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Design and Development of Automatic Drainage Cleaning System

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Abstract –

Water is the basic need for the existence of life on earth. In spite of 70% water on earth majority of water is not suitable for drinking purpose. There is a huge demand of clean water as it is used for a variety of purpose such as drinking, bathing, cleaning, cooking etc. Impurities present in water can cause serious health issues that can damage the life of human beings. Wastewater is characterized as the stream of utilized water from homes, organizations, ventures, business exercises and foundations which are subjected to the treatment plants by a precisely planned and built system of funnels. The measure of stream dealt with by a treatment plant shifts with the season of day and with the times of the year. The procedures looked into here incorporate both those that expel poison soils in wastewater and those that vanishes them. Utilizing a wastewater treatment innovation that expels, instead of decimates, a toxin will give a treatment remains. This sort of wastewater is characterized and characterized by its wellsprings of cause. Regularly 200 to 500 liters of wastewater are created for every individual associated with the framework consistently. At wastewater treatment plant, this stream is dealt with before it is permitted to be come back to the earth. There are no occasions for wastewater treatment, and most plants work 24 hours each day of the week. Wastewater treatment plants takes a shot at basic purpose of the water cycle, helping nature shields water from the intemperate contamination. Most treatment plants have essential treatment and auxiliary treatment.

INTRODUCTION

The waste and gases produced from the industries are very harmful to human beings and to the environment. Our proposed system is used to clean and control the drainage level using auto mechanism technique Mechanical control techniques include the total or halfway evacuation of Plastic containers and disintegrated solids by mechanical means, including: gathering, destroying, cutting, rototilling, rotating, and binding. Mechanical control techniques can likewise be utilized to speed up manual cleaning exercises, including hand cleaning, raking, and cut stump control, with the utilization of engine driven hardware. A mechanical oceanic gatherer (reaper) is a sort of freight boat utilized for an assortment of undertakings,

including amphibian plant administration and waste expulsion in seepage, lakes, coves, and harbours. Reapers are intended to gather and empty vegetation and flotsam and jetsam utilizing a transport framework on a blast, flexible to the suitable cutting stature, up to 3 feet underneath the surface of the water. These administration strategies for A scope of hardware for overseeing and controlling amphibian vegetation is being used today, intended for particular plant sorts (floating ,submersed, and new vegetation) and for operation in particular sea-going environments (untamed water, trenches, shorelines, and wetlands). Cutter bars gather material and bring it on board the vessel utilizing the transport; when the freight boat has achieved limit, slice material is transported to a transfer site. Management involves a given request for waste counteractive action and minimization.

LITERATURE REVIEW

Ganesh U L, et.al. [1] Drainage pipes are very dirty. Sometimes it is harmful for human life while it is need for cleaning drainage system. To solve this problem, they implemented a mechanical semi- automatic drainage water cleaner. The usage of mechanical drainage cleaner to replace the manual work required for drainage cleaning system.

Elangovan K., et.al. [2] Reviewed about drainage cleaning to replace manual work to automated system because manually cleaning system it is harmful for human life .for toxic & in toxic gases wastage thrown into the drainage this project works efficiently to dispose of the waste. 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 automatic control of sewage waste water treatment.

Dr .K.KUMARESAN [3] explained manual work converted to automated system. They made their project economical and efficient with the available resources. As their risk of human loss during cleaning Drainage pipe this project works to reduce the loss of death during work disposal. To overcome this problem they implemented “drainage cleaning machine”

R.Sathiyakala, et.al. [4] explained E bucket (electronic bucket) use for drainage cleaning system because Ebucket lifted a sewage and used evaporation treatment for this sewage wet sewage was converted into dry matters, with the of ARM board (ARDUINO) After this process they were add this waste a government bank without any kind of affection of the bacteria.

S D Rahul Bharadwaj, et.al. [5] proposed with the automatic cleaning of waste water in order to reduce global warming& wastage of power to treat waste water management.

Nitin Sall, et.al. [6] here using waste water technology that removes, rather than destroys, a pollutant in a drainage system. Flow of used water from homes, business industries, and commercial activities is called waste water.

Mr. Nikhil S. Pisal1, et.al. [7] proposed safe load for the chain and the ability of the same to withstand the use of Finite Element Modelling would be the core objective of the work. The design for the chain would

be subjected to F.E Analysis to find the effect of loads (tension) on the link. An existing chain link was used for benchmarking the research work.

