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# Design and Fabrication of Solar Powered Automated Drain Sewage Cleaner

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**ABSTRACT**

Our world is facing difficulties in disposal of solid waste in step with the sources eightieth of solid waste is disposed in drainages, river, lake and different water bodies. AN Automatic drain cleansing system could be a machine that is style to filter the watercourse, sewer and drain line passing through cities. The solid waste like plastic bottles, polyethylene luggage, drink cans, solid scraps etc., area unit largely flow with these lines which require to filter stage to stage. Otherwise, this solid waste will cause blockage of those lines that tends to flood like state of affairs in time of year. To avoid this sort of things this waste is required to be taken out of the drain for continuous flow of drain water. Drain will be clean exploitation automatic system rather than manual robots and labor work. We've got designed this project to get rid of solid waste in water bodies. If we tend to use man power to get rid of waste from drainages having contaminated water, and it causes health problems.so it's higher use new innovations to get rid of wastes. Thus we tend to expect that our project incorporates a higher scope in future and helpful for our society. Until currently we tend to designed our project and attempting to rectify the issues that we tend to known.

***Keywords:*** *Automatic 1, Drain 2, Cleaner 3, Filter 4, Solar powered 5*

## INTRODUCTION

The waste matter management is become major issue these days. Typically seen in densely inhabited country like Bharat is that common waste like plastic bottles, covers and alternative plastic scrap left on the streets and within the open avoidance. These waste as a result of blockage of system throughout monsoon season once flow of water through the road and avoidance systems. These cause accumulation of waste water in drains. This accumulation of waste water results in water-borne malady like epidemic cholera, worm malady, typhoid, malaria, etc. this will cause health issue and might conjointly cause death. In Bharat there's would like of automatic machine which might clean system and collect this solid waste. Presently these drains square measure cleared with the assistance of manual employees wherever the employees ought to get into drains and manually take away the waste. This affects the health of the employees. These employees suffered by the varied diseases. Which have an effect on their life and cut back their immunity. To beat this sort of issues visage by the manual employees and health problems, we tend to project an automatic mechanism, "**Automated Drain sewage Cleaner**".

This system is employed to scrub drainages eliminating human labor involvement and to optimize the method of assortment of waste.

Due to interference of avoidance we tend to see that the wastes get over spill on the roads that could be a huge issue chiefly in season.so by found the automated avoidance improvement system we will cut back the many issues as we will replace the human work World Health Organization clean this avoidance and that they're having high risk of obtaining infections as we see that the avoidance is slim dimension of 910 mm approx. therefore we'd like to ascertain the Automatic drain sewage cleaner within the middle of dimension of avoidance.

### *1.1 BOX TUBE*

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

Fig no 1[Box tube]

***1.2 DC Motor***

The Mechanism consists of 12V DC motor is to help to rotate the shaft in order to complete required load and torque. It will manage the whole conveyor mechanism. The motor have 337 rpm and 250 watt. And it is needed to bear a load of conveyor. The motor has 8Nm of constant torque and have 40Nm stall torque.

Fig no 2[DC Motor]

***1.3 SOLAR PANEL***

The Solar energy is used to make non-conventional energy for recharge the battery. The solar panel is 12V and 100 watts and it will charge a 60Ah battery. 8 hours is required to charge battery

Fig no 3[Solar Panel]

***1.4 BATTERY***

The Battery is used as a rechargeable and storage battery and secondary cell. It is made up of one or more electrochemical cells. Rechargeable batteries are made in different shapes and sizes, that ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of electrode materials and the electrolytes are used including lead–acid.


Fig no 4[Battery]

### *1.5 CONVEYOR MECHANISM*

The conveyor mechanism is with four universal bearings, two shafts, four chain sprockets and two chains. There is a fork that attach to the chains and it will rotate and collect the waste from drains. The shaft are made up of mild steel.

