

Automatic Sewage Cleaning Machine

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Abstract: The motive of the project is to automate the sewage cleaning process in drainage, to protect the biodiversity. A study recently published in the Proceedings of the National Academy of Sciences (PNAS) found that at least 88 percent of the Earth's water surface is polluted with plastic debris. The result is not just a number, it says the contamination level of water. All the plastic wastes are of less density and so they float. The wastes also block the water path at narrow regions. The floating waste reduces the absorption amount of sunlight by water which results in imbalance of aquatic system. The reduction of this level of contamination is a very difficult one. And we cannot employ humans to clean the floating wastes because it may cause severe problems. We can overcome this problem by using a machine in that field. Our project is about automatic sewage cleaning machine, which can be used to clean the solid floating wastes that may be plastic or any other lighter waste materials. There are two parts mechanical & electronics. Mechanical system performs the lifting, moving & throws the waste by the power of motor. Electronics part of this controls the speed, frequency of the mechanical components.

Key Words: Automatic, Floating, Wireless, non degradable wastes.

1. INTRODUCTION:

Cleaning of drains has always been a problem. Labors cleaning drain seems unethical. It also leads to a high risk of them catching infections or poisoning due to large amounts of waste/chemicals in them. Also throwing of bottles/plastics and other such objects in the water lead to narrowing and eventually create a block in the flow of water. This leads to overflow in many cases. So here we provide a fully automated sewage cleaning machine to tackle these modern day sewage jamming issues. Our system uses an automated drain cleaning system that lets fluids flow through it but catches the floating waste like bottles & plastic and accumulates it. Our project consists of metal teeth based jaws that are mounted over the chain of the conveyor which is inclined to an angle. The inclined wire frame fixed along with the conveyor is used to let liquid flow but catch all solid waste. The machine consists of a storage tank on top of it. The jaws keep moving over the conveyor using a motorized shaft which is connected using a belt. It then reaches the top and turns upside down to discharge the solid waste in the storage tank. The jaws then move downward as the motor keeps rotating. The cycle continues. This project consists of a floating arrangement along with navigational facilities. The electronic part controls the speed of the conveyor and navigation and provides a control over the machine using Wi-Fi network. The system is a very efficient way to clean the floating waste from water reservoirs such as ponds, dams, rivers, etc. This system has limited human intervention in the process of cleaning and in turn reduces spreading of diseases to mankind.

2. LITERATURE SURVEY:

Ganesh U L, et.al. ^[1] demonstrated the utilization of mechanical seepage cleaner to trade the manual work required for waste cleaning framework. Seepage funnels are extremely messy. Now and again it is unsafe for human life while it is requirement for cleaning waste framework. To defeat this issue, they executed a mechanical self-loader seepage water cleaner thus the water stream is effective in view of general filtration of wastages with the assistance of that undertaking. Various types of condition dangers diminished with the assistance of Drainage framework machine.

R.Sathiyakala, et.al. ^[2] clarified E pail (electronic basin) use for seepage cleaning framework since E-can lifted a sewage and utilized dissipation treatment for this sewage wet sewage was changed over into dry issues, with the of ARM board (ARDUINO) this procedure was performed. After this procedure they were include this waste an administration bank with no sort of warmth of the bacteria. NitinSall, et.al. ^[3] clarified stream of utilized water from homes, business enterprises, business exercises is called squander water. 200 and 500 liters wastage water are produced every individual consistently. So utilizing waste water innovation that expels, instead of pulverizes, a poison in a seepage framework.

M. Naveena Reddy, et.al. ^[4] created scientific model of a profile changed curved gear age system. They researched the tooth under cutting of a non-standard curved apparatus, in light of the purposed numerical model. They created driving and driven profile changed circular gears. This venture supportive in outline and creation of high exactness circular gears. N.Yashaswini, et.al. ^[5] outlined and broke down for passing on granular materials to the tallness of 15m at the rate of 10tones/hr yield. They clarified fundamental plan estimations for the improvement of the container lift in 3D condition of NX programming. They likewise completed the static and vibration examination on the pail lift. They clarified dynamic conduct of the pail and apparatus shaft get together. They at long last discovered the adjustment of plan parameters.

