

Abstract

Labours cleaning drains seems unethical and also leads to high risk of them catching infections or poisoning due to large amounts of waste/chemicals in them. 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 outfall or outlet. The proper disposal of common wastes is still a challenge faced nowadays, even though automation plays a vital role in the industrial and commercial applications.

Now-a-days even though mechanical drainage plays a vital role in all industrial applications in the proper disposal of sewages from industries and commercials are still a challenging task. Drainage pipes are used for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockages in the drainage system. . Solid waste in drainage water includes empty bottles, polythene bags, papers etc. The drains get blocked due to these wastes in water. Wastewater is characterized as the stream of utilized water from homes, organizations, ventures, business exercises and foundations which are subjected to the treatment plants by a precisely planned and built system of funnels. This sort of wastewater is characterized and characterized by its wellsprings of cause. Regularly 200 to 500 litres of wastewater are created for every individual associated with the framework consistently.



1.1 Introduction:

The aim of this project is to replace the manual work in drainage cleaning by an automated system. Impurities in drainage water can be like empty bottles, polythene bags, papers, etc. These impurities present in drainage water can cause blockage in the drainage system. The drainage system can be cleaned time to time manually or such a system can be designed that will automatically throw out wastages and will keep the water clean. Robots are been in use for making the human life easier and comfortable. It plays a vital role in all sorts of applications like agriculture, industries, security and environment. There are so many hazards occasions in day today life for human life where the human can't work .In that situations without a significant amount of safety precautions like, the disposal of wastes that are hazardous, radioactive substances, distant handling of volatile devices and righting and hostage situations among others the pick and place robots, often called arm robot can be used. Robots can work safely at these dangerous conditions. These robots guarantee the human safety and replace enormous human work force. It can be also applied in surgeries, defence purposes and medical science with artificial intelligence, manufacturing field and super market field. These are compact and efficient robotic systems.

This project is designed to keep clean the drainage system and helps the smooth working of the system. The chief function of the automatic drainage cleaning system is to collect, transport, as well as dispose the solid waste in the waste bucket by the help of claws. So that the waste is collected by the conveyer and they are transported to the bag behind and disposed. This project automatically cleans the water in the drainage system, each time any wastage appears and this form an efficient and easy way of cleaning the drainage system and preventing the blockage.

1.2 Problem statement

Today manual scavenging of the drainage is practiced in all places of India, wherein men enter the manholes and clean the waste materials in the drainage manually with no technical equipment. It is a dreadful process where the drainage wastes are cleaned by the people that may include the basic tools like buckets, brooms for disposing the drainage wastes. This practice might jeopardize the lives of humans.

When residential property experiences drainage issues, water can be a nuisance and actually cause a great deal of damage. Different drainage problems including puddling, pooling saturated soil and even undirected downspout water, can destroy landscaping and turn a backyard into a swamp into a it creates moisture and mold problems and can damage home foundations drainage serious concern when there is a problem.

Organic matter and nutrients causes an increase in aerobic algae and depletes oxygen from the water column. This causes the suffocation of fish and other aquatic organisms. Sulphate particles from acid rain can cause harm the health of marine life in the rivers and lakes it contaminates, and can result in mortality. To put it bluntly: Water pollution kills. In fact, it caused 1.8 million deaths in 2015, according to a study published in the lancet. Contaminated water can also make you ill. Every year, unsafe water sickens about 1 billion people. And low-income communities are disproportionately at risk because their homes are often closest to the most polluting industries.

Effects on human being-

Major respiratory problems: Asthma along with dry coughs, headaches, and throat irritations can be caused by Sulphur dioxides androgen oxides from acid rain. Brain damage, kidney problems, and Alzheimer's disease has been linked to people eating "toxic" animals/Plants.



In today's life, for an urban city solid waste management is an important issue. Because of drainage water blockages occurs in rainy season. The cleaning process depends on the labours which have a limitations and health problems. To overcome this we proposed to implement a design of Automated Drain Collection Robot.

1.2 Solution

- In today's life, for an urban city solid waste management is an important issue. Because of drainage water blockages occurs in rainy season.
- The cleaning process depends on the labours which have a limitations and health problems.
- To overcome this, we have proposed to implement a design of Automated Drain Collection Robot.
- With the help of Automated Drain collection Robot we can minimize the manual work of the labours.
- As the manual work is slower so by using the Robot we can clean the drainage pipes much faster.

2.1 Literature Survey

1. "A study of Pipe-Cleaning and Inspection Robot"-Nguyen Truong-Thinh,

Department of Mechatronics, University of Technical education Ho Chi Minh City, Viet Nam **Nguyen Ngoc-Phuong** , Department of Mechatronics, University of Technical Education, Ho Chi Minh City, Viet Nam **Tuong Phuoc-Tho**,
Department of Mechatronics, University of Technical Education, Ho Chi Minh City, Viet Nam

Pipe cleaning and inspection robot is one of the new concepts of professional service robots. Sewer pipes are typically of non-man-entry classification (less than 0.8 m diameter). In this paper, a pipe-cleaning and inspection robot specifically designed for this function . This paper presents a new approach for design and development of cleaning robots in an unknown pipe workspace. They proposed a new cutting method for cleaning work as well as an underwater inspection method. In this study, they discuss a communication which makes the cleaning robot navigate the sewer pipe. It also evaluate the performance of proposed inspection and cleaning processes via experiments and real tests.

2. "The Design and Study of the Drainage Pipelines Dredging Robot"-Yuan Fucai College of Mechanical and Electrical Engineering, Henan University of technology .Zhengzhou ,china.Wang Lizhu College of mechanical and Electrical Engineering ,Henan University of Technology . Zhengzhou ,china.