Fig no 5[Conveyer Mechanism]

## 2.1 REVIEW OF LITERATURE

Ankita B Padwal [1] Automatic voidance water cleansing and system victimization motorcar mechanism planned to beat the important time issues. Our planned technique is to filter and management the voidance level victimization motorcar mechanism technique. motorcar mechanism is major dominant unit. The voidance level a monitor by the municipal. The system used chain, driver, bucket, frame etc. Arman Shaikh [2] the general public washrooms stay constantly dirty as a result of the users don't flush water once victimization the bathroom. during this project they're implementing the automated lavatory cleansing system, this can be supported natural philosophy also as software package programs with completely different algorithms for the automated system. once the general public bathrooms stay constantly dirty then the system clean the bathrooms mechanically with facilitate of assorted sensors and arduino controller. Nitin Sall [3] Explained regarding the flow of used water from homes, business industries, industrial activities is named waste water. 200L and 500L wastage water area unit generated all and sundry on a daily basis. therefore by victimization waste water technology that removes, instead of destroys a waste material in an exceedingly system. Dr .Narendra Bawane [4] The watercourse finish off machine has been used in this places wherever there is waste rubbish inside the water body that area unit to be removed. This machine is consists of waterwheel driven conveyer mechanism that collect and take away the wastage, garbage and plastic wastages from water bodies. This conjointly cut back the difficulties that we tend to face once assortment of rubbish is finished . A machine can raise the waste surface rubbish from the water bodies, this might ultimately finish in reduction of pollution and in conclusion the aquatic animal's death to those issues are reduced. It contain of Belt drive mechanism that lifts the rubbish from the water. Gaurav S Gajare [5] The analysis paper focuses on replacement the manual technique of cleansing the system with semiautomated mechanical voidance cleaner. the tactic followed today is proving to be the hazard for the employee enterprise the method of cleansing the drainages. at the side of voidance water some solid waste travels through the voidance line and at the junction points of system these solid waste gets accumulated over time and so causes the blockage of system. This urges the requirement of cleansing of the voidance line on time. therefore this technique can facilitate to resolve such downside and can so assist you to confirm timely cleansing of the system by segregating the solid waste. N. Yashaswini [6] designed and analyzed for conveyancing granular materials to the peak of 15m at the speed of 10tones/hr output. They explained regarding the fundamental style calculations for the event of the bucket elevator in 3D surroundings of NX software package. They conjointly administrated static and vibration analysis on the bucket elevator. They explained dynamic behaviour of the bucket and kit shaft assembly. Vivek Cuon alpinus [7] because of the difficulties baby-faced to keep the beach clean manually, we've to come back up with instrumentality that not solely collect the waste and conjointly separates. this can be straightforward for waste disposal. The machine principally consists of associate degree engine and it runs through a fossile that driven the entrie method. The waste is collected by conveyor balde and at the side of the sand that falls of through the perforations done on the conveyor back to the sand bed materials come about through principle of density distinction. It consists of 2 hoppers wherever the various waste area unit collected that facilitate straightforward diaposal of waste. Reshav Bisen [8] Once Mahathma gandhi aforementioned that sanitation has a lot of values and importance than independence. Normally, we tend to seen that dirt on the road causes unclean. numerous studies shows that thirty third of pollution is creates by dirt on road in Republic of India which can cause health and accident downside for folks motion on road. Hence, it's necessary to stay clean road from dirt and dirt. during this project a trial has done to style and development of dirt cleansing machine for cleansing of dirt beside the road divider by sterilization manual method with economical technique. This machine carries with it scrubber brush which offer sweeping action at constant time vacuum dirt collector is provided which can clean the dirt. Also, by introducing this project our aims to meet the goals of Swachch India Mission. Praveen H [9] cleansing is that the main basic would like for all citizenry and it's necessary for daily routine method. the standard road and floor cleansing machine is most generally employed in several applications like example roads, railway stations, airports, hospitals, Bus stands, in multi buildings, faculties etc. conjointly this machine uses human energy for its operating operation. it's a user friendly also as eco-friendly. In our project we tend to area unit aimed to use simply obtainable materials with low price and it is simply fancied and simple to use and management. it's the higher various for standard machine. Ms T.Deepiga [10] outlined the water watching systems like Tank pollution watching and water pipeline leak sensing watching. They avoided Brobdingnagian quantity of water wasted by uncontrolled use of huge residences. They used the PID primarily based water level watching to point the amount of water for our generation.