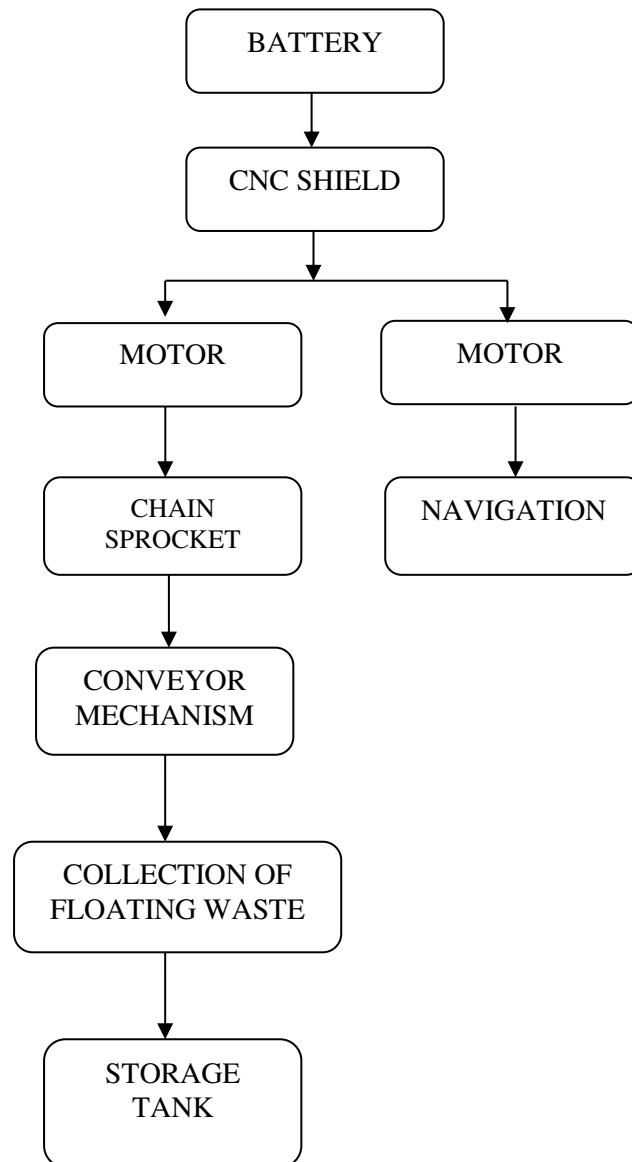
Pedersen, et.al. ^[6] expelled undesirable wonder, by utilizing chain drive reproduction program. It is utilized as a contrasting option to or in blend with physical trials. They framed a particular model of the marine motor chain drive for substantial speed frameworks. They utilized persistent contact constrain strategy for the recreation and examination. Played out a dynamic reproduction of extensive marine motor chain drives. They created novel definition for the recreation of the progression of roller chain drives utilizing a constant contact compel technique. They utilized numerical model for perform reasonable dynamic reproduction of vast marine motor chain drives, inside a direct recreation time. They likewise clarified that it is conceivable to contrast the numerical outcomes and exploratory outcomes.

H. I. Jimoh, et.al. ^[7] demonstrated the exploration was an appraisal of seepage issues in the tropical condition of Ilorin, Nigeria. With a specific end goal to accomplish the logic of the work, such an information have been sourced from coordinate hands on work. Such information incorporate seepage measurements, sorts of squanders in waste channels, issues of squanders and methods for squander administration. These information have been broke down through the utilization of engaging insights and cross organizations as a fundamental strategy for information investigation. James C. Conwell, G. E. Jhonson ^[8] proposed the outline and development of another test machine design that offers same points of interest over the customary one. The new machine and orderly instrumentation give more reasonable chain stacking and permit connect strain and roller sprocket affect checking amid typical activity. The joining of sit still sprocket permits autonomous change of test on length and preload.

3. MATERIALS:

S.NO	DESCRIPTION	SIZE/QTY	COST OF MATERIAL
1	Frame, Sheet Metal	As per dimensions	1500/-
2	Chain Sprocket	4 NOS	60/-
3	Microcontroller	1 NOS	400/-
4	12V Battery	1 NOS	900/-
5	CNC Shield V4	1 NOS	450/-
6	Arduino Nano	2 NOS	600/-
7	NRF24L01	2 NOS	300/-
8	Stepper motor NEMA17	3 NOS	1450/-
9	Stepper Drive	3 NOS	450/-
10	12V DC MOTOR	1 NOS	850/-
11	Traction Pulley	2 NOS	500/-
12	Relay Board	1 NOS	150/-
13	DC to DC Converter	1 NOS	150/-
14	Propeller Blades	3 NOS	250/-
15	Bearings	4 NOS	800/-

4. METHOD:



5. ANALYSIS AND CALCULATION:

1 Shaft

Material used=Mild steel.

Length=910mm

Inner Diameter=21mm

Outer Diameter=24mm

Length between shaft to shaft=930mm

Power transmitted by the shaft = 108577.5105watt

2 Maximum Bearing Load

$$L/g = 248.256/ 9.81 = 25.3064Kg$$

If the weight exceeds more than the calculated weight the load on the bearing will increase due to which there will be improper rotation of the chain occurs.