In order to solve the difficulty of dredging drainage pipelines, intensity of labor and other problems, a new type of drainage pipelines dredging robot was developed. The status quo and several ways of cleaning drainage pipelines at home and abroad and walking mechanism of the robot were analyzed. According to the operating environment and the technical requirements, and based on the modular thinking, the moving bodies, the control systems and the operating device of the robot were designed. The robot can move independently, when it takes an operating tool to do cleaning work, and its performance can meet the design requirements by experiment.

3. “Design and Development of Robotic Sewer Inspection Equipment

Controlled by Embedded Systems”-Dr. S.P. Singh Krishna Institute of Engg. & Tech., Ghaziabad(U.P). Dr. Ashish Verma and Dr. H.S. Gour University, Sagar(M.P). Ajay K. Shrivastava Krishna Institute of Engg. & Tech., Ghaziabad(U.P)

The presently available sewer inspection equipments based on CCD cameras have limitations and problems, as it requires the sewer lines to be drained. In this paper an automatic robotic sewer inspection equipment is proposed which uses ultrasonic sensors instead of CCD cameras. Hence it can work in water filled pipes without any need to drain it. Its working is controlled by embedded system. This can detect the blockage position and its type. The system can be further enhanced to clean the blockage also.

4. “Drainage Cleaning Robot”- Mr. Abhishek Singh , Mr. Ankit B Parashar , Mr. piyush Dewangan , Mrs. K.Uma (Electronics and Telecommunication Department, Bhilai Institute of Technology, College, Durg, Chhattisgarh Swami Vivekananda Technology University, INDIA)

The proposed concept in this paper is to replace the manual work on drainage cleaning by an automated system. Impurities in drainage

water can be only like empty bottles, polythene bags, paper, etc. These impurities present in drainage water can cause blockage in the drainage system. The drainage system can be cleaned time to time manually or such a system can be designed that will automatically through wastages and will keep the water clean. This project is design to keep clean drainage system and help the smooth working of the system .This project automatically cleans the water in the drainage system and preventing the blockage.

5. "*Intelligence Drainage Cleaning Using Arm Robot*"-S.Shamili, T.Saarika and R.Malar Final year-ECE Department, IFET College of Engineering, Villupuram, Tamil Nadu, India, Associate Professor-ECE Department, IFET College of Engineering, Villupuram, Tamil Nadu, India

The recent development in robotics has enabled robot technology to solve many practical problems that humans encounter in day-to-day activities. But, even today manual scavenging of the drainage is practiced in all places of India, wherein men enters the manholes and clean the waste materials in the drainage manually with no technical equipment. It is a dreadful process where the drainage wastes are cleaned by the people that may include the basic tools like buckets, brooms for disposing the drainage wastes. This practice might jeopardize the lives of humans; therefore, a drainage cleaning robot is essential to replace the human intervention. The overflow of drainage water leads to several hazards to the environment. The method used now days contains pumps to suck the drainage water but it fails to clean the rock solids inside the drainage hole. In order to overcome this issue, an attempt has been made to design and develop a ARM robot, which can be controlled by the PWD workers and efficiently cleaning and disposing the drainage wastages thereby controlling the overflow of drainage water by transmitting messages from drainage using transmitter encloses RF transmitter and diode logic to the receiver which has Arduino UNO and GSM modem with RF receiver placed on the street poles.

6. "*Semi-automatic drain for sewage water treatment of floating materials*"- Ganesh U L, Vinod V Rampur Assistant Professor, Mechanical Department, PESITM, Shimoga, Karnataka, India

In this research paper the proposed concept is to replace the manual work in drainage cleaning by mechanical drain cleaner. Now-a-days even though mechanical drainage plays a vital role in all industrial applications in the proper disposal of sewages from industries and commercials are still a challenging task. Drainage pipes are used for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockages in the drainage system. To overcome this problem and to save human life we implement a design "mechanical semi-automatic drainage water cleaner" and we designed our project to use this in efficient way to control the disposal of wastages and with regular filtration of wastages. The Drainage system cleaner is a machine which helps to protect the environment from different kinds of environmental hazards through the promotion waste management by the removal of garbage from the drainage system. These wastes when not removed end up settling in residential places where these wastes are burnt thereby causing climate change otherwise these wastes block the drainage systems thereby causing flooding.

7. **"A Review Paper On Automated Drainage Cleaning System"- Harshvardhan Baria, Mackwan Akash, Nirav Makwana, Raj Parmar, Mr. Sharad Chhantbar** 1-4U.G. Student, Mechanical Engineering, Sigma Institute of Engineering, Bakrol, Gujarat, India 5Assistant Professor, Mechanical Engineering, Sigma Institute of Engineering, Bakrol, Gujarat, India

Water is a basic necessity of humans & all living beings. There is plenty of water on earth but that is not suitable for human use. Clean water is more important if used for some purpose. The impurities present in water can cause hazardous & disease. As long as the draining system is considered as the function of main drainage system is to collect, transport & disposed of the water through an outlet. Impurities in drainage water can be only like empty bottles, polythene bags, papers etc. these impurities present in drainage water can cause blockage or drainage system can be cleaned time to time manually or such a system can be designed that will automatically throughout

wastage & will keep the water clean this project is designed to keep clean the drainage system and help the smooth working of the system. This project automatically cleans the water automatically clean the water in the drainage system is time any wastage appears and this form and efficient & easy way of cleaning the drainage system and preventing the blockage.

8. "***AUTOMATIC DRAINAGE CLEANING SYSTEM***"-A.Nagadeepan, J. Hersha himlan, J. Guruyogeshwaran, S. Balaji Assistant professor, UG Scholars, Department
Of Mechanical Engineering ,TRP Engineering College ,Trichy

In this project the proposed concept is to replace the manual work in drainage cleaning by mechanical drain cleaner. There is a huge demand of clean water, as it is used for a variety of purpose such as drinking, bathing, cleaning, cooking etc. Impurities present in water can cause serious health issues that can damage the life of human beings. Water is the basic need for the existence of life on earth. In spite of 70% water on earth majority of water is not suitable for drinking purpose. Now-a-days even though mechanical drainage plays a vital role in all industrial applications in the proper disposal of sewages from industries and commercials are still a challenging task. Solid waste in drainage water includes empty bottles, polythene bags, papers etc. The drains get blocked due to these wastes in water. Drainage are using for the disposal of waste and unfortunately sometimes there may be loss of human life while cleaning the blockage in the drainages .These wastes when not removed end up settling in residential places where these wastes are burnt thereby causing climate change otherwise these wastes block the drainage systems thereby causing flooding. Therefore the chief function of the automatic drainage cleaning system is to collect, transport, as well as dispose the solid waste in the waste bucket by the help of claws. So that the waste is collected by the conveyer and they are transported to the bag behind and disposed.