## 3.1 PROBLEM IDENTIFICATION

Mainly automated drainage cleaning system focus on unwanted things present in the water resources, like garbage, plastic covers, polythene etc. This type of system is simple and very useful for the sewage treatment. Now days the waste material in ponds, well, rivers is increasing day by day due to peoples constant use. This type of waste also increase to the external level on festivals. This drainage system is made with solar panel increase the life span of the system and also reduces energy usage from other electrical devices

## 4.1 DESIGN CALCULATION

***Battery***

12 volt, 3 amps

Battery watts = volt x amps

= 12 x 3

Battery watts = 36 watts

***Motor***

Speed = 30 rpm

Voltage = 12 Volt

Power = 18 Watt

Torque of the Motor

Torque = (p x 60) / (2πN)

Torque = (P x 60) / (2 x 3.14 x N)

Torque = (18 x 60) / (2 x 3.14 x 30)

Torque = 5.72 N-m

Torque = 5.72 x 103 N-mm

Maximum load, m is calculated as below

T= Fr

5.72= Fx3

F = 19.6 N

We Know that,

Force, F = mg

19.6=m 9.81

m= 1.90 Kg

The maximum time the motor will run while not interruption

=40Ah/1.4167= twenty eight hours thirty five minutes.

Time taken by the battery to urge absolutely charged by electrical device

(full intensity of sun at(90°))

=V*40Ah/100

= 2 hour

## 5.1 DESIGN

The system is designed in 3D prisma software with which we were able to construct 3D model with required dimensions.it is an animation software. The interference between designer and software is really good in 3D prisma 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.

Design no 1 [Solar powered Drain Sewage Cleaner]

Design no 2 [Solar powered Drain Sewage Cleaner]

## 6.1 RESULT

Drainage Cleaning System is a social incentive project where we tried to present a much better procedure to keep our drain clean and thus providing the way to a cleaner and safer surrounding. We performed the following test and results are being discussed as follows:

- Weight Lifted: We tried to present the model where the model is successfully able to lift the 5Kg of the drainage wastes.
- With the constraint of the size and budget the project performs excellent in its parameters.
- Speed of the Drain: As the setup which performs excellently on the constraints condition that have been designed in view of the real life drain condition, we try to provide the drain with the minimum speed and able to derive out the results that the battery is getting charged and able to run the mechanism.

| LOAD | VELOCITY | POWER |
|---|---|---|
| 10 kg | 0.01 m/sec | 40 watts |
| 8 kg | 0.02 m/sec | 29 watts |
| 5 kg | 0.04 m/sec | 20 watts |
| 1 kg | 0.06 m/sec | 6 watts |

The lifter lift maximum weight of 10kg waste with velocity of 0.06m/sec to complete one rotation and consumes 40 watts

The lifter lift weight of 1kg waste with velocity of 0.01m/sec to complete one rotation and consumes 6 watts

## 7.1 CONCLUSION

The problem of drainage blockage due to plastic waste and other solid waste can be eliminated by using of automated drain sewage cleaner. Cleaning of drains has always been a problem. Labours cleaning drain seems unethical and also leads to a high risk of them catching infections or poisoning due to large amounts of waste/chemicals in them. So here we provide a model for automated drainage cleaning system. From this design we fabricate drain sewage cleaner for seperating solid waste from the drainage water which will further avoid the blockage of drainage line avoid flooding.Form the testing we got the result as the maximum load lifted by the lifter is 10kg and minimum load is 1&<1 kg.If the load is 1 or <1,we can effectively clean the drainage.

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