3 Chain Drives

P=11.372mm.

Chain length = $L = pLp = 2057.4$ mm

4.3.3 Lifter

Length=610mm

Breadth =120mm

Gap between each lifter=700mm

4 Collecting Bin

Length =920mm

Breadth =610mm

Height =340mm

Area of the collecting bin = $1.2 \times L \times B = 280600\text{mm}$

6. MOTIVATION AND OBJECTIVE:

The problem of water logging due to plastic, thermocol and metal leads to pest growth and it favors diseases like malaria, typhoid etc. This is unsafe for human life and hence the idea of this project emerged. The objective of the proposed project is to design and fabricate an automated machine for drainage cleaning in order to prevent humans from getting affected by various diseases from the infectious microbes present in the sewage while cleaning manually. This proposed system is to minimize or overcome the problem faced while using man operated machine and to minimize the increased dumping rate of waste. Not only that it can be used to clear waste in stagnant water bodies like the pond, lake etc... By this we can reduce the cost of cleaning as well as loss of human lives during the process.

7. EXISTING METHOD:

The existing system is completely a mechanical based project. It is a stationary system, simply kept in the sewage area to collect the wastes passing over it. The chain and sprocket is used for conveyor movement, which has fitted fork plates to collect the wastes from the sewage. The rotation of the chain along with the plates will collect the floating wastes and put off the wastes in the bin that is placed at the backside of the system.

8. RESULT AND DISCUSSION:

Sewage blockage due to plastics and other non degradable wastes are the common cause of sewage water overflow in a particular area. When waste water pipes/drains are blocked, sewage water overflows from the pipes into our home through its plumbing system. Not only can this cause substantial property destruction, but also the reason for many disease causing bacteria which is hazardous to our health. For these important reasons, it is necessary to have sewage removal performed quickly and properly by a proper mechanism.

A. Mechanical setup

The mechanical setup is the final fabrication of the system using mechanical components that includes outer casing as shown in diagram. Once the design meets the requirements, the real time setup is fabricated.

B. Electrical setup

Battery is the main source of power for the entire electrical circuit design and switches are used for effective working of the circuit. A voltage regulator is used to regulate the voltage as per the requirement. RF transmitter and receiver are used for remote control operation. Thus, the complete electrical set up is shown in Image.

C. Application of Sewage cleaning machine

This machine is used in almost all types of drains (Large, Small, and Medium) and also in stagnant water bodies (Pond, Lake) is an efficient way to control the disposal of sewages with regular filtration of wastes. This is used to remove waste from river side.