NDUBUISI C. Daniels, et.al. [8] showed the Drainage system cleaner machine used to remove garbage and the drainage system cleaner has three major parts which are the Propeller, the Cleaner and the Pan all makes up for its effective functioning.

Shao-Wu-Zhang, et.al. [9] introduced three drainage devices about the ceramic filter dewatering system. They compared the working processes of three drainage devices, and analysed its future development. Modified the design according to the shortage coming of drainage equip and working mechanism of automatic drainage device.

Prof S.D.Anap, et.al. [10], showed blockage is the major cause of the pollution and flooding in the metro cities. They explained about the design of the cost effective, easy method to control the water level of the tank wirelessly and automatically. They have designed the drainage blockage detection system to avoid such problems.

James C.Y. Guo, et.al. [11] showed roadway sanding is a common practice in cold regions because sand increases the roadway friction when mixing with snow. This study also presented a maximization methodology by which the size of snow storage area can be determined by the diminishing return of sand recovery. In this study, a snow storage element is introduced to the renascence project of a mountainous highway which is running through an environmental sensitive forest area in Colorado.

James C. Conwell, G. E. Jhonson [12] proposed the design and construction of a new test machine configuration that offers same advantages over the traditional one. The incorporation of idle sprocket allows independent adjustment of test on length and preload.

N.Prabhushankar, et.al. [13] The main aim of the proposed work was to remove drainage water by the pneumatic operated spring return reciprocating pump showed dewatering of drainage is generally done using centrifugal pump, but using centrifugal pump is not much effective in complete removal of the suspended and heavy solids and also it consumes lot of electric power for its operation. Manual work can be reduce while cleaning.

Gregor Burger, et.al. [14] described the concept and software design of an innovative general purpose platform for network based model development and look at some of crucial computational design issues. They included features such as the hot-start mechanism and the extension interfaces have proven to be extremely useful when linking city drain3 as a sub-model into larger software project. Described the concept and software design of an innovative general purpose platform for network based model development and look at some of crucial computational design issues.

Ms T.Deepiga, et.al. [15] They also detect the leak by an increase in the LED meter and rushing sound will be bearded in the headset. Defined metric properties of the mechanisms.

ROBERT C. McGREGOR, et.al. [18] They used the Kowalski or Goodyear design, which is made up of modules of eighteen tyres which are connected up to form a flexible mat. Explained that breakwater has proved hydrodynamic ally successful in that no damage to boats at the moorings was experienced even when the winds reached force 11 and waves up to 1.25m high were encountered, without the breakwater moorings could be untenable at wind forces as low as force 5 or 6. From analysis of several beams and orientations this size of breakwater and orientation was judged to be satisfactory. The orientation is a compromise between the extra wave attenuation available if the breakwaters western end is moved northwards and the shorter breakwater length achieved if it were moved south. The water monitoring systems such as Tank water pollution monitoring and water pipeline leakage sensing monitoring. They

avoided large apartments. They used the PID based water level monitoring to indicate the level of water in the tank.

M. Naveena Reddy, et.al. [16] This project helpful in design and production of high precision elliptical gears developed mathematical model of a profile shifted elliptical gear generation mechanism. They investigated the tooth under cutting of a non-standard elliptical gear, based on the purposed mathematical model. They developed driving and driven profile shifted elliptical gears.

Sankalp Verma, et.al. [17] They also motivated to current researchers in the field of fascinating. This paper represented a broad review of the extensive literature available on the subject with a view to trace its history highlighting major trends and discussing significant contributions showed the structure of a kinematic chain is defined by the pattern in which the constituent links of the mechanism are interconnected and deriving the characteristics of the mechanism.

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.

Methodology used for whole processing of Drainage cleaning Machine is given below; this methodology gives way about how work is to be carried out in systematic way. It is standard process of describing process, how it is done in simplest manner. Configuration comprises of use of logical guideline, specialized data, and creative energy for advancement of new component to perform particular capacity with most extreme economy and effectiveness. Thus cautious outline approach must be embraced.

COMPONENT USED

A. Shaft:-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

B. 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 cross- section 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.

C. 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 sprocket- wheel, 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. Some sprockets used with timing belts have flanges to keep the timing belt centred. Sprockets and chains are also used for power transmission from one shaft to another where slippage is not admissible, sprocket chains being used instead of belts or ropes and sprocket-wheels instead of pulleys. They can be run at high speed and some forms of chain are so constructed as to be noiseless even at high speed

D. 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 (Li-ion), and lithium-ion polymer(Li-ion polymer).

E. 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.

F. 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-150gram, Thickness of lifter- 2cm

G. 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-30cm Depth of collecting bin-38cm Length of collecting bin-75cm

H. Solar Panel: - Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Here, the solar panel is being used to power the battery which is used for the application of power to the mechanism of Automated Gutter Cleaning system. It is a panel of 10 watts consisting of photovoltaic solar cells. Per hour solar panel charges 10 watts of power. Since to charge the panel of 25 watts it will consume 150 minutes approximately depending on the sunrays falling on the panel.