9. "***Intelligent Detection and Elimination of Blockage in Sewage pipes using a Robot***"-Aruna .R, Bhavishya .G, Venkatesh .S, Ms. D.Jessintha, Students, ECE Department, Easwari Engineering College Associate Professor, ECE

Department, Easwari Engineering College

This paper presents a robotic mechanism for detecting and eliminating blockages in sewage pipes. This robot is designed to replace human sewage cleaners in order to ensure their health and hygiene. The proposed robot moves through the pipeline, detects the blockages if they are present and clears them by pumping water with high pressure or cuts through the blockage and moves forward. The robot operation is monitored and controlled manually by the sewage worker using a laptop or palmtop computer. The operator can monitor the insides of the pipe via a wireless camera attached to the robot. The various sensors attached to the robot helps to determine the distance of the block from the robot and the presence of poisonous gases inside the pipeline. The pumping mechanism pumps water or air into the pipeline with high pressure in order to loosen and clear the block. The rotating mechanism consists of a fan like structure with sharp blades that penetrate through the blocks by cutting them. This robot is used to inspect various pipeline elements of different size.

10. "Sewage Waste cum Blockage Cleaning Machine - A Review"-Avinash Kumar Thakur , Mehfooz Alam, Durgesh Nand Chaudhary , Kapil Dev Sharma , Manash Dey UG scholar Department of Mechanical Engineering, Assistant Prof. Department of Mechanical Engineering, JIMS Engineering Management Technical Campus, Greater Noida, India

This undertaking thought processes is to propose the idea of semi-computerized sewage cum blockage cleaning machine, to supplant the manual exertion in cleaning septic tanks, sewers, channels and so forth. Waste and sewer blockage are significant reason for spreading sicknesses to human. Thus, this orderly machine utilizes a proficient method to control the transfer of wastage in sewer pipelines. Inverter is another power source if there is an occurrence of rustic regions.

3.1 Scope of the project

In order to modify, we can connect some other systems to our project. This will improve the efficiency of the system. For that purpose we have to make some changes not only in hardware but also in software. We can connect the camera to our project so that when the drain will be collected we can see that action properly. When there is problem for collection due to the camera we observe it immediately and this can be the scope of the project.

As like camera we can also interface the GSM modem to our project for long distance communication from user to robot. In future we can modify the system by using GSM modem. By making slight change we can implement our project in



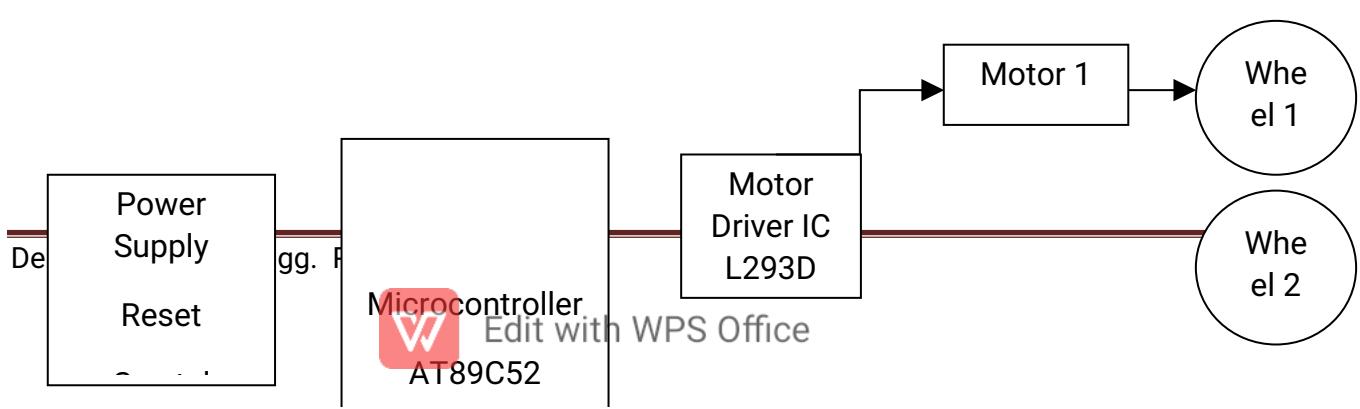
biomedical field for collecting the hazardous garbage.

