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Drainage Cleaning Robot

Mr. Abhishek Singh[1], Mr. Ankit B Parashar [2], Mr. Piyush Dewangan[3], Mrs. K.Uma[4]

[1,2,3,4]*Electronics and Telecommunication Department, Bhilai Institute Of Technology, College, Durg, Chhattisgarh Swami Vivekanada Technical University, Pin: 490009, Chhattisgarh, INDIA*

Abstract — *The proposed concept in this paper is to replace the manual work in drainage cleaning by an automated system. Impurities in drainage water can be only 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. This project is designed to keep clean the drainage system and helps the smooth working of the system. 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.*

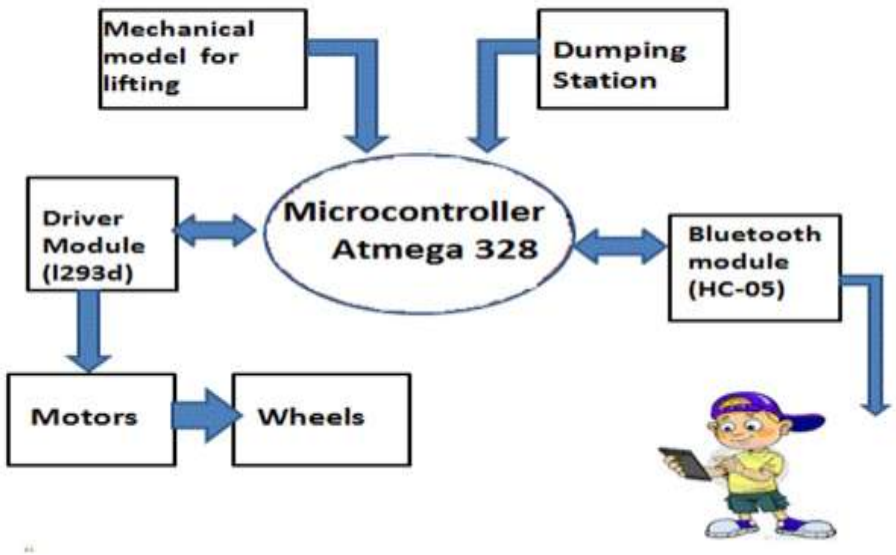
Our proposed project uses special conveyor system, D.C motor, D.C battery and drainage waste storage box equipment's to work as automatic drainage cleaning system. The device is place across an open drain floating waste like bottles, plastic cans, covers…..etc. is lifted by lifters which are connected to the conveyor. The conveyor revolves with the help of D.C motor. When motor runs the conveyor starts to move upward and the waste materials are lifted up by the lifter teeth and stored in storage or collecting bin. Once the collecting bin is full, the waste materials are automatically dumped from the bin to the side of drain. This all are monitored controlled and run by using a handy Bluetooth module that can run from any mobile supporting Bluetooth.

Keywords- *Conveyor belt, TTL (Transistor Transistor Logic), Bluetooth, Motor Driver, Wheels, Collection box .*

I. INTRODUCTION

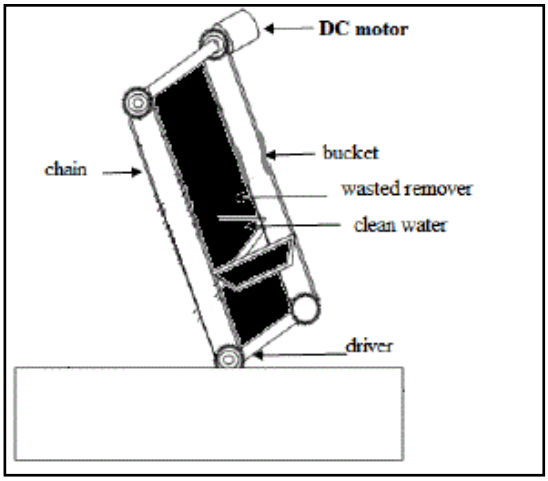
In today's era automation plays a very important role in all industrial applications for the proper disposal of sewage from industries and household is still a challenging task. In India drainage systems are usually open which leads to disposal of solid waste and that causes blockage. Drains are used for the adequate disposal of waste and unfortunately sometimes there may be a threat to human life during the cleaning of blockage in the drains or it can cause serious health issues because of the pertaining problems like malaria, dengue, etc. In order to overcome this problem as well as to save human life we implement a design "Automatic Drainage Cleaning System". We designed our project in order to use it in an efficient way to control the disposal of waste along with regular filtration of drains, removal of solid waste in order to avoid blockage in drains to promote continuous flow of drainage water which ultimately reduces the threat to human life.

