SEWAGE CLEANING MACHINE

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***Abstract*—The earliest form of sewer cleaning was hand excavation whereby labourers loaded sediment into barrows which were moved down the sewer and then lifted out at manholes by bucket. The work is not only dirty, unpleasant and dangerous. The major problem in manual scavenging is the health issues faced by the workers and more over the cleaning is done by human beings because of earning. Nowadays even though automation plays a very important role in all industrial applications, the proper disposal of sewages from industries and commercials are still a challenging task. Drainage cleaning system is proposed to overcome the real time problems. In this project our aim is to replace the manual work in drainage cleaning by introducing a semi- automated system in an efficient way to control the disposal of wastages and with regular filtration of wastages. In our model, a pneumatic piston is connected in a wire rope which in turn is coupled with kinematic linkages. The linkage from the frame is to be submerged into the sewage. When the pneumatic piston is actuated, the grippers which are provided at the bottom expand and collect the solid wastes from the sewage. Ultimately our motto is to fabricate a machine which is cost effective as well as efficient in working.**

I. INTRODUCTION

Manual Scavenging is the most nauseating thing to do; for others, it's the only way to make a living. From drains and sewers to septic tanks and railway tracks, more than half a million manual scavengers across the country are cleaning, carrying and disposing human excreta. They force themselves into choked sewers and septic tanks; hang on for hours, scooping out filth with bare hands and bearing the stench of sewage. Every year, hundreds of manual scavengers die, asphyxiated by poisonous gases. Manual scavenging was banned 25 years ago with the passing of the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993, but it continues to find practitioners. There are structural problems as well, which force people to enter septic tanks. "Septic tanks are designed badly. They have engineering defects which means that after a point, a machine cannot clean it," said A Narayanan, director of Chennai-based Change India. Adding to the problem is the fact that many cities do not have sewerage that covers the whole city. Sometimes, sewage lines are connected to storm water drains which get clogged and demand human intervention. Open drains, are also badly designed, allowing people to dump solid waste into them, which accentuates the problem. Improper disposal of plastic bags and bottles, napkins and other materials clog the drains. Few people take up this lowly job, not knowing that human faeces and urine harbour a variety of diseases. They may carry Hepatitis A, E. coli, Rotavirus, Nor virus, and pinworms. The community risks infection by coming in contact with 2 these wastes. That also explains why sewer workers die as young as 40, falling prey to multiple health issues: cholera, hepatitis, meningitis, typhoid and cardiovascular problems. In fact, repeated handling of human excreta without protection leads to respiratory and skin diseases, anaemia, jaundice, trachoma and carbon monoxide poisoning. It is not going to be possible to eliminate manual scavenging unless we create the right technologies. With proper use of technology, auto (or) semi-automated sewage cleaning machines can be built to save the lives of those unsung heroes.

II. LITERATURE SURVEY

Mr. Saurabh, S. Satpute1, Mr. Vitthal R. Darole, Mr. Pravin, M. Khaderao, Mr. Pankaj, B. Hiralkarl (Automatic Sewage Machine), this project is to replace the manual work in drainage cleaning by automated system. We know that water has a great importance in human being life, the water flow in drain full of wastes like polythene, bottles etc. The drains get blocked due to these wastes in water. Now a days even through mechanical machine plays a vital role in all industrial applications in the proper disposal of sewages from industries and commercials are still challenging task. Drainage are using for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockage in the drainages. The government also spends too much money to clean the drainages. To overcome this problem and to save the human life we implement design "Automatic sewage cleaning system". We designed our project to use this inefficient way to control the disposal of wastages and with regular filtration of wastages. The system has a wiper motor that starts running as soon as the set-up is switched on. Two power window motors are connected to the wheel and it is driven with the help of the remote-control set-up. The process starts collecting the sewage wastes by using the arm and it throws back the waste into the