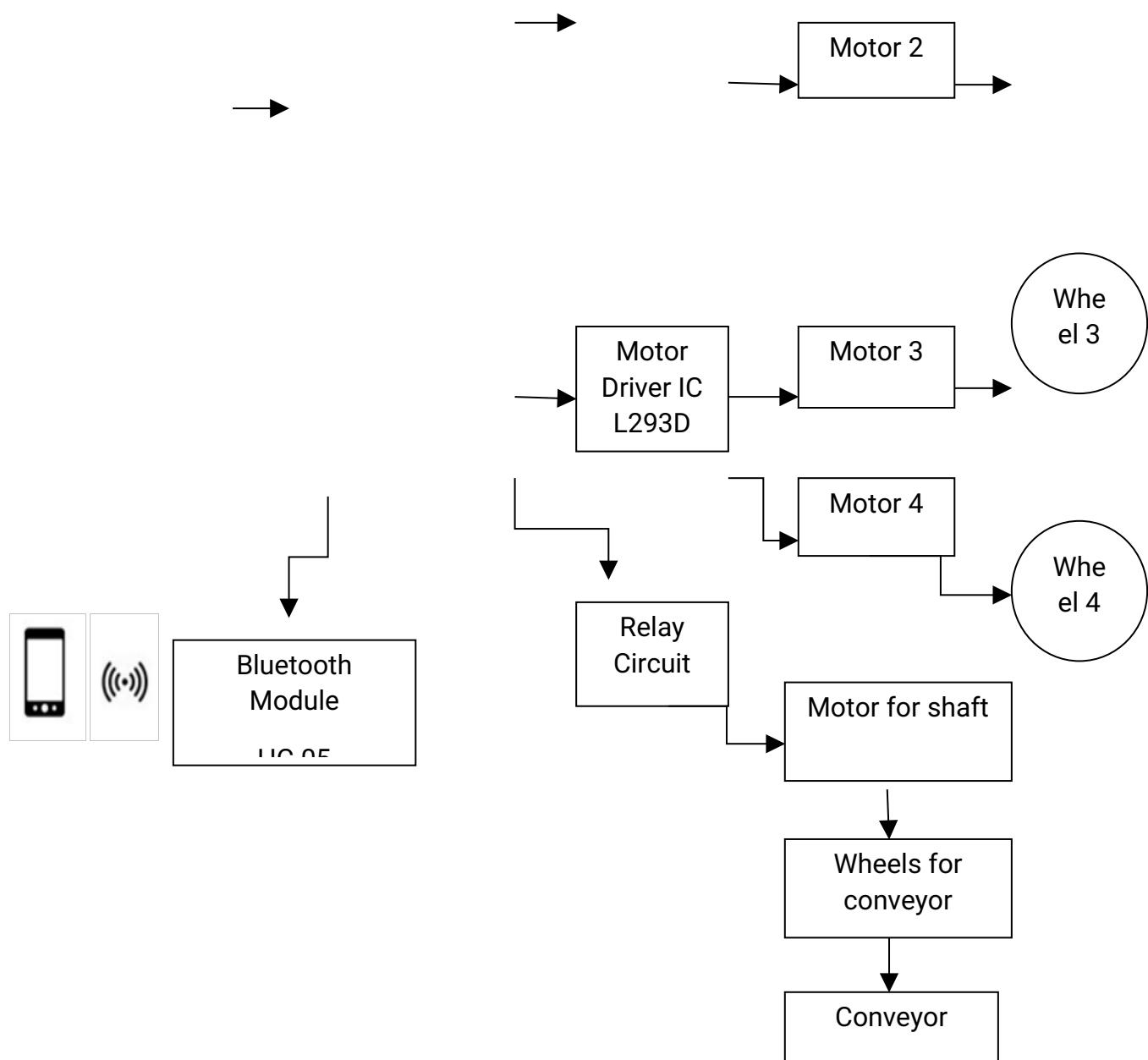
Now a days there are all things are operated by the internet and technologies are improving rapidly. Hence we can also implement the IoT technology. This will saves time. In addition to this we can also use this as river cleaning system. We can connect submersible motors for better performance.

For the underground drainage pipes we can extent the length of the conveyor as per the design. So these are the some additions that can be done in future as per requirement

4.1 Methodology :

Block diagram:





4.1.1 Block diagram of Automated drain collection Robot

The main work of the Project is to collect the Drain from the Drainage Pipe. So, this can be done using robot which operates on the following components like

-
- 1. Microcontroller
- 2. DC Motor
- 3. Motor Driver IC

4. Wheels
5. Sensors
6. Conveyer Belt
7. Bucket
8. Softwares - Keil Compiler, Proteus.
9. Mobile with Bluetooth Facility

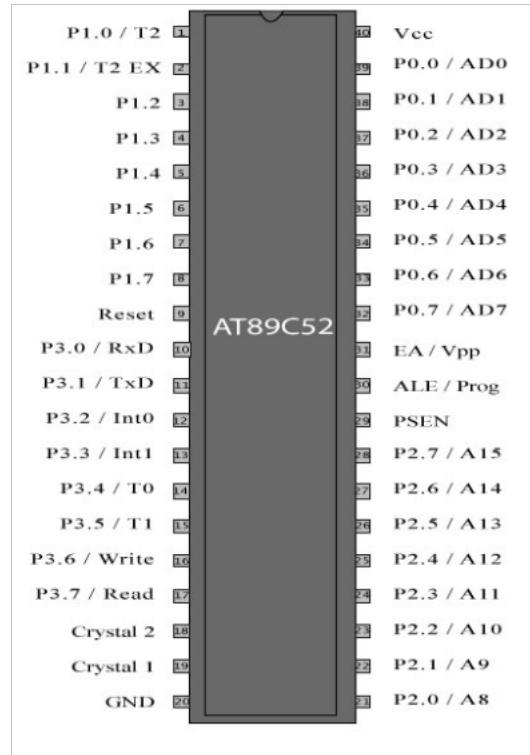
To perform this project we need mechanical ms-casting or metal casting mold. The Angles and bars of it should be properly fitted to the wheels. The upper side of fabrication will be held with vertical bars to conveyer belt rotation.

The main work of the Project is to collect the Drain from the Drainage Pipe. The robot is started by giving power supply to it. By using an Application we will give commands to the microcontroller via Bluetooth which controls the actions of robot which can be clockwise, anti-clockwise, forward and backward. When the robot is sent inside the drainage pipe the conveyer will be in the rotating manner and if it found any obstacle in front of it then due to its rotating manner the obstacle or drain will be taken backside and it will be collected in the bucket. Also the screws which we have fitted to the robot can be removed and if the depth of pipe is much then we can easily take it down. As the IR sensor is connected to the bucket it will sense the level of drain and if it full then the robot will stop and we get information through the app on the mobile.

