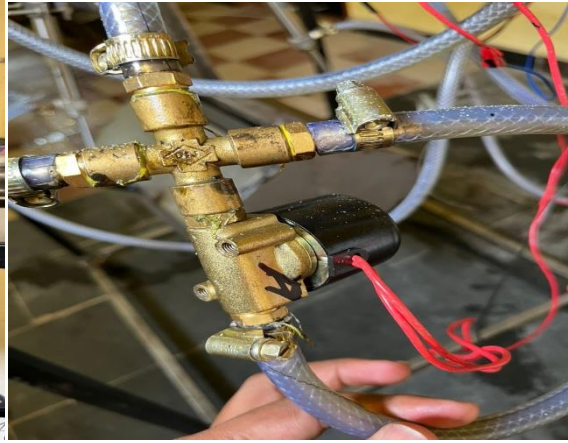
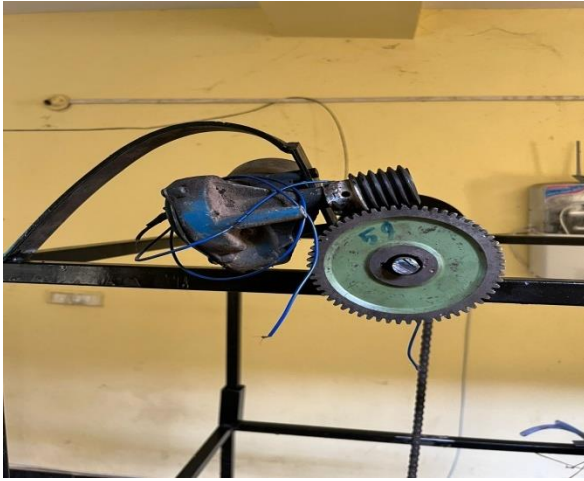
A manhole is an opening through which a man may enter a sewer for inspection, cleaning and other maintenance and is fitted with a removable cover to withstand traffic loads. The manholes are first constructed and then the sewers are laid interconnecting these manholes.

The machine that we are designing uses a pulley mechanism using wire rope. This requires a worker to operate into the manhole in order to open and close the buckets. This machine is driven using battery/electricity to insert the bucket into the manhole, to open, to close and remove the waste collected successfully. By doing so we intend to make the project to be semi – automatic as well.

Our designed machine utilizes a geared shaft mechanism, requiring a worker to operate the buckets from inside the manhole for opening and closing. It is powered by either a battery or electricity, enabling the machine to insert the bucket into the manhole, perform the opening and closing actions, and effectively remove the waste that has been collected. The objective of this design is to achieve a semi-automatic project implementation.

Previous work done



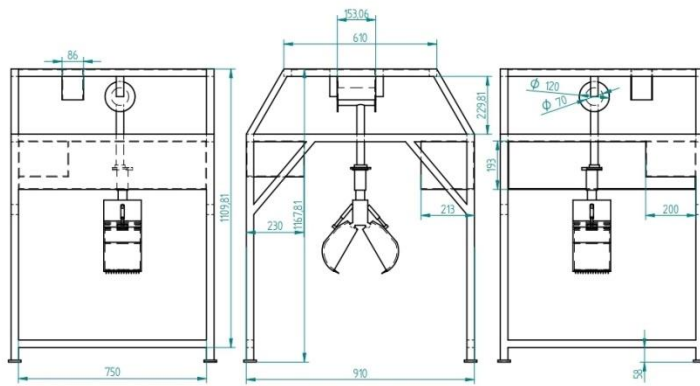
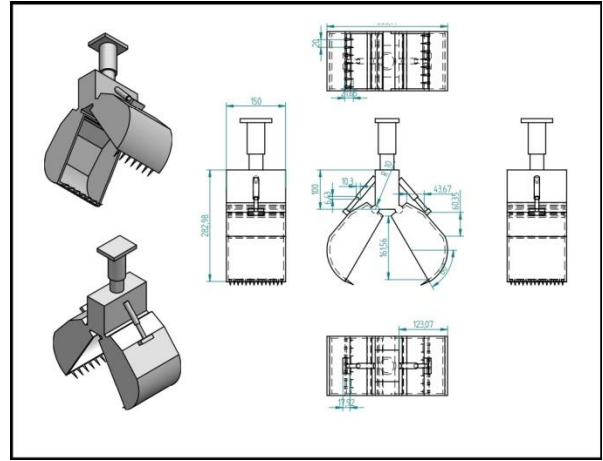
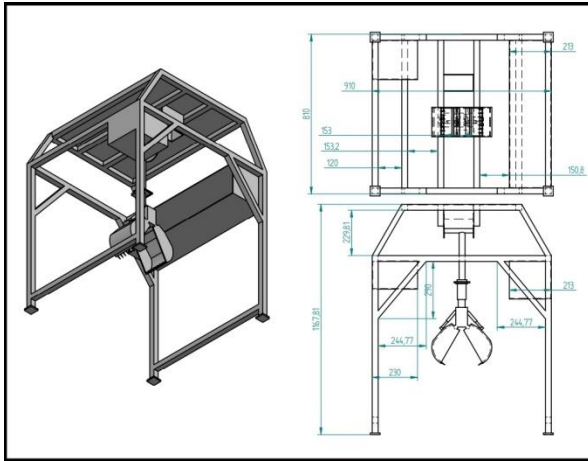


