Solar Powered Automatic Drainage Cleaning System

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Abstract- *In India removal of the solid waste is a significant issue, as per the sources 80% of solid waste is arranged in seepages, stream, lake and other water bodies. The solid waste like plastic containers, polythene packs, soda pop jars, solid pieces and so forth, are generally stream with these lines which need to channel stage to arrange. In any case this solid waste can cause blockage of these lines which will in general flood like circumstance in blustery season. To keep away from this sort of circumstances this waste is should have been removed from the seepage for persistent progression of waste water. Waste can be spotless utilizing programmed mechanical framework rather than manual robots and work. The chief function of the proposed model is to gather solid waste from seepage framework and gather it in bucket. This framework will chip away at sun based energy so it very well may be use where power will be inaccessible. The filtration is done completely by mechanical method. This will diminish the issue looked in manual waste cleaning. This framework will assist with diminishing sicknesses causes because of the sewage water like jungle fever, Dengue, typhoid, etc..*

I. INTRODUCTION

The waste water management has become significant issue these days. India is a densely populated country where the basic waste like plastic covers, utensils and other plastic piece thrown in the several places and in the open seepage. These wastes will block the flow in the drainage system during rainy season when water stream flow through the street and drainage systems. These cause collection of the waste water in drainage. This amassing of sewage water prompts water borne infection like cholera, worm sickness, typhoid, malaria, etc. This can cause medical problem and can likewise cause passing. In India there is need of robotized machine which can clean seepage framework and gather this strong waste. Right now these systems are cleared with the help of manual specialists where the labourers need to get into routes and remove the wastage. This influences the strength of the specialists. These specialists endured by the different infections which influence their life and diminish their invulnerability. To defeat these sort of issues looked by the manual labourers and medical problems, we proposed a mechanized component," Automatic Drainage Cleaning System Using Solar Panel". This framework is utilized to clean seepages killing human work inclusion and to advance the cycle of assortment of waste.

II. LITERATURE SURVEY

As we probably are aware the cleaning of water is our main role so cleaning of water is done physically work now. At the point when human clean drains physically, at that point there are more medical problem which harm the human wellbeing. So we have developed a machine which clean drains naturally and saves the human existence and furthermore different living creatures to many sort of sicknesses.

Increases in non-permeable surfaces, through along with the rise in rainfall, also in few places around the World, have created issues like flooding of cities [12] Miller and Hutchins, 2017; [4] Du et al., 2015. The ISO 14044 Life Cycle Assessment approach assesses the efficiency of environment in building systems over their entire life cycle, from whole and extraction of material to the works of transportation, construction, Khasreen et al., 2009; [1] Ajayi et al., 2015. Traditional underground drainage approaches, which generally consist of blocks made of cement and pipes made of plastic, are radically different from the SuDS approach to handling runoff. Because of the basic variation in SuDS and conventional drainage methods, demand for materials, building blocks. [2] Akadiri et al., 2012. Various studies have recorded the detrimental impact of transportation on land on climate change. [3] Axsen et al., 2020. In recent years, ground breaking strategies for managing and remediating urban runoff have been implemented, including green drainage systems that aim to reduce environmental impacts.

[4] Fathollahi et al., 2021. SuDS has a number of notable advantages, including lowering the risk of floods, groundwater contamination, and drought, as well as providing wildlife habitat and enhancing water quality. [7] Fathollahi et al. The materials were considered to be transported from a fixed distance of 10 kilometers to the construction site. [9] Gibbons et al., 2019 to calculate the inventories of emission. The LCIA was carried out for different levels of maintenance and construction using the ReCiPe model's midpoint and endpoint levels to determine the benefit of each stage to

environmental and impacts of human health. [10] Goedkoop et al., 2008. In contrast to a seepage system utilising piping blocks made of cement, the findings could be due to the use of more PVC pipes of underdrain type in seepage systems with flow capacity of lower value, which will create higher impacts in the environment [11] Hajibabaei et al., 2018. Porous surfaces on the land have been altered by non- porous surfaces like sidewalks and roof of building. [12] McGrane,2016. Depletion of the ozone layer induces a rise in ultra violet radiation from the sun on the earth's surface, which may cause harmful health consequences like skin cancer and defects in the immune system. [14] Slaper and de Gruijl, 2004. Due to growth of population in the urban and the impact created by the change in climate, SuDS devices are much relevant, which requires designers and planners in order to increase the capacity of the drainage. [15] Sohn et al., 2019. According to a review of the literature, several studies have viewed the project's area as the functional unit of the system rather than the project's objective and design intent. [16] Spatari et al., 2011.