bin fixed in the machine at the bottom. An arm is used to lift the sewage and in turn a bucket is used to collect them. The set-up runs even in sewage area with water (limited to a particular amount) so that the wastages which floats on the water surface also gets collected. The garbage which affects the drainage is also picked up and removed. This system has limited human intervention in the process of cleaning and in turn reduces spreading of diseases to mankind. Osiany Nurlansa, Dewi Anisa Istiqomah, and Mahendra Astu Sanggha Pawitra AGATOR (Automatic Garbage Collector) as Automatic Garbage Collector Robot Model Nowadays, the environment problems arise in many towns in Indonesia. These problems come along by developing activities such as construction of houses, offices, and other business areas. The Environment problems occur due to several reasons; they are the low budget allocation on environment management and public awareness in protecting the environment. The Environment issue which comes up from year to year and still cannot be solved is about garbage and waste from various places dispose into rivers. Those garbages can clog water flow, induce the water become dirty, smelly, and often over flow so then give effect floods. This research aims to design and make AGATOR (Automatic Garbage Collector), a rotor robot model as automatic garbage collector to counter accumulation of garbage in the river which has no flow effectively and efficiently. The method of implementation is design and construction. This method includes the identification of needs, analysis of the components required specifically, hardware and software engineering, developing, and testing. The test results obtain data by specification of AGATOR includes IC ATMega16 with 5 Volt voltage and 1,1 amperes current, IC Driver with 12 Volt voltage and 1,2 Ampere current, and Limit switch as the controller. Support devices of the robot are mechanical robot, robot control system, sensor system, and actuator robot. The maximum load drives the garbage receptacle until 5 kg. The average speed of the robot when it takes out the garbage is 0.26 m/s. M. Mohamed Idhris, M. Elamparthi, C. Manoj Kumar, Dr. N. Nithyavathy, Mr. K. Suganeswaran, Mr. S. Arunkumar (Design and fabrication of remote-controlled sewage cleaning machine) The motive of the project is to automate the sewage cleaning process in drainage, to reduce the spreading of diseases to human.

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(Automated Sewage Cleaning System) In this project the proposed concept is to replace the manual work in drainage cleaning by automated system. Now-days even though automation plays a vital role in all industrial application in the proper disposal of sewages from industries and commercials are still a challenging task. Drainage pipes are while cleaning the blockages in the drainage pipes. to overcome this problem and to save human life we implement or design that is “automated drainage cleaning system we design our project to use this in efficient way to control the disposal of wastage and regular filtration of wastage automated drainage 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 problem the surrounding environment. the waste and gases produced from the industries are very harmful human beings and to the 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 is monitor by municipal in this system we used major parts are motor, chain, remote, circuit. Ganesh U L showed the usage of mechanical drainage cleaner to replace the manual work required for drainage cleaning system. Drainage pipes are very dirty. Sometimes it is harmful for human life while it is need for cleaning drainage system. To overcome this problem, they implemented mechanical semi-automatic drainage water cleaner and so the water flow is efficient because of regular filtration of wastages with the help of that project. Different kinds of environment hazards reduced with the help of Drainage system machine. Balachandraetal, reviewed about drainage cleaning to replace manual work to automated system because manually cleaning system it is harmful for human life and cleaning time, is more so to overcome this problem they implemented a design “Automatic drainage water pump monitoring and control system using PLC and SCADA”. PLC and SCADA were designed. In this project, the motto is to use an efficient way, to control the disposal of wastage regularly, treatment of disposal in different way toxic and nontoxic gases. 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, explained manual work converted to automated system. Drainage pipe using for disposal and it may be loss for human life while cleaning the blockage in the drainage pipes. To overcome this problem they implemented “Automatic Sewage Cleaning System”. They designed their project different way clearance of gaseous substance are treated separately so the flow of water efficiently. This project may be developed with the full utilization of men, machines, and materials and money. They made their project economical and efficient with the available resources. They used automation technology relegated with his application of mechanical, electronics, computer-based systems to operate and control production.

