

# Fabrication of Solar Powered Drainage Cleaning Machine

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**ABSTRACT:** The proposed concept of the present study is to replace the physical work in drainage cleaning by automated system. Now-a-days even though automation plays a crucial role in all industrial applications in the proper discarding of sewage from industries and commercials are still a tough task. The objective of the proposed study is to design and fabricate an automated solar machine for drainage cleaning in order to prevent humans from getting affected by various diseases from the communicable microbes present in the sewage while cleaning manually. In addition, the present study lessen the problem faced while using man operated machine and to minimize the increased dumping rate of waste. The existing system is completely a mechanical based, a stationary system, simply kept in the sewage area to collect the wastes passing over it. So this automated sewage cleaning machine is used to reduce the manual scavenging or work. This is going to help the poor labourers to work safely and their health issues can be reduced to greater extent. They do not have to go down the manholes for the cleaning and also by this machine we can do more work in less time.

**KEYWORDS:** Automatic machine, solar panel, sewage water, cleaning, waste

## I. INTRODUCTION

Water is being used in excess amount now-a-days. The implication of water is mainly used for cooking, cleaning, drinking and in various industries. With the sustained development of industries, the problem of sewage water also urgently resolved due to the increasing sewage problems from industries of the surrounding environment. Clean water is more important for many purposes. The impurities present in water system can lead to hazardous disease. As draining

system is considered the function of the main drainage system is to collect, transport and dispose of the water through an outfall or outlet. Impurities in drainage water will be like empty bottles, polythene bags, papers, etc. These impurities present in drainage water can root to blockage of the drainage system. The drainage system can be cleaned often manually or a system can be designed to throw out wastages automatically and to keep the water clean. Hence this study is designed to keep the drainage system clean and helps the smooth working of the system. This project is proposed to clean the drainage water automatically each time of any wastage and this form an effective and ease of cleaning the drainage system to prevent the blockage. It also reduces manual work and improves the quality of water that is cleaned. In this project the following parts like DC motor, chain, solar panel, bucket, frame, wheel, sprocket gear, solid shaft etc were used to fabricate the automatic machine. Many researches are undertaken by Periyasamy, et al.,[1] Manisha Lande, et al.,[2] Anshul Mathur, et al., [3] Balachandar, et al., [4] Ajay Sharma, et al., [5] Kalavathi, et al.,[6] to design an automated machine to clean the sewage system to replace the manual work of cleaning drainage by automatic machine.

## Problem Statement

In today's era automation plays a major role in all industrial applications for the appropriate clearance of sewage from industries and household is still a difficult task. Drain pipes are used for the adequate discarding of waste and unfortunately sometimes there may be a risk to human life during the cleaning of obstruction in the drain pipes or it can cause severe health effects because of the pertaining issues like malaria, dengue, etc. In order to prevail over this problem as well as to save human life we employ a design "Automatic

Drainage Cleaning System". The designed project can be used as an efficient way to control the removal of waste along with regular filtration of drains, taking away of solid waste in order to avoid blockage in drains to maintain continuous flow of drainage water which eventually reduces the threat to human life.

**Existing Method**

The existing machine structure is entirely a mechanical based project. It is a stationary system, merely kept in the sewage area to collect the wastes passing over it. The chain and sprocket is employed for conveyor movement, which has fitted fork plates to collect the wastes from the sewage. The rotation of the chain all along with the plates will collect the floating wastes and transfer the wastes in the bin that is positioned at the backside of the system.

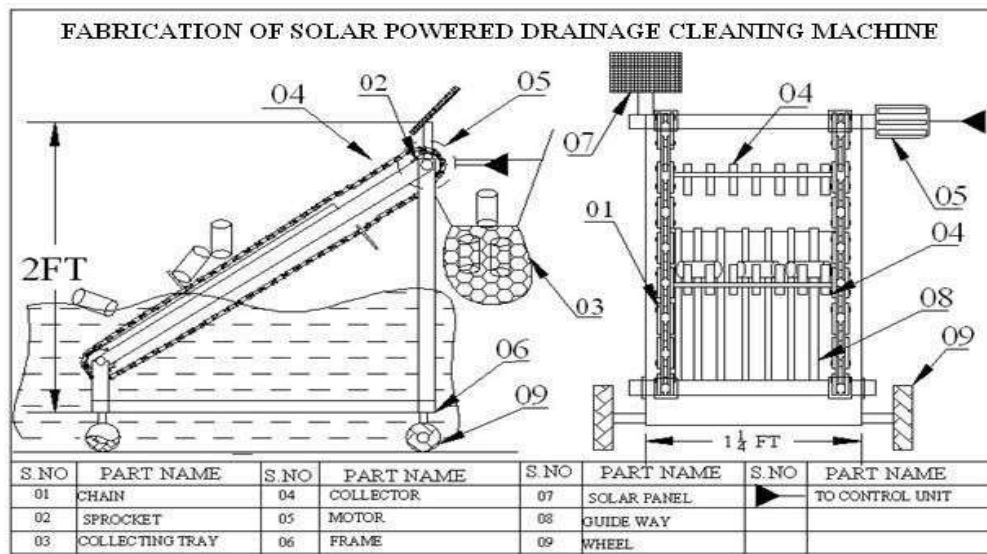
components to full fill the requirements of complete operation of the machine.