Here is the block-wise description of the system-

- Microcontroller :

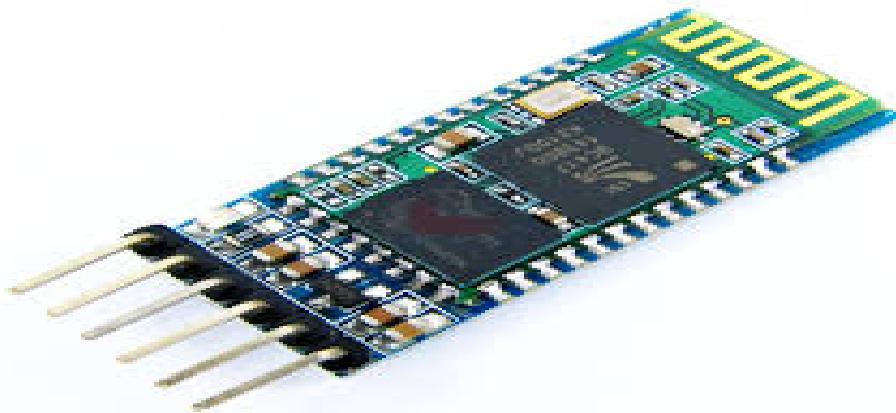
The main controlling element of our project is the microcontroller IC i.e. AT89C52. Bluetooth, android App, power supply, reset, crystal are the input devices or modules connected to the microcontroller. Relay circuit, motors, motor driver IC are output devices or modules connected to microcontroller.



4.1.2 Pinout diagram of At89C52

- Bluetooth Module :

In our project, Bluetooth is basically used to communicate with the robot through the microcontroller. We are going to use a Bluetooth module (HC05) for this. To give the command an android app is there. Through the Application software we are able to control each and every action of robot.



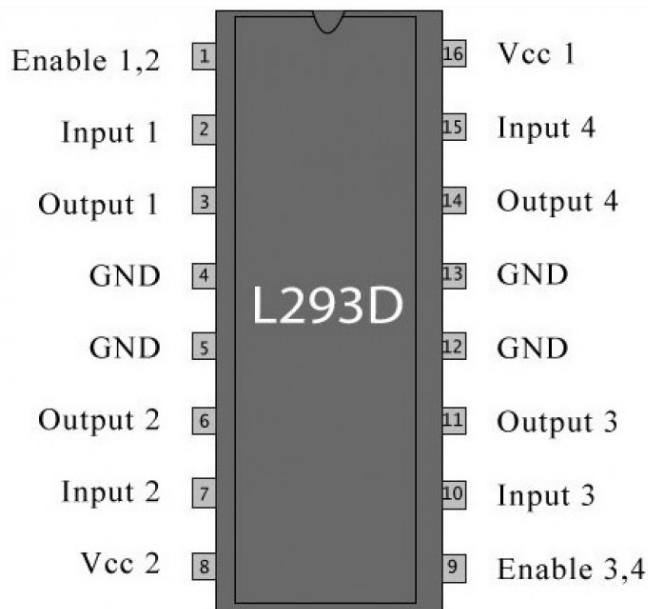
4.1.3 Bluetooth module HC05

- Batteries :

Batteries are used to give supply to the motors used in the robot.

- Motor driver IC :

The output of the microcontroller is very low. As it is unable to drive the motor. For this, we have to use the motor driver IC. The motor driver IC takes input from the microcontroller and convert it to high voltage level which is required to drive the motors.



4.1.4 Pinout of L293D

- Relay circuit :

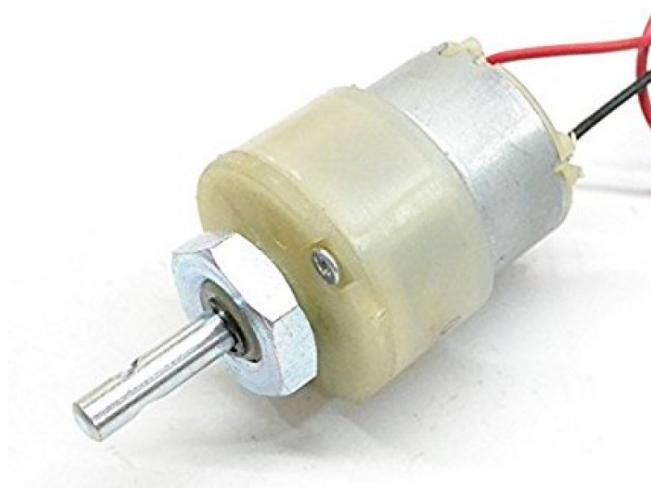
If any load comes on the motor, then it will cause damage to the robot so to avoid it relay is used as a fuse here. It will turn off the robot and the Bluetooth connection will also get disconnected and the user will get to know that there is some problem.

- DC Motor for shaft :

A motor shaft is mechanical component for transmitting torque and rotation, usually use to connect others. The main function of motor shaft is to transfer the engine torque from the gearbox or differential to the wheels. It must also compensate for all variations in angle or length resulting. It will drive the wheels of fitted to the conveyor.