III. WORKING

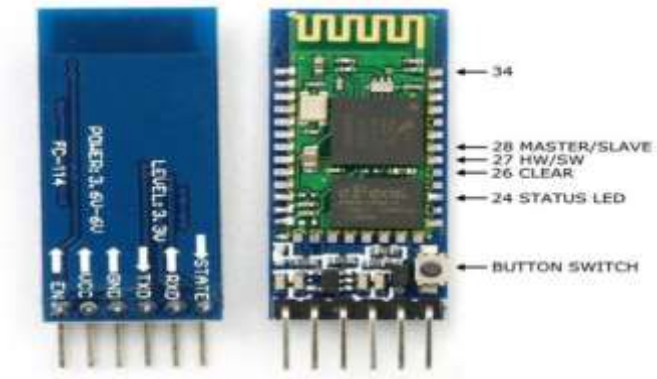
The machine can be operated manually as well as through Bluetooth control. Once the compressed air is allowed to pass through the valves, the solenoid actuates the piston. During the forward stroke of the piston, the kinematic linkages get compressed. This helps the grippers to pick the required object. During the return stroke of the double acting cylinder, the linkages are retracted to its initial position which eventually releases the object from arms of the gripper. Here, depth of the operation can be lowered or raised by means of a pulley, manually. However, that entire process can be automated via an Arduino and a Bluetooth control device. An electric motor of 20kg torque (12V) is fitted to the pulley's shaft which in turn gets attached to an electronic circuit board. This board consist of an Arduino and a Bluetooth controlling device. This electronic setup allows you to lower and raise the linkage depth automatically through an app.

IV. DETAILED WORKING OF ELECTRONIC COMPONENTS

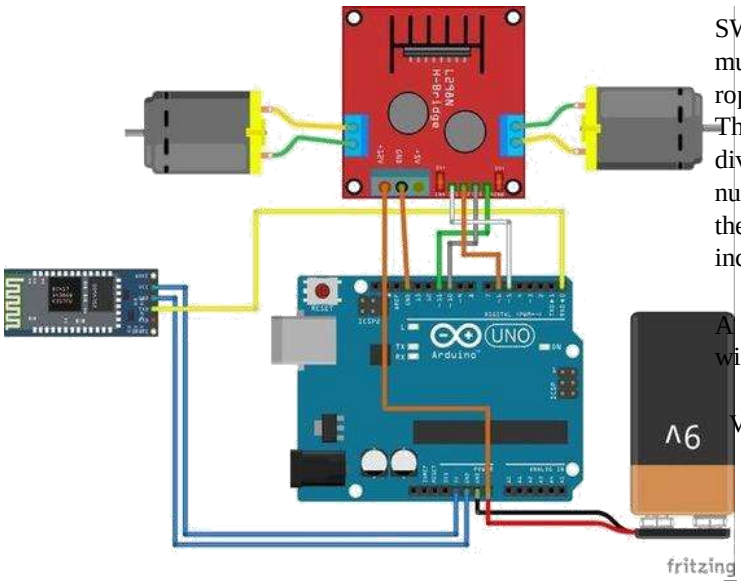
- FIRST THE INPUTS FROM THE FIRE BLADE (A, B, C, D) ARE CONNECTED TO THE CORRESPONDING INPUTS OF ARDUINO UNO (8, 9, 10, AND 11).
- The supply and ground terminals from the Bluetooth chip are connected to that of the Arduino Uno board through jumper cables.
- The power terminals are connected to the 12V DC battery because 5V supply obtained through direct connection is insufficient to run the motor. Thus, a 12V battery is provided.
- The left motor (M1) in Fire blade is connected to the motor.
- Now update the arduino program to the arduino Uno through the system.
- Then connect the RX (receiver) and TX (transmitter) of the Bluetooth chip to the TX and RX of the Arduino Uno.
- Connect the Bluetooth by using a smart phone. • Control the motion of the motor through the commands available in the application.