I. 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.

J. Fasteners: - A Nut A nut is a type of fastener with a threaded hole. Nuts are almost always used opposite a mating bolt to fasten a stack of parts together. The two partners are kept together by a combination of their threads' friction, a slight stretch of the bolt, and compression of the parts. In applications where vibration or rotation may work a nut loose, various locking mechanisms may be employed: Adhesives, safety pins or lockwire, nylon inserts, or slightly oval-shaped threads. The most common shape is hexagonal, for similar reasons as the bolt head - 6 sides give a good granularity of angles for a tool to approach from (good in tight spots), but more (and smaller) corners would be vulnerable to being rounded off. Other specialized shapes exist for certain needs, such as wing nuts for finger adjustment and captive nuts for inaccessible areas.

K. Screw or Bolt: - A screw, or bolt, is a type of fastener characterized by a helical ridge, known as an external thread or just thread, wrapped around a cylinder. Some screw threads are designed to mate with a complementary thread, known as an internal thread, often in the form of a nut or an object that has the internal thread formed into it. Other screw threads are designed to cut a helical groove in a softer material as the screw is inserted. The most common uses of screws are to hold objects together and to position objects.

H. 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 because of ice or snow can blow the fuse for the motor or trip a circuit breaker. Other possible causes are the interior switch that controls the wipers failing, wires in the system being damaged, or the linkage that pushes and pulls the wiper arms breaking. Moving parts in the linkage may also be stuck from corrosion and/or gunk and need lubrication.

Fabrication:

- These are the preliminary setups done for the manufacturing of our machine. Steps in the manufacturing The design and the measurements were made perfect and the model prototype was made, the leg and the post were measured and they were made in perfect perpendiculars as they don't come out of centre of gravity.
- Then the cutting plan was done and the raw materials were made in sizes as the cutting plan. Then the sheet was made into sizes and they were welded. Then skeleton was made to hold the conveyer.
- As the conveyer merges in water they were choose as stainless steel and the mesh work was done as they must allow the water flow and collect only the waste in water. Then the bearings were fixed in the shaft, and the chain sprocket was mounted on the shaft.
- The chain was chose since to the slip in waster to be arrested, and then the drive was chosen as ac motor also the belt drive is used.

TURNING OPERATION

Turning may be a machining method inner which a cutlery, usually a non-rotary tool bit, describes a helix tool course through manner of method of shifting some of or a lot much less linearly at the same time as the piece of hard work rotates. The turning processes are generally achieved on a lathe, considered to Bethe oldest tool tools, and can be of four different sorts at the side of right now turning, taper turning, and profiling or out of doors grooving. Those sorts of turning processes will turn out numerous shapes of materials like right now, conical, curved, or grooved art work piece. In general, turning uses clean single-element reducing tools.

ARC WELDING

Arc attachment could be a method that's accustomed be part of metal to metal by mis-treatment

electricity to form enough heat to soften metal, and also the melted metals once cool result in a binding of the metals. It is a kind of attachment that uses a attachment power provide to form an electrical arc between AN conductor and also the base material to soften the metals at the welding point. They can use either direct (DC) or alternating (AC) current, and expendable or non-consumable electrodes. The attachment region is typically protected by some sort of shielding gas, vapour, or slag. Arc attachment processes could also be manual, semi-automatic, or absolutely machine-controlled

CONCLUSION:

In the treatment device of drainage, waste water manage with the aid of using the device and the gathering bin to obtain automated manage of waste water treatment. Drainage from domestic and industries is handled via this project to satisfy the national emission standards, with stable operation, low price and good effect. The cleanser functions extra efficiently at some point of the heavier rains which has more quantity of going for walks water with garbage and excessive velocity. Risk of Labors catching infections or poisoning because of massive amounts of waste and chemical substances can be reduced. Automation is a technology involved together along with his application of mechanical, electronic and computer based systems to perform and manipulate production. This gadget is used To Operate Automated Gutter Cleaning System. This project can be advanced with the entire utilization of men, machines, and substances and money. Also we've got observed thoroughly the study of time movement and made our project affordable and efficient with the available resources.