II. BLOCK DIAGRAM



A. Mechanical setup

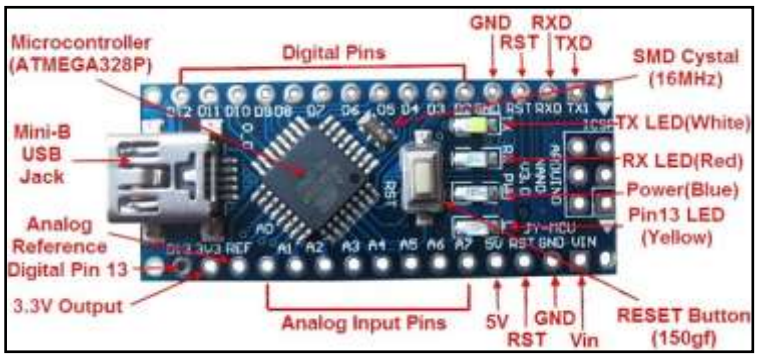
The mechanical setup is the final fabrication of the system using mechanical components that includes outer casing as shown in Fig2.1. Once the design meets the requirements, the real time setup is fabricated. The base of gadget is of dimension 30cm*30cm*30cm, with adjustable wheel dimension helps to cover various drainage system. The lifting part of the setup consist of conveyor belt that takes out the solid waste material from the drain the basis structure of this conveyor is shown in figure.



Conveyor belts are commonly used to convey items with irregular bottom surfaces, small items that would fall in between rollers or bags of product that would sag between rollers. Belt conveyors are generally fairly similar in construction consisting of a metal frame with rollers at either end of a flat metal bed. The belt is looped around each of the rollers and when one of the rollers is powered the belting slides across the solid metal frame bed, moving the product.

B. ATMEGA 328 BASED NANO

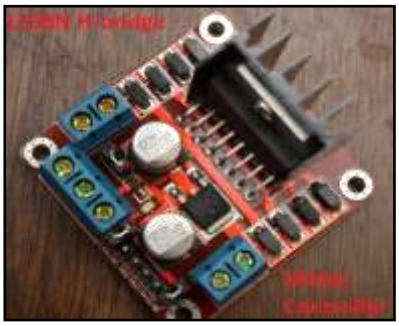
We are using Arduino Nano which is based on the ATmega328. The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x) or ATmega168 (Arduino Nano 2.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.



C. Electric Motor

An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse of this would be the conversion of mechanical energy into electrical energy and is done by an electric generator. In normal motoring mode, most electric motors operate through the interaction between an electric motor's magnetic field and winding currents to generate force within the motor. In certain applications, such as in the transportation industry with traction motors, electric motors can operate in both motoring and generating or braking modes to also produce electrical energy from mechanical energy. Found in applications as diverse as industrial fans, blowers and pumps, machine tools, household appliances, power tools, and disk drives, electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as from the power grid, inverters or generators. Small motors may be found in electric watches. Electric motors are used to produce linear or rotary force (torque), and should be distinguished from devices such as magnetic solenoids and loudspeakers that convert electricity into motion but do not generate usable mechanical powers, which are respectively referred to as actuators and transducers.

D. Motor Driver L298d

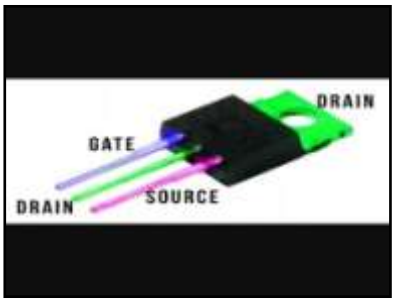


Motor driver l298d Drive a 2-phase bipolar stepper motor or two DC motors with the L298 dual H-Bridge chip, mounted on this handy breakout board along with all necessary peripherals. It is ideal for robotic applications and well suited for connection to a microcontroller requiring just a couple of control lines per motor. It can also be interfaced with simple manual switches, TTL logic gates, relays; etc.This dual bidirectional motor driver is based on the very popular L298 Dual H-Bridge Motor Driver IC. This module will allow you to easily and independently control two motors of up to 2A each in both directions. It is ideal for robotic applications and well suited for connection to a microcontroller requiring just a couple of control lines per motor.