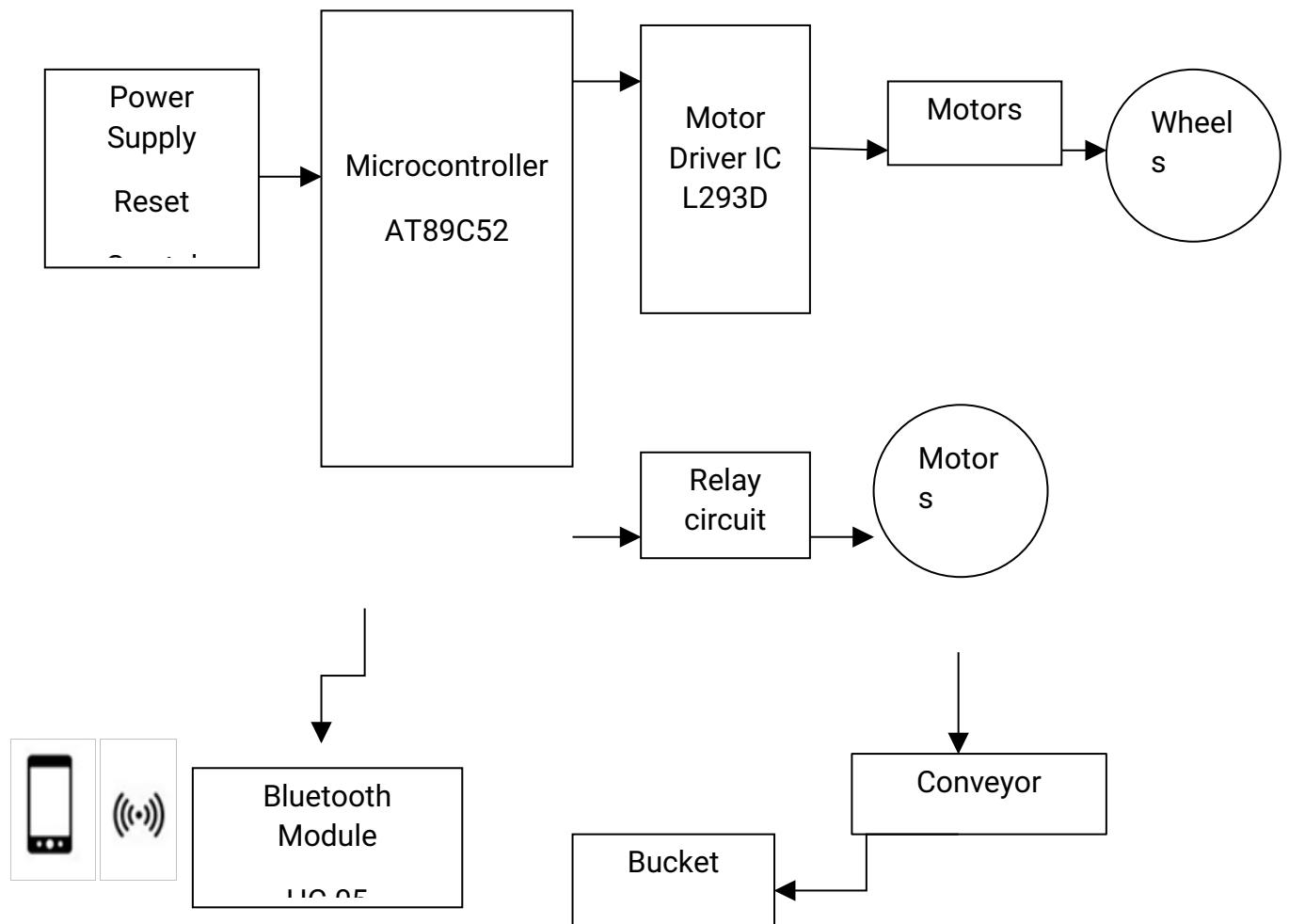
- DC Motors :

The basic element in the robot is DC motor. The motors are fitted in the wheels of the robot. Due to the motors we can move the robot in any direction like in forward, backward, in clockwise and in anticlockwise.



4.1.5 DC Motor

4.2 Architecture



4.2.1 Architecture Diagram

Above is the system architecture of automated drain collection robot. This is the architecture and simplified diagram of our project. This is used to learn the diagram easily. In this architecture there are blocks as follows:

- Microcontroller At89c52
- Bluetooth Module
- Motor Driver L293D
- Motor

- Wheels
- User Mobile

In our proposed work, if any drain comes in front of the conveyor then it will collect that drain at back of the robot where a bucket will be placed for drain collection. The microcontroller will give control signals to the Driver IC L293D which will drive the motors. The motors will start rotating the wheels and we will be able to move the robot in any direction. A Bluetooth module will be also placed in the robot circuit. We can operate the robot by using an application in the user mobile via Bluetooth. As the bucket gets full of drain then the IR sensor will sense and the robot will turn off.

Bluetooth Module-

We are using the Bluetooth Module HC05 for communicating with the robot. The Bluetooth is an inbuilt facility in the mobile phone so we can easily communicate with the robot via Bluetooth.



5.1 Details of the Design, Working and Process

Microcontroller AT89C52

The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density non volatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

Bluetooth module

In our project the HC05 bluetooth module is used. HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Typically it has 80dBm sensitivity, Up to +4dBm RF transmit power, Low Power 1.8V Operation , 1.8 to 3.6V I/O and integrated antenna.

Driver IC I293D



The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. It is designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. It has Wide Supply-Voltage Range: 4.5 V to 36 V, Separate Input-Logic Supply, Internal ESD Protection, Thermal Shutdown, High-Noise-Immunity Inputs, Functionally Similar to SGS L293 and SGS L293D, Output Current 1 A Per Channel (600 mA for L293D), Peak Output Current 2 A Per Channel (1.2 A for L293D).

DC motor

The specifications of motors used in our project is 12v and 60 rpm. A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

Working :

The main work of the Project is to collect the Drain from the Drainage Pipe. The robot is started by giving power supply to it. By using an Application we will give commands to the microcontroller via Bluetooth which controls the actions of robot which can be clockwise, anti-clockwise, forward and backward. When the robot is sent inside the drainage pipe the conveyer will be in the rotating manner and if it found any obstacle in front of it then due to its rotating manner the obstacle or drain will be taken backside and it will be collected in the bucket. Also the screws which we have fitted to the robot can be removed and if the depth of pipe is much then we can easily take it down. As the IR sensor is connected to the bucket it will sense the level of drain and if it full then the robot will stop and we get information through the app on the mobile.

