



## Design and fabrication automated scavenger sewage machine

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**Abstract :** *The proposed concept is to replace the manual work in gutter cleaning by Automated gutter cleaning system. Now-a-days even though mechanical drainage plays a vital role in all domestic and industrial applications in the proper disposal of sewages from domestic, industries and commercials are still a challenging task. Drainage pipes are using for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockages in the drainage system. The Automated Gutter Cleaning system is a machine which helps to protect the environment from different kinds of environmental hazards through the promotion waste management by the removal of garbage from the drainage system. These wastes when not removed end up settling in residential places where these wastes are burnt thereby causing climate change otherwise these wastes block the drainage systems thereby causing flooding. In this project the proposal concept is to replace the manual work in drainage cleaning by automated system. We know that water has a great importance in human being life, the water flow in drain full of wastes like polythene, bottles etc. The gutters get blocked due to these wastes in water. To overcome this problem and to save human life we implement a design "Automated Gutter Cleaning system" and we have designed our project to use this in efficient way to control the disposal of wastages and with regular filtration of wastages.*

**Keywords** - Automated, Cleaning, human life, Scavenger, sewage.

### I. INTRODUCTION

Water is being used very fast in today. The significance of water is mainly used for cooking, cleaning and drinking in our lifestyle. The water used in the factory and the house comes from the drains and reaches in the rivers, in the ponds and in the oceans. In which more solid ingredients (polythene, bottles etc) along with water also reaches. We have built Automated drain cleaning machine with the main purpose of removing these solid materials from drains. This machine can be established at any point of drain very easily. It has been design in such a way that its lets water flow through it but collects all the solid substances and gives a group in the dustbin. This machine is able to do cleaning and moving process together on the drains/gutters. The Drainage water cleaner system are used to clean wastes from water like polythene, bottles etc. present in water. This can be used to overcome the problem of filtration of wastes from water and it save the time and cost that spend on cleaning the drainage. As the industry setup increase in the environment the water coming from industries are full of wastes like polythene, bottles, and other materials and that water mix with the other water that are used by people and we know that that water is not good for the for health of people.

### II. LITERATURE REVEIW

Ganesh U L, 2016/17, showed the usage of mechanical drainage cleaner to replace the Manual work required for drainage cleaning system. Drainage pipes are very dirty. Sometimes It is harmful for human life while it is need for cleaning drainage system. To overcome this Problem, they implemented mechanical semi-Automated drainage water cleaner and so the water flow is efficient because of regular filtration of wastages with the help of Drainage system machine. Dr.k.kumaresan 2016, explained manual work converted to automated system. Drainage Pipe using for disposal and it may be loss for human life while cleaning the blockage in the Drainage pipes. To overcome this problem they implemented "Automated Sewage Cleaning System". They designed their project

different way clearance of gaseous substance are treated Separately so the flow of water efficiently. This project may be developed with the full Utilization of men, machines, and materials and money. They made their project economical And efficient with the available resources. They used automation technology related with his Application of mechanical, electronics, computer based systems to operate and control Production. R.Sathiyakala,02/2016 explained E bucket (electronic bucket) use for drainage cleaning System because E-bucket lifted a sewage and used evaporation treatment for this sewage wet Sewage was converted into dry matters, with the of ARM board (ARDUINO) this process was Performed. After this process they were add this waste a government bank without any kind of Affection of the bacteria. Nitin Sall,2016, explained flow of used water from homes, business industries, commercial Activities is called waste water. 200 and 500 liters wastage water are generated each person Every day. So using waste water technology that removes rather than destroys a pollutant in a Drainage system.Ndubuisi.C.Daniels,2014, showed the Drainage system cleaner machine used to remove Garbage and sewage automatically which helped to protect the environment from different Kinds of environmental hazards. The drainage system cleaner has three major parts which are The Propeller, the Cleaner and the Pan all makes up for its effective functioning. S D Rahul Bharadwaj,2013, Proposed with the automatic cleaning of waste water in order To prevent global warming and melting of glaciers. The results emphasize the need of waste Water treatment plants, through which the water is treated before suspending in rivers. Firstly Power is generated and that power is used for waste water cleaning process Balachandraetal,2012, Reviewed about drainage cleaning to replace manual work to Automated system because manually cleaning system it is harmful for human life and cleaning Time, is more so to overcome this problem they implemented a design “Automated drainage Water pump monitoring and control system using PLC and SCADA”. PLC and SCADA were Designed. In this project, to use efficient way to control the disposal of wastage regularly, Treatment of disposal in different way toxic and nontoxic gases. PLC controller from Siemens Was used in the treatment system of drainage wastewater control by the stepper motor,compressor, gas exhauster, pressure valve and the liquid level, flow and other analog variables to achieve Automated control of sewage waste water treatment. James C. Conwell, 12/1989,G. E. Jhonson proposed the design and construction of a new test machine configuration that offers same advantages over the traditional one. The new machine and attendant instrumentation provide more realistic chain loading and allow link tension and roller sprocket impact monitoring during normal operation. The incorporation of idle sprocket allows independent adjustment of test on length and preload.of that project. Different kinds of environment hazards reduced with the help of Drainage system machine