- Dc Motor (3 Qty)
- Battery
- Spur Gear (3 Qty)
- Chain
- Sprocket (4 Qty)
- Micro Controller
- Relay Unit
- Bluetooth Device
- Android App (Bluetooth)
- Wheel

**Components and Its Specification**

The Fabrication of Solar Powered Drainage Cleaning Machine consists of the following

**II. DESIGN AND FABRICATION**



**Fig. 1 Drawing for Fabrication of Solar Powered Drainage Cleaning Machine**



Fig .2 Top View



Fig .3 Side View

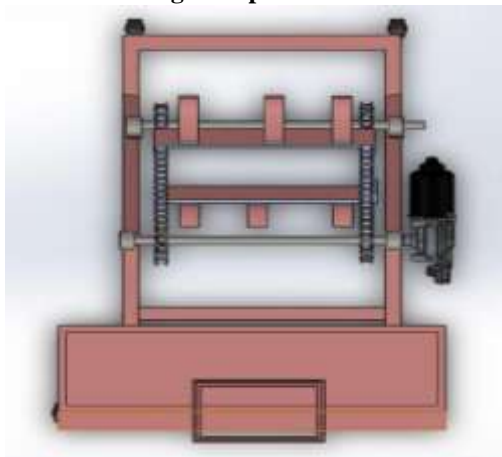


Fig .4 Front View



Fig .5 Isometric View

### III. EXPERIMENTATION

Fabricated drainage cleaning machine is placed across a drain so that only water flows through the lower basement. This system comprises of four sprockets (set of two). All kind of floating wastes is lifted by the lifters which are linked to the chains. The chain revolves with the sprockets that are driven with help of worm gear motor. The reason to choose worm gear motor is that it has high torque and low rpm. When electric power is on, the motor starts to rotate continuing the sprockets and the chain. As the chain starts to rotate the lifter starts to lift up and collects the floating waste from the waste water and stores into the collecting bin. The collecting bin is of removable type which can be replaced by another bin when gets filled up by waste. A wire mesh is placed between the arrangements so that no solid waste flows through the arrangement. The regulator is attached to control the speed of the motor based on the amount of flow of the solid waste. The solar panel which consists of photovoltaic cells generates electricity / power harnessed from sun's heat and light radiation and generated power is stored in the

battery. A voltage regulator is used to maintain a constant voltage level. This voltage is used to provide supply to the arduino. The arduino's high output is given to the transistor for the switching purpose to drive the motors and driver motor ic. The transistor switches to give high output to the motor connected with the blade of the lawn mower. Along with this motor driver ic has one pin connected with the arduino and other with the transistor. The high pulse of driver ic turns on the motors connected with the wheels of the machine. The machine can also be controlled through mobile phone due to the presence of bluetooth module. When the motor starts running, the shaft is rotated by rotating the gear arrangement and starts to collect and dispose the wastes.

### IV. MERITS

- Recyclable garbage can be collected in huge amounts
- Reduction of manual labour.
- Portable.
- Low cost.

#### DEMERITS

- Implementation cost is high
- Proper maintenance required

#### APPLICATIONS

- Mainly applied in plastic industries.
- It is used to separate plastic, thermocol from sewage.
- It is used for removing the waste for the drainages automatically to prevent blockage of drainage.
- This project can also be used in the “SMARTCITY”

#### V. CONCLUSION

- Automation is a technology concerned with the application of mechanical, electronic and computer based systems to operate and control production.
- This system is used to operate automatic drainage cleaning system. This project may be developed with the full utilization of men, machines and materials and money.
- The present study is made effectively and economically with the available sources.
- The automated solar sewage cleaning machine is designed and manufactured using gear changing and shaft coupling principle. It consist mainly DC geared motor, shafts, waste removal plates, dust bin, bearings, sprocket and chains.
- Construction resources are easily available, creates employment (construction and maintenance) and simple to construct.
- This system was designed, fabricated successfully and also tested. It works satisfactorily.

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