

Design of Iot Based Manhole Cleaning System

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Abstract:

Robotics is a rapidly developing branch of technology. The development of electronics and microprocessors give the opportunity to create new devices combining mechanical structures, electronics, and software. In this project we proposed the concept of an robot which replace the manual work of cleaning drains by humans and to overcome the real time problems. The robot lets water flow through it but catches large solid waste like bottles, plastic. Labor cleaning drains leads to a high risk of them catching infections or poisoning due to large amount of waste/chemical in them. So for reducing work of humans and analyzing several problems, we proposed our project.

Cleaning drains and drain pipes is very challenging. Humans cleaning drain pipes and drains appear to be at risk of contracting infections or poisoning as a result of waste and chemicals in them. Excess waste can also overflow the drain causing a slew of problems for the environment. In order to solve the real time problems involved in cleaning the sewers by individuals, we present the idea of a robot to carry out the grunt work. IOT technology based drain pipe cleanup machine addresses the ongoing sewer blocking problems. A automated robot is designed for cleaning the wastage. A node system will detect the fluid level, blockage, sewer lid position, and report on the server, thereby reducing the complexity involved in cleaning the sewers.

All the data regarding the drain will be available for the observer on the web server which can be operated through a mobile, laptop or pc. By the observation it can be controlled and necessary actions can be taken right from the observing place without entering the drain. So that the humans can be safe from the harmful gases, liquid and other substances which may be available in the drain or gutter. Also with the help of lid detection accidents can be prevented, pedestrian can be protected from falling due to improper or broken lids of the drains.

Keywords: Cleaning, Water flow, IOT technology, Robot

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I. Introduction

Water is being used very fast today. The significance of water is mainly used for cooking, cleaning and drinking in our lifestyle. The water used in 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. So to overcome from these problems we can filter the water drainage water before it mix with other water. This type of filtration of water is called primary filtration. In this project we use DC or AC motor to run the system when power supply is available& the Equipment we used are motor, chain, driver, bucket, frame, wheel, sprocket gear, solid shaft etc. Water is a basic necessity of human and all living beings. There is a plenty of water on earth that is not suitable for human use. The impurities present in water can cause hazardous diseases. Waste water is defined as the flow of used water from homes, business industries, commercial activities and institutions which are subjected to the treatment plants by a carefully designed and engineered network of pipes. The biggest impact of cleaning the chemical wastes can cause respiratory diseases and it plays a challenging issue for the municipality officers. Water damage is classified as three types of contaminated water. They are clean water, gray water and black water.

Automated drainage water cleaning and control system using auto mechanism proposed to overcome the real time problems. With the continued expansion of industries, the problem of sewage water must be

urgently resolved due to the increasing sewage problems from industries of the surrounding environment. Our proposed system is to cleaning and control the drainage level using auto mechanism technique. Auto mechanism is the major controlling unit and the drainage level a monitor by municipal. In this system we used hand wheel, chain, driver, bucket and frame.

II. Methodology

In order for the gutters to remain on the side of the house and do their job effectively, they must remain clean and free of debris. Debris inside gutters weigh them down which can over time pull them away from the house. Along with snow and ice during the winter months, they can eventually fall off. And if they are not free of debris, such as leaves, twigs, acorns, etc., it can stop the flow of water out to the street and eventually it will find its way back to the foundation of the house. Depending on the amount of trees around a house, the average homeowner may need to clean them two or more times a year and this are usually done manually.

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. 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.