### III. METHODOLOGY

The device is place across a drain so that only water flows through the lower basement. Floating waste like bottles, plastic cans, covers.....etc. is lifted by lifters which are connected to the chain. The chain revolves with the sprocket wheel which is driven by the motor. The energy provided to the motor is electrical energy. When motor runs the chain starts to circulate making the lifter to lift up. The wastage material are lifted by lifter teeth and stored in storage or collecting bin. Once the collecting bin is full, the waste materials are removed from the bin.If we turn on motor switch or if we supply current to the motor the motor starts to rotate. The rotary motion of the shaft is connected to the top shaft by chain and sprockets which is placed on taper bars. From top shaft that motion is transferred to the bottom shaft by using sprockets and chains. The teeth which is used for lifting waste from drainage is placed or attached between two chains which are on top and bottom shafts. The dust bin which is used for collecting all the waste is attached to vertical bars behind the chains. There will be a mesh between the chains and dust bin which act as a barrier for stopping the waste without floating. When we switch on the motor the two shafts starts to rotate. Thus the teeth also starts rotate. The teeth enters into water while rotating when it

is coming up it also lift the waste present on the water along with it. It carries the wasted along with it and finally dumps that waste in dustbin during rotation.

A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power. The various members such as pulleys and gears are mounted on it.

Material used=Mild steel.

Length=910mm

Outer Diameter=20mm

Length between shaft to shaft=930mm

Power transmitted by the shaft = 108577.5105watt

Shafts are generally formed by hot rolling and finished to size by cold drawing or turning and grinding.

## 1.2 Bearing

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts. Rotary bearings hold rotating components such as shafts or axles within mechanical systems, and transfer axial and radial loads from the source of the load to the structure supporting it. The simplest form of bearing, the plain bearing, consists of a shaft rotating in a hole. Lubrication is often used to reduce friction. In the ball bearing and roller bearing, to prevent sliding friction, rolling elements such as rollers or balls with a circular crosssection are located between the races or journals of the bearing assembly. A wide variety of bearing designs exists to allow the demands of the application to be correctly met for maximum efficiency, reliability, durability and performance.

## 1.3 Sprocket

A sprocket or sprocket-wheel is a profiled wheel with teeth, or cogs, that mesh with a chain, track or other perforated or indented material. The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth. Sprockets are used in bicycles, motorcycles, cars, tracked vehicles, and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc. Perhaps the most common form of sprocket may be found in the bicycle, in which the pedal shaft carries a large sprocketwheel, which drives a chain, which, in turn, drives a small sprocket on the axle of the rear wheel. Early automobiles were also largely driven by sprocket and chain mechanism, a practice largely copied from bicycles. Sprockets are of various designs, a maximum of efficiency being claimed for each by its originator. Sprockets typically do not have a flange.

## 1.4 Battery

Battery used A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. It is composed of one or more electrochemical cells. The term "accumulator" is used as it accumulates and stores energy through a reversible electrochemical reaction. Rechargeable batteries are produced in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of electrode materials and electrolytes are used, including lead–acid, nickel–cadmium (NiCd), nickel–metal hydride (NiMH), lithium-ion (Liion), and lithium-ionpolymer(Li-ion polymer).

## 1.5 Chain

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles.

Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Another type of drive chain is the

Morse chain, invented by the Morse Chain Company of Ithaca, New York, United States. This has inverted teeth.

#### 1.6 Lifter Mounts

Lifting equipment, also known as lifting bin, is a general term for any equipment that can be used to lift loads. This includes sewages like polythene, plastic bottles, wastage which generally occurs in the water, thermocol, and other dusty and sewage partials which comes in the contact with that equipment. In our project we used two lifter for better performance, and it also help for balancing the model. The dimension of the lifter are as follows Lifter of width 12.7cm, Total length of lifter-60cm, Weight of lifter-150 gram, Thickness of lifter 2cm.

#### 1.7 Collecting Bin

Collecting bin is the rectangular hollow box which is situated behind the model. It is used for the purpose of collecting the sewages which is comes in the contact of the lifter. When the lifter completes its cycle it reaches to the bin and removes all sewage in the collecting bin. The collecting bin made up from sheet metal. Dimension of the collecting bin

Width of collecting bin-50cm

Depth of collecting bin- 44cm Length of collecting bin-75cm

#### 1.8 Gears

A gear or more correctly a "gear wheel" is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part in order to transmit torque. Two or more gears working in tandem are called a transmission and can produce a mechanical advantage through a gear ratio and thus may be considered a simple machine. Geared devices can change the speed, magnitude, and direction of a power source. The most common situation is for a gear to mesh with another gear, however a gear can also mesh a non-rotating toothed part, called a rack, thereby producing translation instead of rotation. The gears in a transmission are analogous to the wheels in a pulley. An advantage of gears is that the teeth of a gear prevent slipping. When two gears of unequal number of teeth are combined a mechanical advantage is produced, with both the rotational speeds and the torques of the two gears differing in a simple relationship.

