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Review Paper on Design and Development of Solar Powered Drain Cleaning System

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ABSTRACT: This paper proposes a concept which can be used to replace manual cleaning work in the drain by a mechanical cleaning machine. This will not only prevent the blockage of the drainage pipes but also will free the workers from their tiresome work. Thus the machine will reduce the blockage resulting into a clean and healthy environment.

KEYWORDS: Automatic Debris Separator, Waste Management,

I. INTRODUCTION

In the 21st Century the problem of flooding of the drainage pipes has become a very serious issue. Flooding of the drainage pipes occur when there is an obstacle to the flow of flowing water through the drainage pipes. Empty plastic bottles, polythene bags, cloth bags, etc clog the drainage pipes. They create blockage in the path of flowing water. The over-flooded water pollutes the nearby area leading to an unhealthy environment. It increases the risk of diseases. The impurities present in the water leads to stinking smell and diseases. Also the non-biodegradable waste present in it acts as a catalyst to pollution and an unhealthy environment.

II. LITERATURE REVIEW

Ganesh UL and Vinod Rampur¹ shows how the mechanical designed can be used to replace the manual process of drain cleaning. Drainage pipes are not only unhygienic to clean but also possess threat to human life. To overcome this situation they used a mechanical system consisting of a semi-automatic drainage cleaner which helps to periodically remove the wastage. Different types of environment hazards can be reduced by this system of drain cleaning.

MilindKolhe, Rahul Shende, R.C. Waghule and A.H. Ingle² helped to design an automatic system that could reduce the human labour workforce. This would helped the labourers as it was easy to remove the waste from drainage pipes. The

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workers are happy as they did not need to enter drainage pipes to clean it. It helped to save the threat to human life also to protect the environment.

ManojRathod, VasantPund, Rahul Pangale, Jivan Rathod³ highlighted the flood issue that takes place in Mumbai in 2005. An approximately 2000 peoples died in the flood. The main cause of the flood was blockage in the drain pipes due to plastic bags, plastic bottles, thermocol and other non-biodegradable waste. Due to all this waste problem of flood becomes very severe. The drainage system designed by them was able to clean the waste time to time and helps in saving the time required to clean the drainage pipes.

Balchandra G., Karthikeyan S., Elongovan K., Divyn N.⁴ used the PLC SCADA system to fully automate the system of drainage cleaning and along with it they added a pump monitoring system, control system consisting of a compressor, gas exhauster, pressure valve, stepper motor and level sensor. Once the working of machine is start it checks the flow of water and gas generated depending on it changes the speed of motor.

Mrugank Sharma, Shahabaz Siddique, Archit, PawanShrivastava, Shivam Kumar Tiwari⁵ took a step further to create the machine more environment friendly. The mechanical cleaner developed uses a power derived from solar panels but they lacked the automation and also the speed of the chain was fixed. There was absence of system that changes the speed of the motor.

R. Sathiakala, S. Flora Grace, P. Maheshwari, S. MajithaBhanu, R Muthulakshmi⁶ suggested the use of an Electronic Bucket. Usually waste collected from the collector will be dumped into the bin. The waste will be dumped into the bin. This waste will be in wet form. This can cause more havoc as more diseases can spread more easily from wet and damp surroundings. Also wet waste will cause more stink and leads to an unhealthy environment. The Electronic Bucket will help to dry out the wet waste by heating the bucket. This helps to dry out the wet waste collected from the drainage pipes and converts it into dry waste. This helps to kill the germs and bacteria present in it. This in turn will prevent spread of diseases which will lead to a healthy environment.

NDUBUSIC.Daniels⁷ carried out a research. This research helped in the development of the project in many ways. The research stated that time to time removal of waste from the drainage pipes helped to maintain the environment free from diseases. This waste when removed from the residential and industrial helped to reduce the effect of water pollution. This way very useful as it helped to prevent the diseases and kept the environment clean and healthy.

Dr.Kumaresan.ME.PhD⁸ compared the two systems the mechanical and the human labour. The main factors for the comparison made by him as time, economy, and efficiency. The time required by the system will be less and also be more economic. Manual labour is more tiresome work and is a more time consuming process. The efficiency of the mechanical system was greater than the human.

S.D.Anap⁹ states that flooding of the drainage pipes is a major concern as it is a prime factor of pollution in the metro cities. The system designed by him helped to detect the blockage in the drainage pipes. The system helped in the proper monitoring of the condition in the drainage pipes. It also helped to provide timely information on time of the conditions. There was an implementation of a wireless sensing network which helped to monitor the conditions of the drainage pipes. For monitoring the level of water in the drainage pipes a level sensor was used.

M.Raveena Reddy¹⁰ prepared a profile shifted elliptical gear generation mechanism using mathematical model analysis. This carried out investigation of the teeth undercutting of a non-standard elliptical gear, on the basis of the mathematical model proposed. This helped in the design and development of driving and driven gears.

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MedhaKalekar, AnandKelkar, Shashidhar Pamarthi¹¹ proposes to use an Obstacle Detection and Decision Based Navigation System. They explain that the system would be very helpful to deal with real world problems. The system had 3 ultrasonic range finders. The rangefinder was used to detect distances on X-axis, Y-axis, Z-axis. This was helpful to detect the various obstacles and the co-ordinates of the obstacles. The robot then uses these parameters to control the speed of the motor. This was also helpful as the vehicle could position itself to that place. Thus it required almost no human intervention.

Viresh.G.S, Puneeth.K, Mahendra.S, Karthik.N.S, Balaji.V¹² carried out changes in the mechanical drain cleaning machine by replacing the chain mechanism by belt drive and Gear Drive. They made a detailed Study of the three systems on the basis of efficiency, Output and all other factors that caused a change in the system. They also carried out experiments by changing the flow-rate of flowing water in the drainage pipes for checking the efficiency and output.

III. CONCLUSION

This paper brings into focus the research work done as well as on-going study and work. Many research work is being carried out in this process regarding its automation, efficiency and study in great depth. Our work will focus on increasing the efficiency and automating the process of drain cleaning process.

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