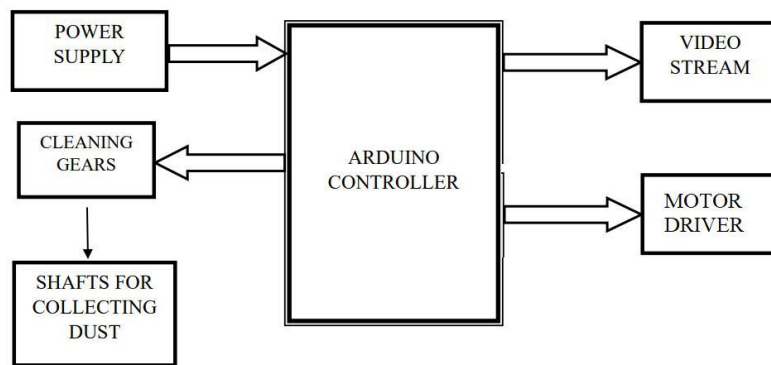


Figure 1: Block Diagram

III. Results:

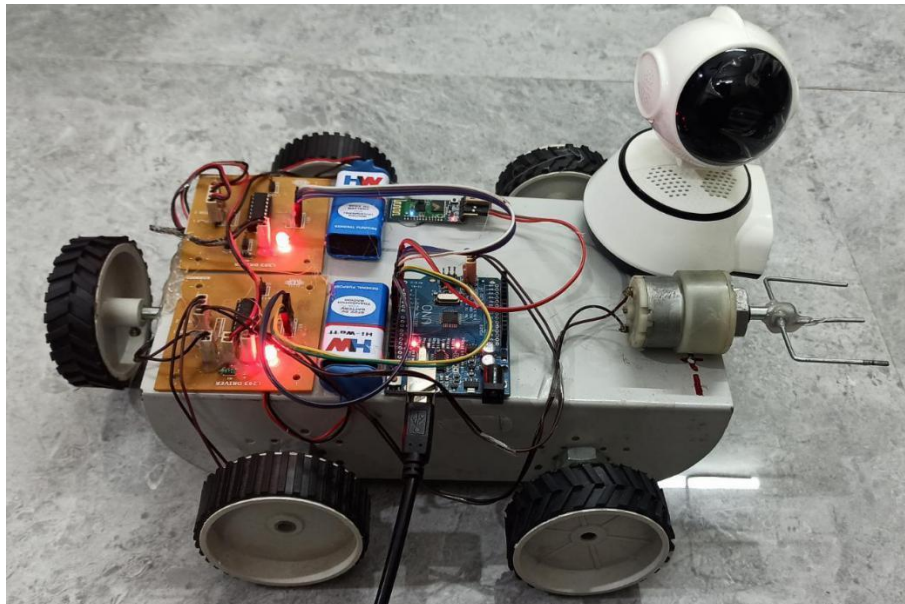


Figure 2: Experimental setup for mobile robot

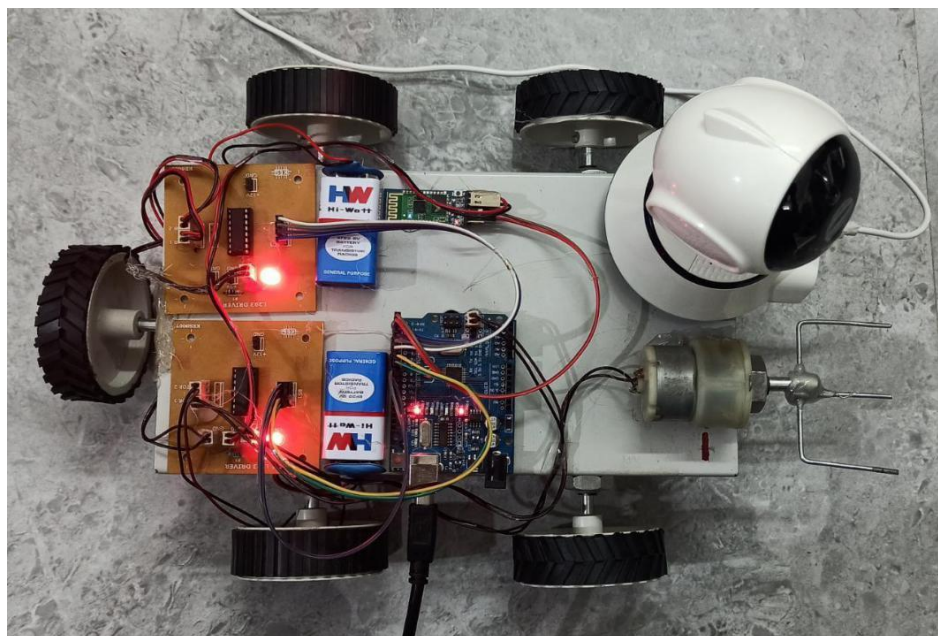


Figure 3: Experimental setup for mobile robot

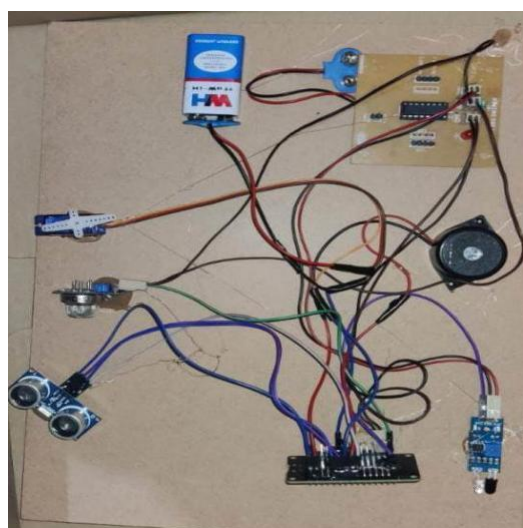


Figure 4: Experimental setup for Node 1

IV. Conclusion:

By implementing this system, drains, gutters can be cleaned and monitored with an automated approach. Thus, this system is cheaper and efficient when compared to other type of automation system. In large scale applications, high sensitivity sensors and powerful motors with cleaning brushes can be implemented for large operations.

References

- [1]. Ashraf, Mohammad & Shariful, Md & Chowdhury, Alam. (2012). Drainage Planning in the Cities of Bangladesh: Case Study of Drainage and Water Logging in Chaktai Commercial area, Chittagong. Journal of Bangladesh Institute of Planners. 2. 10.3329/jbip.v2i0.9556.
- [2]. N. Truong-Thinh, N. Ngoc-Phuong and T. Phuoc-Tho, "A study of pipe-cleaning and inspection robot," 2011 IEEE International Conference on Robotics and Biomimetics, Karon Beach, Phuket, 2011, pp. 2593-2598, doi: 10.1109/ROBIO.2011.6181695.
- [3]. P. Shukla, "Design of Inspection and Cleaning Robot," Int. J. Sci. Res. Eng. Technol., vol. 3, no. 6, pp. 2278–882, 2014.
- [4]. J. S. J. Kumar, J. Tiwari, S. Khasnavis, and A. A. Joseph, "Design of a Sewer Robot to Detect Blockages in Sewer" Middle-East J. Sci. Res., 24 (S1): 236-239, 2016
- [5]. Rampur, Vinod & U L, Ganesh. (2016). SEMI-AUTOMATIC DRAIN FOR SEWAGE WATER TREATMENT OF FLOATING MATERIALS. International Journal of Research in Engineering and Technology. eISSN pISSN. 2319-1163
- [6]. Nitin Sall, et.al., "Drain Waste Water Cleaner", Global Journal of Researches in Engineering: J General Engineering Vol No- 16, 2016.