III.SOLAR DRAINAGE CLEANING MACHINE DESIGN, SELECTION OF MATERIAL

The material used for the construction of the wheel chair is mild steel. The reason to use mild steel is as following properties

Based on the mechanical properties of the mild steel, it is known that mild steel has higher tensile strength and machinability and also it is of low cost and recyclable. So it is concluded that choosing mild steel as material for fabricating the product will be appropriate.

Design of the system

With the assistance of AutoCAD programming the 2D model for the proposed works has been sketched which is very much required. The Fig. 1 shows the isometric view and the back perspective on the created plan of the model. Many changes were made in the dimensions and plans during creation of the model. The forks, fitted in the system, were designed based on the size and the properties of the waste materials in the seepage channels. Fig.2. shows the model of the project done in the SOLIDWORKS software.

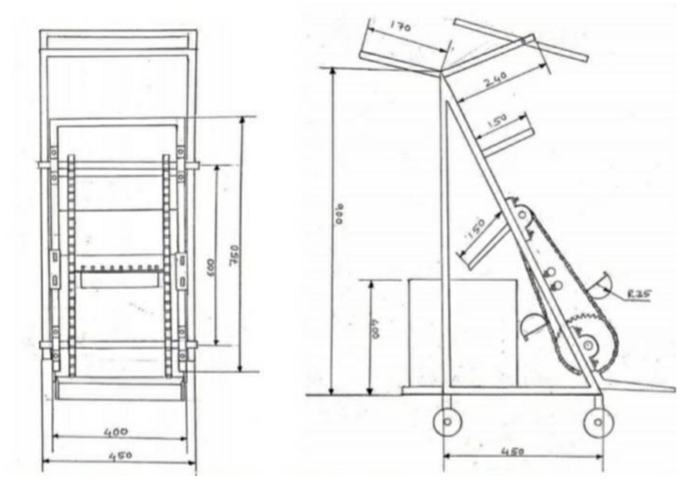

Fig1: 2D Drawing in AutoCAD Software)

Fig. 2. 3D modeling done in SOLIDWORKS software

IV. WORKING MECHANISM

In this model the lifting forks are lifted with the aid of the chains which are along the line of axis of the sprockets. Thus here the chain drive mechanism is used to operate the lifting arms. The working of the framework is completely precisely. The framework is run on 12V DC battery. The battery is charged by 100 Watt solar board. 25 Amp motor is utilized to drive the sprocket. The information sprocket is again drive the two another sprocket by chain transmission. The sheet metal jaw is fixed on pivoting chain which is utilized as transport to gather the waste skimming in water. The gathered waste in jaw is again drop in sheet metal dustbin. This construction is upheld by a strong MS outline. The below figure fig.3 represent the overall experimental set up of the proposed model. The fig. 3 (a) depicts the side view of the fabricated model fig. 3 (b) shows the front view of the experiment and fig (c) represents the top of the experiment.

V. NUMERICAL CALCULATION

Power of the motor = 16W

Speed N = 25rpm

Exterior diameter of the shaft = 18mm

Interior diameter of the shaft = 16mm

Power, $P = 2\pi NT/60$

Torque = $60*16/2\pi 30$

= 5.09 Nm

Maximum load, m is calculated as below

T = Fr

5.09 = F*0.065

F = 78.35 N

We know that,

Force, F = mg

78.35 = m*9.81

m = 7.98kg

The maximum time the motor can run without interruption

= 40Ah/1.4167

= 28 hours 35 minutes

Time taken by the battery to get fully charged by solar panel (full intensity of sun at 90°)

= V*40Ah/100

= 2 hours

VI. CONCLUSION

Water is a fundamental need of people and every single living being. Abundant amount of water is available on the earth but large quantity of it isn’t suitable for human use. In this project, the clean water is more significant in the event that could be used for several purposes. The impure substances in water can be risky and can cause several diseases. Independent of the length of the drainage system, the capacity of the fundamental drainage system is together and dispose the water through an outlet. The principle of gear changing and shaft coupling is used for designing and manufacturing of this model. It comprises of DC gear motor, shafts, waste removing plates, dust receptacle, bearings, sprocket and chains. From this work it is concluded that the time taken by the battery to be charged fully by solar panel at full intensity of sun at 90° is 2 hours (approx). the time motor can continuously run is 28 hours and 35 minutes. The torque produced by the motor is 5.41 Nm.

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