FIRE BLADE MOTOR DRIVER

ARDUINO UNO CLONE



BLUETOOTH MODULE



CIRCUIT CONNECTION

V. DESIGN CALCULATION

5.1 TORQUE P = T W ------ (1)
Johnson 20 kg-cm motor, High Torque DC geared motor.

FEATURES:
300RPM 12V DC motors with Metal Gearbox and Metal Gears
• 18000 RPM base motor
• 6mm Diameter shaft with M3 thread hole
• Gearbox diameter 37 mm.
• Motor Diameter 28.5 mm
• Length 63 mm without shaft
• Shaft length 30mm
• 180gm weight
• 30kgcm torque
• No-load current = 800 mA, Load current = up to 7.5 A (Max)
• Recommended to be used with DC Motor Driver 20A or Dual DC Motor Driver 20A.

A machine must rotate to produce power! A machine with no rotation can deliver torque - like an electric motor - but since no distance is moved by force - no power is produced. As soon as the machine starts to rotate power is produced.

P = (2NT* 3.1415)/60 ------- (2)
= (2 * 300 * 30 * 3.1415) / 60
= 9.42 KW.

WIRE ROPE:

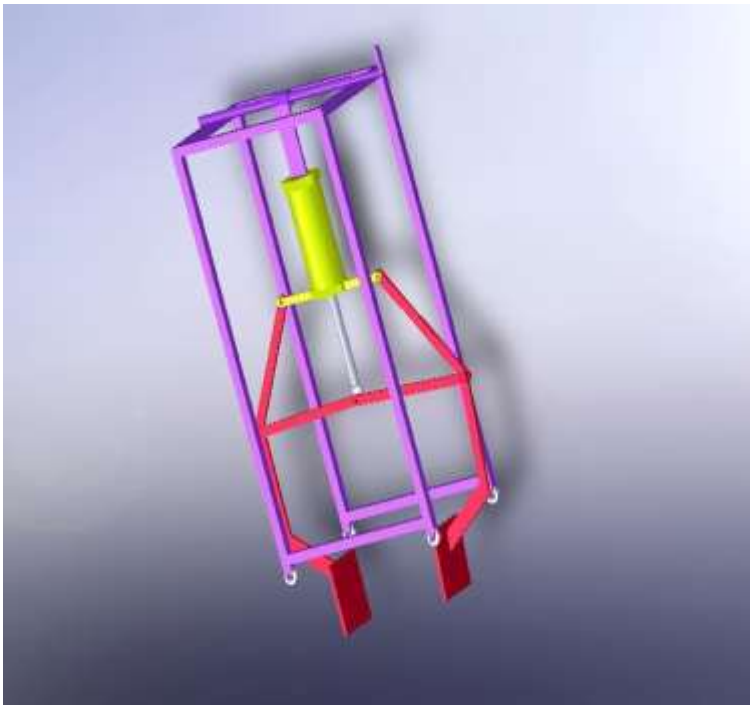
WIRE ROPE SAFE WORKING LOAD- The term safe working load (SWL) of wire rope means the load that can be applied and still obtain the most efficient service and also prolong the life of the rope. The formula for computing the SWL of a wire rope is the diameter of the rope squared, multiplied by8 (D x D x 8 = SWL in tons). Example: The wire rope is 1/2 inch in diameter. Compute the SWL for the rope. The first step is to convert the 1/2 into decimal number by dividing the bottom number of the fraction into the top number of the fraction: (1 divided by 2 = .5). Next, compute the SWL formula: (.5 x .5 x 8 = 2 tons). The SWL of the 1/2-inch wire rope is 2 tons.

A winch is a mechanical device that is used to wind up or wind out a rope or wire rope.