E. Hc-05 Bluetooth Modules

Bluetooth is a technology for wireless communication. It is designed to replace cable connections. Usually, it connects small devices like mobile phones, PDAs and TVs using a short-range wireless connection. And it uses the 2.45 GHz frequency band. The connection can be point-to-point or multipoint where the maximum range is 10 meters. The transfer rate of the data is 1Mbps (or a maximum of 2Mbps)

F. MOSFET



The MOSFET (Metal Oxide Semiconductor Field Effect Transistor) transistor is a semiconductor device which is widely used for switching and amplifying electronic signals in the electronic devices. The MOSFET is a core of integrated circuit and it can be designed and fabricated in a single chip because of these very small sizes. The MOSFET is a four terminal device with source(S), gate (G), drain (D) and body (B) terminals. The body of the MOSFET is frequently connected to the source terminal so making it a three terminal device like field effect transistor. The MOSFET is very far the most common transistor and can be used in both analog and digital circuits.

G. Wheels

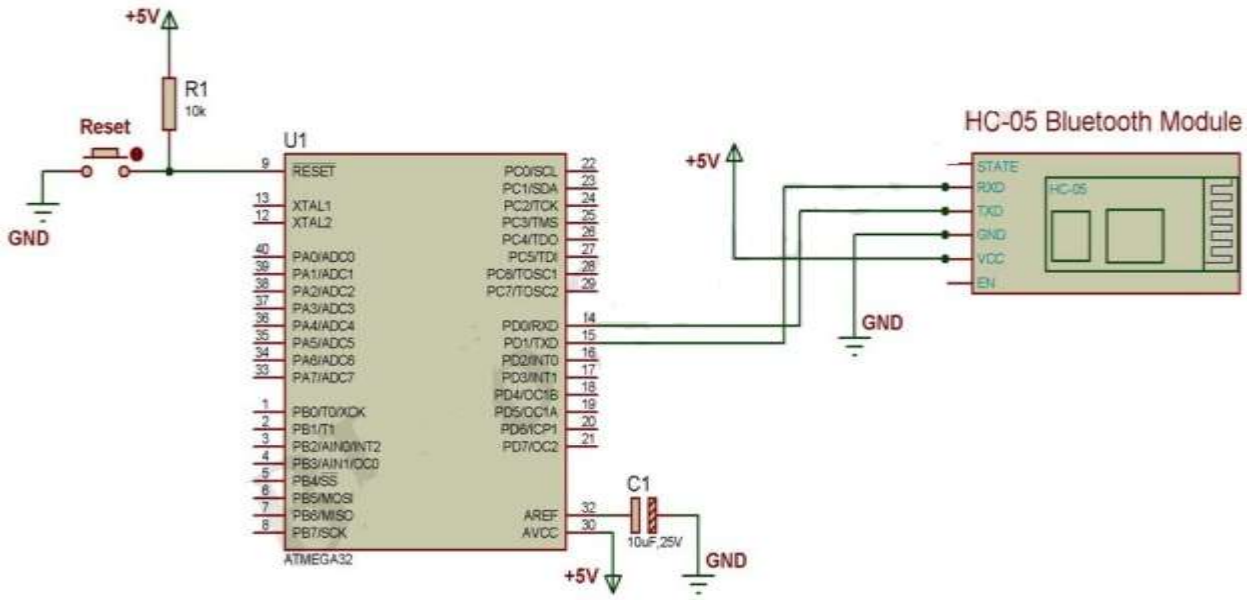
Most common wheels used in robotics is standard wheels. This type of wheels is characterized by two degrees of freedom and can run in front and back. The angle between the robot frame and the wheel is constant while the center of the wheel is fixed to the robot frame. Depending on the design and requirements, standard wheels are used especially for classical methods of driving and steering