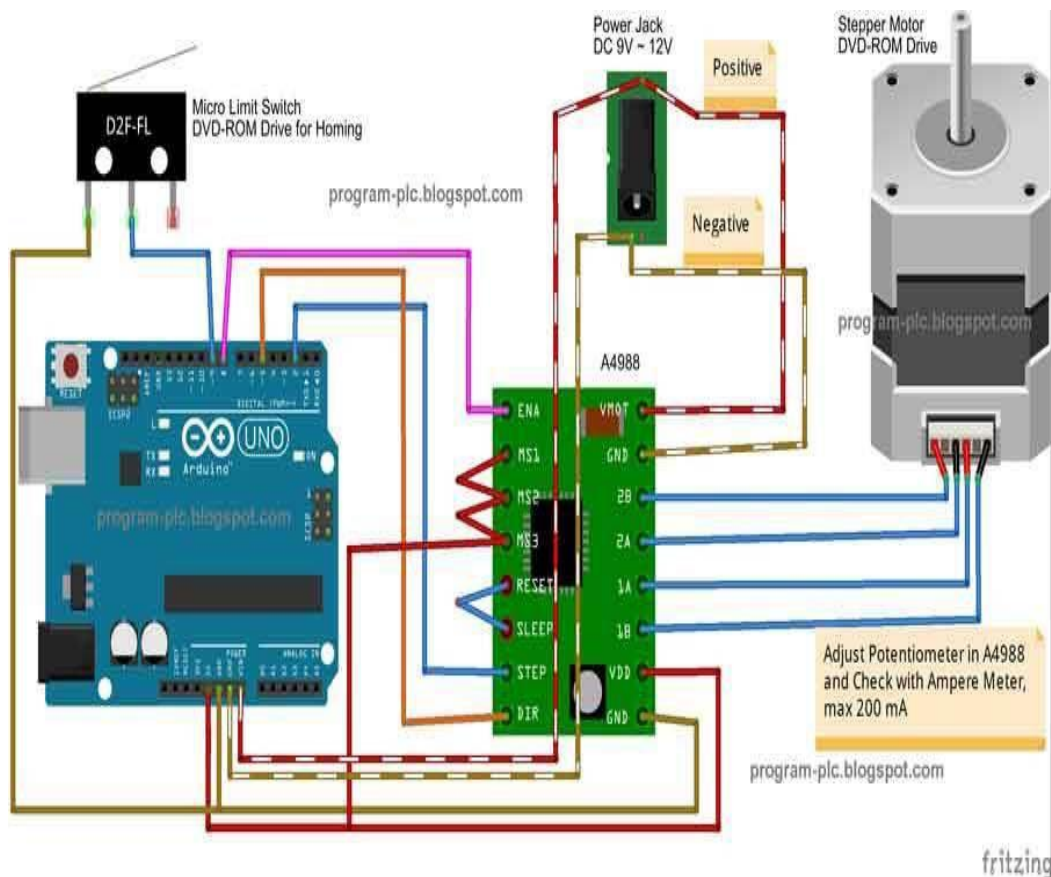
D. Advantage of Sewage cleaning machine

This cleaning system is easily operatable and cheap to fix the drainage problems. And, there is a reduction of labor oriented method of cleaning. It is a medium weighted portable machine that requires less power. Large amount of garbage is collected and sent for recycling.

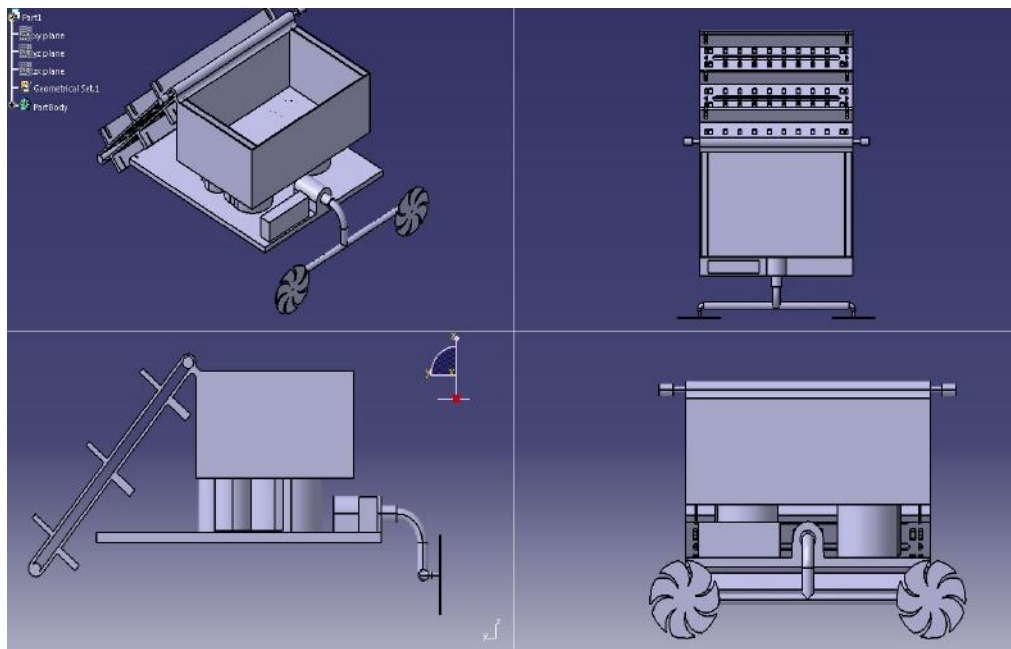
9. RECOMMENDATIONS:

- Use of solar cell to eradicate power problems.
- Suitable coating of material should be done to avoid corrosion.
- Increase the float capacity to increase the load of waste collected.
- Increasing the power of motor to lift all kinds of loads.

10. ELECTRICAL SETUP:



11. MECHANICAL OVERALL VIEW:



12. CONCLUSION:

Our writing survey features the progressing headway in the waste cleaning framework. Numerous particular exact examinations have been done and classifications, for example, self-loader waste cleaning framework and its mechanization have been concentrated to an awesome profundity. We concentrate more on making the framework portable in the seepage. . In the treatment arrangement of seepage Waste water control by the engine, roller chain and sprocket, lifter and the gathering receptacle to accomplish self-loader control of sewage squander water treatment. The

framework can move in the deplete to gather the gliding waste in order to lessen human works. The cleaner worked move successfully amid the heavier downpours which had more volume of running water with junk and high speed.

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