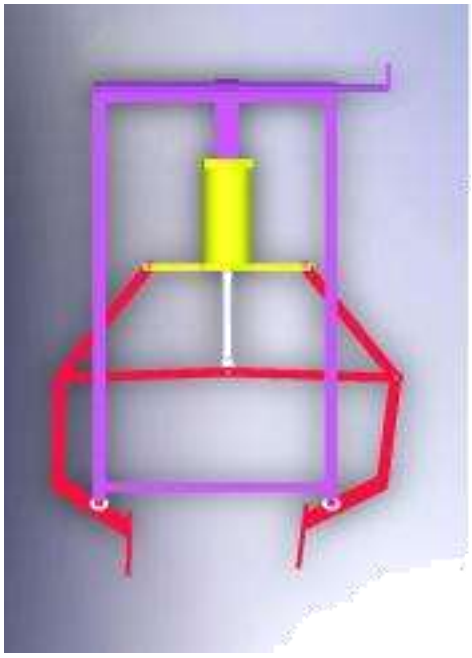
Velocity Ratio - The velocity ratio can be expressed as
VR = R / r (3) = 2 (assumed)
Where VR = velocity ratio
R = effort force radius (m)
r = load radius (m)

Effort Force - The force to raise a load can be expressed as F=W/μVR
= W r / μ R
= m a g r / μ R (4)
= (10*9.81*1)/(1*2)
=5 * 9.81 = 49.05 N (5 Kg Appx)

Where F = force (N)
μ = mechanical efficiency of the system (equal to one for an ideal friction-less system, a fraction less than one for real-world systems with energy losses due to friction)
m = mass (kg)
ag = acceleration of gravity (9.81 m/s2) W = weight (N)



ISOMETRIC VIEW OF MACHINE



FRONT-VIEW OF MACHINE

VI. CODING FOR UP AND DOWN MOTION

```
int A = 8;
int B = 9;
int C = 10;
int D = 11;
char a;
void setup () {
  pinMode(A, OUTPUT);
  pinMode(B, OUTPUT);
  pinMode(C, OUTPUT);
  pinMode(D, OUTPUT);
Serial.begin(9600);
}
void loop() {
if(Serial.available() > 0)
{
a = Serial.read();
Serial.println(a);
if(a == 'R')
{
Serial.println(a);
digitalWrite(A, 0);
digitalWrite(B, 1);
digitalWrite(C, 0);
digitalWrite(D, 0);
}
if(a == 'L')
{
digitalWrite(A, 1);
digitalWrite(B, 0);
digitalWrite(C, 0);
digitalWrite(D, 0);
}
if(a == 'U')
{
digitalWrite(A, 0);
digitalWrite(B, 0);
digitalWrite(C, 0);
digitalWrite(D, 0);
 }
}
}
```

VII. CODING FOR BLUETOOTH SETUP WITH ARDUINO

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(0, 1);
int ledpin=12;
int Data;
void setup()
{
mySerial.begin(9600);
pinMode(ledpin,OUTPUT);
}
void loop ()
{
if (mySerial.available())
{
Data=mySerial.read();
if(Data=='1')
{
digitalWrite(ledpin,HIGH);
mySerial.println("LED On! ");
}
else  if (Data=='0')
{
digitalWrite(ledpin,LOW);
mySerial.println("LED Off! ");
}
}
}
```

VIII. EFFECTS AND ADVANTAGES

- The System Can Move into The Drain to **Collect the Floating Waste** Which Will **Reduce Human Labor**.
- The Cleaner Function Is Most Needed During the Heavier Rains Which Had More Volume of Running Water with Garbage and High Velocity.
- Avoids the Direct Contact of Human with Drainage System, As the System Is **Semi-Automated**.
- **Safety** is **the Key Concept** and It Probably Avoids the Country Nagging Concept.

IX. CONCLUSION

Automation is a technology concerned with his application of mechanical, electronic and computer-based systems to operate and control production. Our aim is to fabricate and automate a machine at a lower cost which would benefit the manual scavengers. By implementing this concept of drainage cleaning method there will be reduce in the manual scavengers in our country which reduces the health hazards for humans thereby reducing the environmental pollution in our country.

X. REFERENCES

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