

# Automatic Drainage Cleaning System Using Solar Panel

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**Abstract -:** In India disposal of solid waste is major issue, according to the sources 80% of solid waste is disposed in drainages, river, lake and other water bodies. A automatic drainage cleaning system is a mechanical device which is design to filter the river, sewer and drainage line passing through cities. The solid waste like plastic bottles, polythene bags, soft drink cans, solid scraps etc., are mostly flow with these lines which need to filter stage to stage. Otherwise this solid waste can cause blockage of these lines which tends to flood like situation in rainy season. To avoid this kind of situations this waste is needed to be taken out of the drainage for continuous flow of drainage water. Drainage can be clean using automatic mechanical system instead of manual robots and labor work . The proposed models chief function is to collect solid waste from drainage system and collect it in bucket. This system will work on solar energy so it can be use where electricity will be unavailable. The filtration is carried out by fully mechanically. This will reduce the problem faced in manual drainage cleaning. This system will help to reduce diseases causes due to the sewage water like malaria. Dengue, typhoid etc.

Keywords- drainage, sewage water, solid waste, solar, automatic.

## 1. Introduction

The wastewater management is become major issue nowadays. Usually seen in densely populated country like India is that common waste like plastic bottles, covers and other plastic scrap left on the streets and in the open drainage. These waste because blockage of drainage system during monsoon season when flow of water through the road and drainage systems. These cause accumulation of waste water in drains. This accumulation of sewage water leads to water borne disease like cholera, worm disease, typhoid, malaria

etc. This can cause health issue and can also cause death. In India there is need of automated machine which can clean drainage system and collect this solid waste. Currently these drains are cleared with the help of manual workers where the workers have to get into drains and manually remove the waste. This affects the health of the workers. These workers suffered by the various diseases which affect their life and reduce their immunity. To overcome this kind of problems faced by the manual workers and health issues, we proposed an automated mechanism, " Automatic Drainage Cleaning System Using Solar Panel".

This system is used to clean drainages eliminating human labor involvement and to optimize the process of collection of waste.



Fig.1. floating plastic



Fig.2. solid waste in drains

**PROBLEM DEFINITION:**

Mainly automatic drainage cleaning system focus on the unwanted elements present in our nearby water resources such as garbage, plastic, thermacoals. This system is simple and effective invention on sewage treatment. Now a days the amount of waste material in lakes ponds wells etc. is increasing day by day due to people’s constant use. This amount of waste also increases to the extreme level on festivals. This drainage system in build with solar panel increases the life span of the system and also reduces energy usage from other electrical devices.

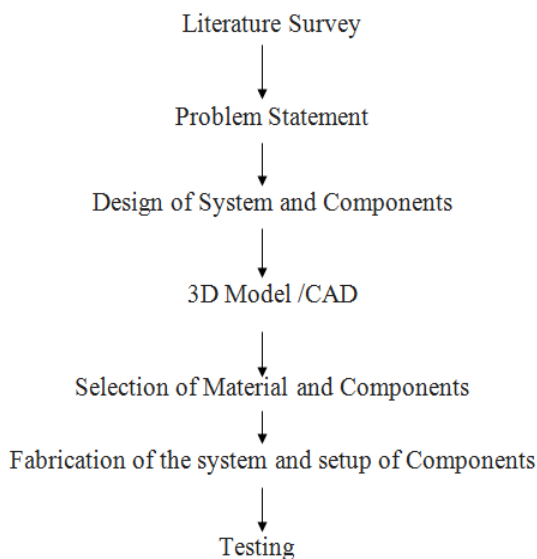
**OBJECTIVE:**

- 1) Purpose of this project is to replace the manual work in drainage cleaning by an automated system.
- 2) The manual cleaning causes various disease to the workers to avoid it.
- 3) To avoid the blockage of drainage line cause by solid waste.
- 4) To avoid floods situation in rainy season.

**WORKING PRINCIPLE:**

The working of the system is fully mechanically. The system is run on 12V dc battery. The battery is charged by 100watt solar panel. 25amp motor is used to drive the sprocket. The input sprocket is again drive the two another sprocket by chain transmission. The sheet metal jaw is fix on rotating chain which is used as conveyer to collect the waste floating in water. The collected waste in jaw is again drop in sheet metal dustbin. All this structure is supported by a solid MS frame.

**METHODOLOGY:**



**DESIGN OF THE SYSTEM:**

The system is designed in solid works software with which we were able to construct 3D model with required dimensions. The interference between designer and software is really good in Solid works compare to other software.

The design of the system is done on the basis of precise working of the system. The design is done so that it can bear load of working mechanism and components like solar panel, battery, conveyor mechanism and waste collected in the box. There are basically two parts of design.

- 1) Design of the system
- 2) Mechanical design

The design of the system consist of design of framework of mild steel which will support the system and mechanical design consist of design of mechanical components like conveyor mechanism.