#### 1.9 Dc Motor

Windshield wipers are powered by a small electric motor, usually mounted on the firewall or under the cowl (the area under the windshield's base). The motor activates linkage that moves the wiper arms back and forth. On vehicles with a rear window wiper, a separate motor powers the one in the rear. Signs that a wiper motor is about to fail include slow or intermittent operation, wipers that will operate at only one speed, or arms that stop in the middle of the windshield when turned off. If your wipers don't work, the fault could also lie with other parts of the wiper system. In the winter, for example, trying to use the wipers when the blades are stuck to the windshield. A gear or more correctly a "gear wheel" is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part in order to transmit torque. Two or more gears working in tandem are called a transmission and can produce a mechanical advantage through a gear ratio and thus may be considered a simple machine. Geared devices can change the speed, magnitude, and direction of a power source. The most common situation is for a gear to mesh with another gear, however a gear can also mesh a non-rotating toothed part, called a rack,

thereby producing translation instead of rotation. The gears in a transmission are analogous to the wheels in a pulley. An advantage of gears is that the teeth of a gear prevent slipping. When two gears of unequal number of teeth are combined a mechanical advantage is produced, with both the rotational speeds and the torques of the two gears differing in a simple relationship.

. the windshield because of ice or snow can blow the fuse for the motor or trip a circuit breaker. Other possible

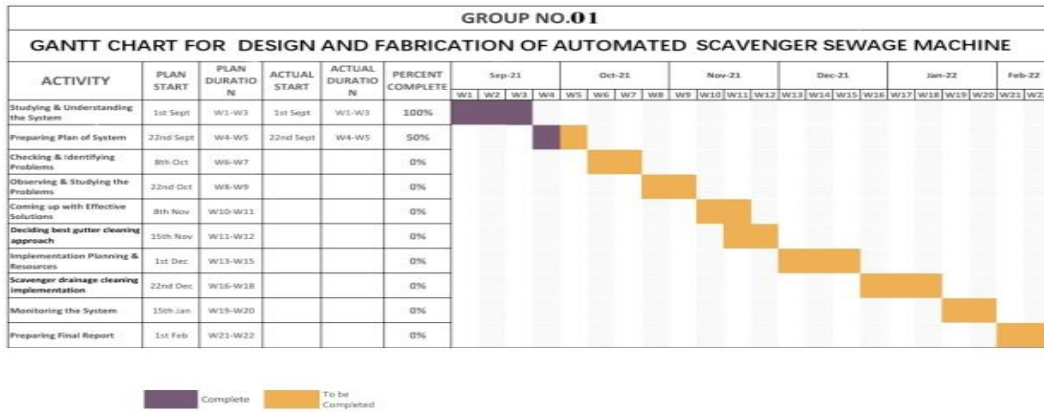


Fig 1. Gantt chart for design and fabrication of automated scavenger sewage machine

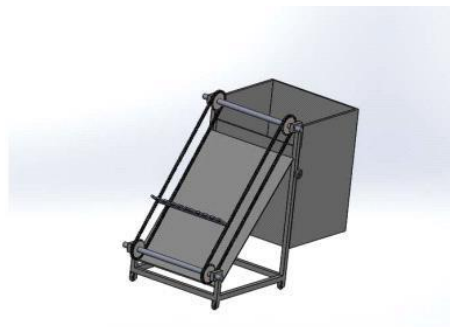


Fig 2. Basic Design of Automated gutter cleaning machine

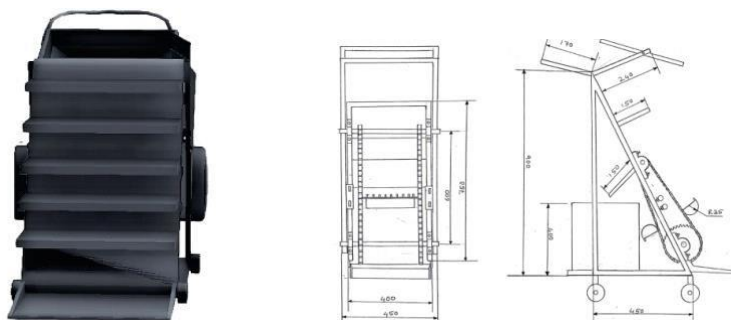


Fig 3.3D and Front and Side View 2D Automated Gutter Cleaning System

In the treatment system of drainage, waste water control by the machine and the collecting bin to achieve automatic control of waste water treatment. Drainage from domestic and industries is treated through this project to meet the national emission standards, with stable operation, low cost and good effect. The cleaner functions more effectively during the heavier rains which has more volume of running water with garbage and high velocity. Risk of Labors catching infections or poisoning due to large amounts of waste and chemicals will be reduced.

Automation is a technology concerned with his application of mechanical, electronic and computer based systems to operate and control production. This system is used To Operate Automated Gutter Cleaning System.

This project may be developed with the full utilization of men, machines, and materials and money. Also we have followed thoroughly the study of time motion and made our project economical and efficient with the available resources. This system is Designed, Fabricated successfully and also tested. It works satisfactorily. We hope that this will be done among the most versatile and interchangeable one even in future. Thus we can able to obtain following through Automated Gutter Cleaning system.

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