Automated Garbage Removal System

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Abstract—Dozens of millions of tons of plastics and other debris end up floating in water bodies around the world. This project namely Automated Garbage Removal System makes use of electrical system to remove floating trashes. The device is placed across the water body so that flow occurs through lower grids. Waste like plastic bottles, cans, bio-debris etc. are lifted up by using conveyer fitted with projecting teeth. These chains are driven by electric powered motors. On further scope we can make use of solar power system in which photovoltaic cells used are coupled with storage batteries for full day working, without the need of any other electrical system. Secondary conveyer is provided to remove the trashes to the dumping regions.

Keywords—Debris, Electrical system, Photovoltaic cells, Batteries, Solar Power, Plastic pollution, Chain drive, Plastic Debris.

1 INTRODUCTION

Water running through drainage system mostly carries waste materials most which are non-biodegradable which cause flooding as well as climate change. Overflow of water drainage system occurs when there is a blockage of drainage system. This blockage forces the water to find its way apart from the mapped-out drainage system. Hence the running water spills over the horizontal height of the drainage systems spreading to regions alongside the drainage system, it causes the problems like pushing down of structures such as fences, water logging of farm lands and residential building, etc. The impurities present in water can cause hazardous and harmful diseases which can be very harmful to all living beings.

As long as the drainage system is considered, the function of the main drainage system is to collect, transport and dispose of the water through an outlet. Impurities in drainage water can be like empty bottles, polythene bags, papers, plastic, domestic waste, etc. The problem such as Environmental Pollution and spreading of viral Diseases are controllable.

Automation of Drainage Cleaning System would reduce the risk of various diseases spread due to blockage of waste. This Drainage Cleaning system will clean the solid waste at the surface of drainage which would allow the flow of water. The device is placed across drain so that only water flow through lower grids and the waste is been collected.

Once in the drainage system, the litter is potentially able to travel via the storm water conduits, streams, rivers, lakes and estuaries until it eventually reaches the open sea. Along the way, however, items frequently become entangled in the vegetation along the banks of the streams, rivers or lakes, or strewn along the beaches. Some of this debris is picked up - often at great expense. Most of it is probably buried in the river, lake or beach sediments.

2 WORKING PRINCIPLE

2.1 Working of Mechanical Parts:

The device is placed 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 proposed debris cleaner basically consists of plastic bin to back of which a debris collector is to collect the waste garbage materials. The horizontal mild steel hollow bars support a rotating chain which is fixed to two gears over which chain will be rotating. Over the chain a horizontal grit (debris) lifter is affixed. When the chain rotates, the debris lifter collects the floating solid debris and moves vertically to the top of the debris collector are reached. Once it is up to the point of the collector it reverses its motion such that the debris collected on the plane surface of the collector falls into the collecting bin which is situated behind the metal grating frame. The rotation of the chain is achieved by electric motor which is provided on the rotating shaft. We use ball bearing in this device, it makes the rotational motion of gears and chains easy. And also, AC to DC converters are used in this machine because we need to convert AC power supply to DC power.

The Debris cleaner is placed in the channel where the solid debris is flows along with the water, after that switch on the power supply. This AC power supply is need to convert to the dc power which is achieved by ac to dc converter.

This converted dc power drives the 2 gears through ball bearing, that gear is engaged with moving chain. In this stage we need to take care of proper alignment of chain with gear teeth. That moving chain is attached with two debris lifters, which are moving along with the chain. The purpose of debris lifter is to lift the solid waste in the channel.

2.2 Working of Electrical Parts:

Infrared Obstacle Sensor Module has built-in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect presence of any obstacle in front of the sensor module. The module has on board potentiometer that lets user adjust detection range. The sensor has very good and stable response even in ambient light or in complete darkness.

IR sensors detect the object with in its range and send the information for the Relay and Relay transforms the information to the microcontroller and microcontroller runs the DC motor as per the Guidance of the IR sensors. The system will be operated only when the object is detected by the IR sensorsmargins.

3 Components Used

3.1 Collector Bin:

The collector bin is used for collecting the solid debris in the channels. The collector bin is placed back side of the machine which makes easy collection of solid wastes. The collector is in the rectangular shape. This is attached to the MS bars with the help of screws. The Collector Bin is also called as Debris collector, where it is made of Mild Steel (MS).

3.2 Cycle/ Bike Chain:

In operations using a chain speed of 50 m/min. or less, chain elongation due to wear can almost be ignored. Under such low-speed conditions, the service life of the chain largely depends on its fatigue strength. Low-speed operation is more economical than operation under "normal conditions". Low speed is recommended for operations with fewer start-ups and stops that enable smooth power transmission. Selection of ambient atmosphere, layout, lubrication, etc. for low-speed operation is the same as that for operation under normal conditions.