6. OBJECTIVES

- Through this project we aim to eliminate the practice of human entering the manhole physically to clean and collect the waste.
- We are concentrating on using an electric mechanism to open the close the buckets.
- We intend to design our project at a reasonable cost, as the present machines cost lakhs together.
- The existing machines occupy a lot of space on the road while we are concentrating on making our machine compact.
- The machines that are in use now require skilled labourers while our machine can be easily operated.

7. METHODOLOGY

- The first step being the selection of the mechanism. In order to open and close the buckets we are implementing a grabbing mechanism.
- After selecting the mechanism the material that is suitable for this purpose is selected. For our project the material being used is Galvanized Mild Steel.
- After the selection of the material the bucket is designed, where the calculations are carried out regarding the volume, weight that can be carried etc.
- The next step is the fabrication of the bucket and frame. The frame is fabricated according to the Calculations made.
- In the semi – automatic part of our project, we are using DC motors, gear box and other electrical components to perform the vertical motion and an actuator to perform the opening and closing action.



Components

MS Sheets

Mild steel contains around 0.05–0.30% carbon making it malleable and ductile. Mild steel has moderately low elasticity, however, it is modest and simple to shape; surface hardness can be expanded through carburizing.

24v DC Motor

This high torque reduction motor and is extremely reliable with its power requirements. It is the most commonly used motor for Scooters, Bikes, and wheelchairs! This motor is capable of rotation in both, clockwise or counterclockwise directions by reversing the motor's power wires.

Power Supply

The 12-volt version has screw terminals and a rectangular base. Since it is 12-volt, this type can be used to power car accessories outside of an automobile, using extra wiring or an adapter.

Electric Actuator

An electric actuator is a device that can create movement of a load, or an action requiring a force such as clamping, using an electric motor to create the necessary force.

Bevel Gear

Bevel gears are gears where the axes of the two shafts intersect and the tooth-bearing faces of the gears themselves are conically shaped. Bevel gears are most often mounted on shafts that are 90 degrees apart, but can be designed to work at other angles as well.

8. Result and Conclusion

The manhole cleaning machines intend to reduce the health hazards that is caused when a worker enters into the manhole and to keep the environment clean.

The following tests were conducted and the results are as follows:

Depth of the manhole: The depth of the manholes varies from 1 meter to about 3 meters. Our Machine is designed to reach a depth of about 1 meters as most of the manholes have the that depth.

Weight Lifted: Our machine is designed to lift about 5 kgs of waste with the constrain of the parameters and the budget.

9. Scope for Future Work

We gathered information and equipment required for the Design and Fabrication of Semi-Automated Sewer Excavator. Studied the construction and principle of it. To Fabricate and

test its working. We hope that this will be among the most versatile and interchangeable in cleaning system. As the project has been based on the concept, to integrate the benefits for human health, societal concerns and national cleanliness policy. Therefore it covers many sections of proportionate benefits to the all sphere of our present life.

For Industry

Our Project, as being new in the market network will provide the entrepreneurs the much needed ideas to blend the technology with societal benefits and harness the market. As a nation we are focusing on the Public benefits in the policy making and providing the young generation the employment and environment safety. While being a high- market potential project conserves the profit for the industry section with the advance of providing the corporate social benefits.

For Society-

Sanitations is one of the very basic amenities required for the basic living of a man and providing with such a technological and economical instrument which can change the pathetic sewerage condition of the town and cities of mediocre India. With such a potential instrument of employment generation in the society through industry co-operation, these products land you in the win-situation for the people.