**3D MODEL /CAD:**

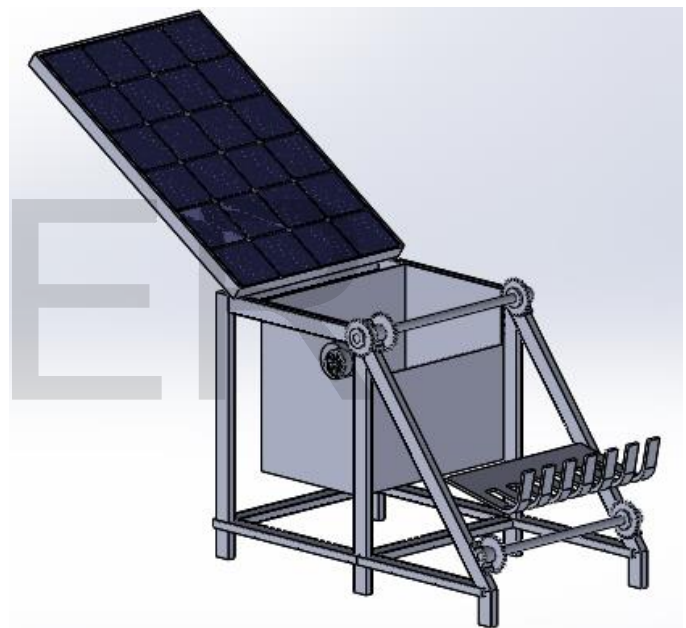


Fig.3. assembly of drainage cleaning system

**SELECTION OF MATERIAL AND COMPONENTS:**

The factor considered while selection of the material are load acting on frame and cost of the material. The system is need to sustained various forces like weight of the motor, weight of the waste collected in bucket and forces induced by water flow etc. Hence to sustain these loads and also available in low cost, we select CI as our base material. This material also provide good welding strength when joined by arc welding and it is easily available in market.

**COMPONENTS:**

**1) BOX TUBE:**

The box tube used for framework is made of mild steel. The mild steel is combination of iron ore and coal. The mild steel used is of A633 grade E having tensile strength of 520Mpa and yield strength of 380Mpa. The main function of mild steel framework is to support the whole mechanism.

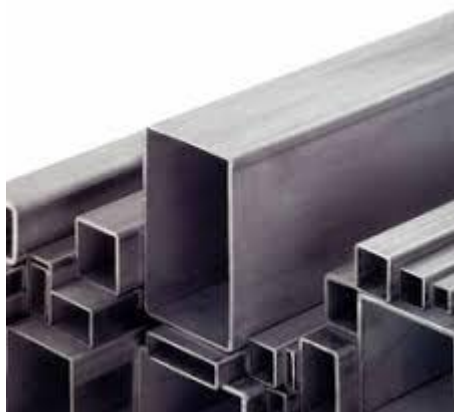


Figure 4. Box tubes

**2) SOLAR PANEL AND BATTERY:**

To make use of non-conventional energy solar panel is selected to recharge the battery. The solar panel is of 12V 100 watts. This solar panel will charge a 60Ah battery. This will enough to run the motor for required time. The time required to charge battery is of 8 hours.



Fig.5.solar panel



Fig .6.battery

**3) DC MOTOR:**

The 12V DC motor is used to rotate the shaft in order to complete required torque and load. This will carry whole conveyer mechanism. The motor is of 337RPM and 250 watt. It is essential to bear load of conveyer. It has 8Nm of constant torque and 40Nm of stall torque.



Figure 10.DC motor

**4) THE CONVEYOR MECHANISM:**

The conveyer mechanism is consists of four universal bearings, two shafts, four chain sprockets and two chains. There will be fork attached to the chains which will rotate and collect the waste from drains. The shaft are made of mild steel.



Fig.7.sprocket

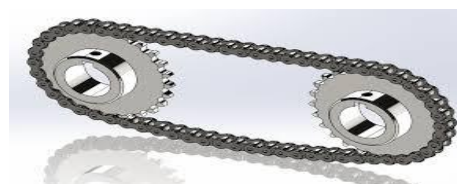


Fig.8.conveyer mechanism

Sr. no.	Name of the components	Quantity
1	MS tubes	20 feet
2	Solar panel	1
3	Battery	1
4	Sprocket	5
5	Chain	2
6	Solid shaft	2
7	Wire net	1
8	Dust bin	1
9	Motor	1

Table no.1

**FABRICATION OF THE SYSTEM CONSIST OF MANUFACTURING AND SETUP OF COMPONENTS:**

The main frame of the system is joined by arc welding because it gives high welding strength and also its simple and cost effective process. In this welding process highly skilled worker is not required. The component is fixed on the frame with the help of nut and bolt mechanism.



Figure 13. welding process.

**RESULT:**

This battery is charged by 12V 100W solar panel. Solar panel takes 8.4hrs to charge battery by assuming 150gm waste is collected per revolution, the total amount of solid waste collected in 1 hour will be 5.9kg. The system should be fix to the ground to avoid vibration.

**CONCLUSION:**

Our automatic drainage cleaning system has successfully replaced manual drainage cleaning ways. So our project is economical and efficient by the use of solar energy. This system was designed and fabricated successfully it works satisfactorily.

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