5.2 Program



```
// fwd-1, rev-5, stop-4, left-2, right-3, spray on -6, off-7.  
// l-f, f-l, s-s, b-r,  
#include<reg51.h>  
  
sbit m1=P2^0;  
sbit m2=P2^1; //1 // 1  
sbit n1=P2^2;  
sbit n2=P2^3; //2  
sbit relay=P2^4;  
  
void serial_init(void)  
{  
    TMOD = 0x20;  
    SCON = 0x50;  
    TH1 = -0x03; //0xFD;  
    TL1 = -0x03;//0xFD;  
    TR1 = 1;  
    // EA = ES = 1;  
  
}  
  
void main(void)  
{  
    unsigned char mybyte;  
    serial_init();  
    P2=0x00;  
    while(1)  
    {  
        while(RI==0); //wait to receive  
        mybyte=SBUF; //save value  
        RI=0;  
  
        if(mybyte=='0')  
    }
```



```
{  
  
m1=0;  
    m2=1; //1  
    n1=0;  
    n2=1; //2  
  
}  
  
if(mybyte=='1') //ok  
{  
  
    m1=1;  
    m2=0; //1  
    n1=1;  
    n2=0; //2  
}  
  
if(mybyte=='2') //ok  
{  
  
    m1=1;  
    m2=0; //1  
    n1=0;  
    n2=1; //2  
}  
  
// fwd-1, rev-5, stop-4, left-2, right-3, spray on -6, off-7.  
  
if(mybyte=='3')  
{  
  
    m1=1;  
    m2=0; //1  
    m1=0;  
    m2=1;  
    n1=1;  
    n2=0; //2
```



```
}

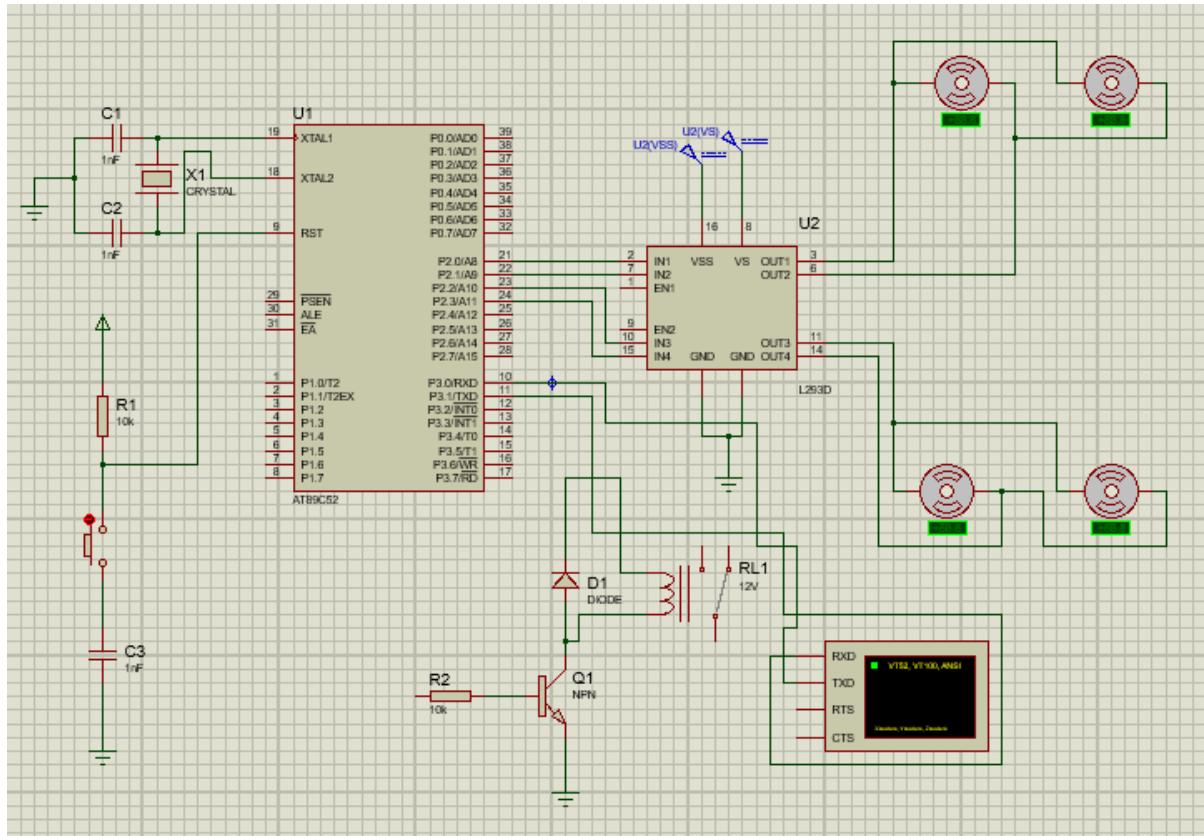
if(mybyte=='4')//ok
{
    m1=1;
    m2=1; //1
    n1=1;
    n2=1; //2
    relay=0;
}

if(mybyte=='5')
{
    relay=1;

}
}
}
```