3.3 Electric Motor:

Although AC motors are used in most of the cases, DC motors have many applications and used for multi-purpose applications. In any electric motor, operation is based on simple electromagnetism.
The motor used in this project is WIPER MOTOR.

3.4 IR Sensors:

An IR sensor consists of an IR LED and an IR Photodiode; together they are called as Photo Coupler. The Infrared Obstacle Sensor has built-in IR transmitter and IR receiver. Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations. Hence, they are called IR LED's. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

4 Sensors Specifications

The main specifications of the sensors are:

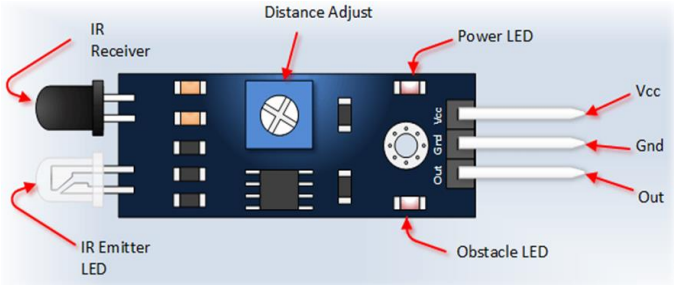
4.1 Operating Voltage: **3.0V – 5.0V**

4.2. Detection range: **2cm – 15cm (Adjustable using potentiometer)**

4.3 Current Consumption: **at 3.3V: ~23 mA**, **at 5.0V: ~43 mA**

4.4 Active output level: **Outputs Low logic level when obstacle is detected**.

4.5 On board Obstacle Detection LED indicator



5 Process of Fabrication

The Steps involved the Project are:

Step 1: Prepare base, vertical columns and horizontal bars by using arc welding.

Step 2: Fix the two gear on top and bottom.

Step 3: Fix motor and rectifier on side of the gear shaft.

Step 4: Place the chain drive on gears with proper alignment.

Step 5: Fix two debris lifters to the chain.

Step 6: Fix the plastic collector bin by using screws.

6 Welding Process

A weld is made when separate pieces of material to be joined combine and form one piece when heated to a temperature high enough to cause softening or melting. Filler material is typically added to strengthen the joint.

Welding is a dependable, efficient and economic method for permanently joining similar metals. In other words, you can weld steel to steel or aluminium to aluminium, but you cannot weld steel to aluminium using traditional welding processes. Welding is used extensively in all sectors or manufacturing, from earth moving equipment to the aerospace industry.

The number of different welding processes has grown in recent years. These processes differ greatly in the manner in which heat and pressure (when used) are applied, and in the type of equipment used. There are currently over 50 different types of welding processes. We'll focus on 3 examples of electric arc welding, which is the most common form of welding. The most popular processes are shielded metal arc welding (SMAW), gas metal arc welding (GMAW) and gas tungsten arc welding (GTAW). • All of these methods employ an electric power supply to create an arc which melts the base metal(s) to form a molten pool. The filler wire is then either added automatically (GMAW) or manually (SMAW & GTAW) and the molten pool is allowed to cool.

7 WORKING MODEL SETUP

8 ADVANTAGES

8.1 It is a simple method to remove the garbage.

8.2 Minimize the human efforts in cleaning debris channel.

8.3 Simplicity of design and control.

8.4 This machine cleans drains effectively.

8.5 It avoids the conventional method of cleaning.

8.6 Single machine replaces the number of labours required for cleaning purpose.

8.7 It avoids the blockages of drains.

8.8 Environment friendly system.

9 ESTIMATION AND COSTING

PARTICULARS	COST(Rs)
Iron Material	3000
Debris Lifter Material	1500
Chain System	500
Electronic System	5000
Gears	1000
Labour Charges	3000
Miscellaneous	800
TOTAL	14800

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11 CONCLUSION

11.1 The project presented has involved the development and implementation of Automatic garbage removal from the channels or drains.

11.2 The motivation of this work is to implement this idea in the field of drainage cleaning.

11.3 This Project helps to clean the channels with less efforts and reduces the number of labours required for cleaning purpose.

11.4 Using the simplest method to replace the old traditional cleaning method to automatic one.

11.5 On the basis of these result we can conclude that it is an innovative method of minimising manual stress and thus very much reliability, stabilizing in the drainage.

11.6 The project carried out by us made an impressing task in the environmental purpose and it is very useful for the small-scale works.

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