5.4 Proteus Design



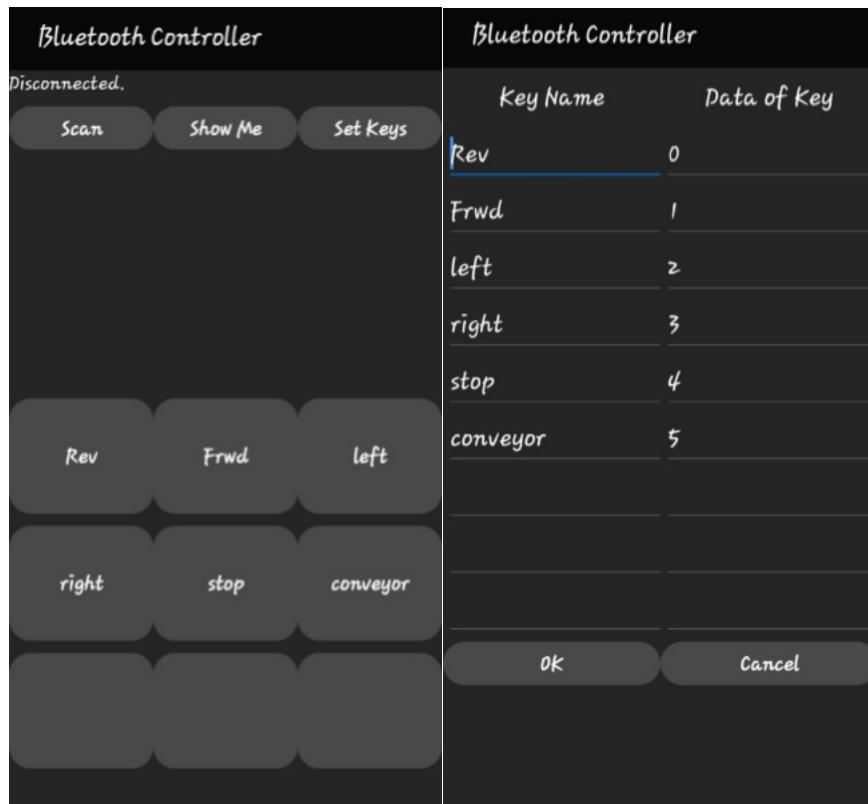


5.4.1 Proteus design

6.1 Results

Commands	Logic to the motors
Forward	01 01

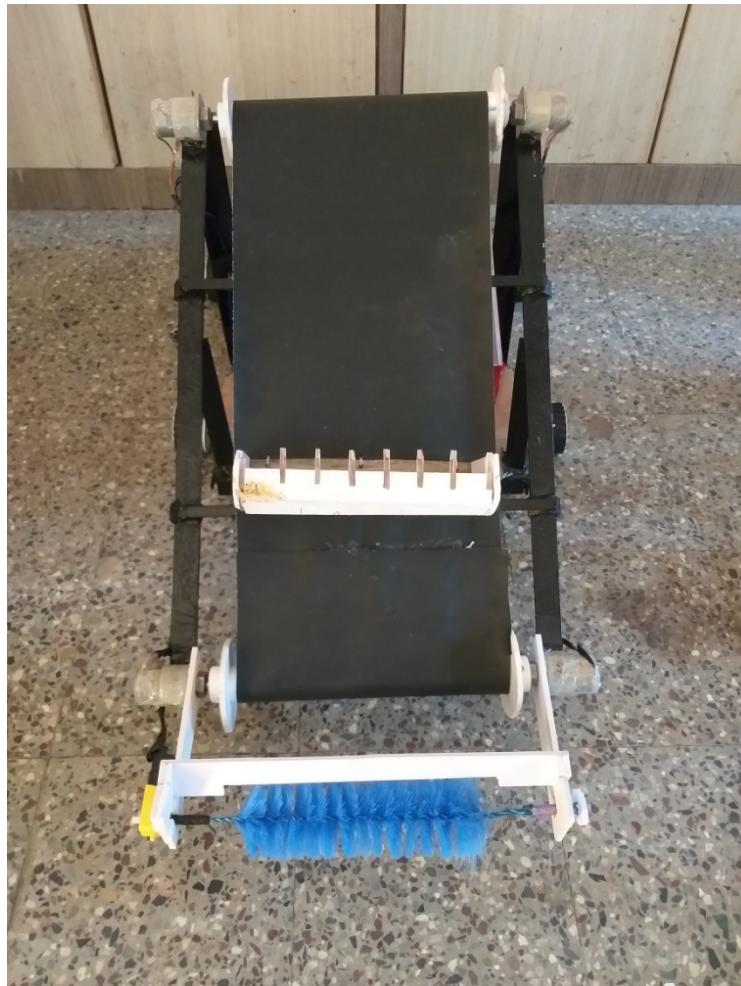
Reverse	10 10
Left	10 01
Right	01 10
Stop	11 11



6.1.1 Bluetooth controller application



6.1.2 Side view of the project model



6.1.3 Front view of the project model

6.1.2 Applications

- **Drain collection** – We know that drainage pipes are heavily blocked because of garbage and collection of garbage is hectic process in cities and metro areas.
- **River cleaning** – Rivers are dirty in most of urban areas . the robotic structure can be modified for river cleaning .
- **Industrial garbage** – There are many industries where drain pipelines are blocked due to garbage this robot can be used for heavy garbage collection.
- **Bio-Medical waste** – This type of waste can harm the human health and due to this various diseases can be spread. So by modifying our project to certain level we can also collect the bio-medical waste.



Conclusion

Our project is, automated drain collection robot. It is basically designed to collect the drain from open and closed drainage systems. In this the microcontroller AT89C52 is used. The bluetooth module HC-05 is interfaced with the microcontroller. An application is developed through which the user can give commands to the robot. For eg. When we will give forward command the robot moves in the forward direction and when the command for the conveyor is given, the conveyor will start rotating. The robot will dump the collected drain into the container. The IR sensor is connected to the container so that when the capacity of the container is full, the sensor will sense the level and the robot will stop automatically. Garbage collection by labours is time consuming process and drainage blockage is severe problem so to overcome those we can use Automated drain collection robot for effective cleaning process.



References:

1. **"A study of Pipe-Cleaning and Inspection Robot"**-Nguyen Truong-Thinh, Department of Mechatronics, University of Technical education Ho Chi Minh City, Viet Nam **Nguyen Ngoc-Phuong** , Department of Mechatronics, University of Technical Education, Ho Chi Minh City, Viet Nam **Tuong Phuoc-Tho**, Department of Mechatronics, University of Technical Education, Ho Chi Minh City, Viet Nam
2. **"The Design and Study of the Drainage Pipelines Dredging Robot"**-Yuan Fucai College of Mechanical and Electrical Engineering, Henan University of technology .Zhengzhou ,china.**Wang Lizhu** College of mechanical and Electrical Engineering ,Henan University of Technology . Zhengzhou ,china.
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