III. WORKING

Floating waste like bottles, plastic cans, covers etc., are lifted by lifters which are connected to the conveyor. The whole mechanism is basically above the drain only lifting part goes inside the drain .This again reduces the wear and tear. The conveyor revolves with the sprocket wheel which is driven by a motor. When the motor runs, the conveyor starts to circulate and it makes the lifter to move upwards. Floating waste like bottles, plastic cans, covers…..etc. is lifted by lifters which are connected to the conveyor. The wastage material are lifted by lifter teeth and stored in a collector bin. Once the collecting bin is full, the waste materials are removed from the bin automatically. This proposed system is similar to a remote operated car using Bluetooth. The system/robot fully runs across the drainage automatically. Our proposed project uses special conveyor belts drive system, D.C motor, D.C battery, bearing, shaft, carrier, and drainage waste storage box, Microcontroller, Bluetooth module equipment's to work as fully automatic drainage cleaning system/robot.

1. The gadget is place over the drain.
2. This anchor is appended to equip driven by motor. Motor is begin bind is begin to circle.
3. Making teeth to lift up squandered material put away in tank.
4. Motor can use to rotate conveyor drive system.
5. This motor can operate on battery.

IV. INTERFACING AND PROJECT VIEW

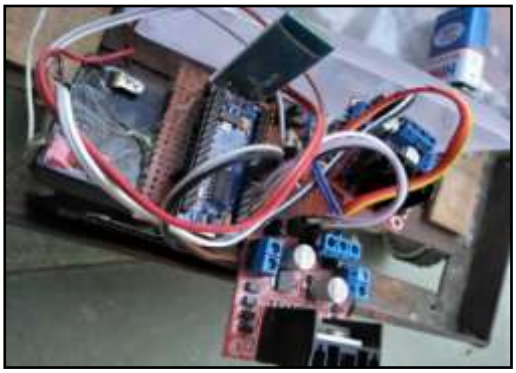


Circuit Diagram of HC-05 Bluetooth Module Interfacing with ATmega32

The communication between HC-05 Bluetooth Module and ATmega32 microcontroller takes place through UART serial communication protocol. The ATmega32 microcontroller will send the string first and to the HC-05 Bluetooth Module. The HC-05 Bluetooth Module transmits the received strings to the Android Mobile through Bluetooth and the Android mobile displays the received strings in the Bluetooth Terminal App window. After sending each string, the microcontroller sends the carriage return and new line character to HC-05 Bluetooth Module

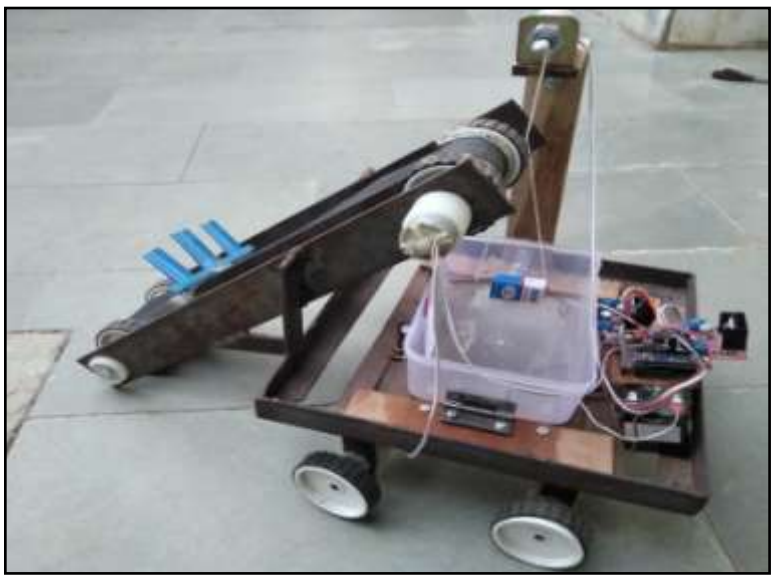
Base of the robot

The figure shows the Base structure of the robot. This structure is made up of iron sheets/stripes joined together by welding in the required pattern. The base of the robot has been made adjustable so that it can adjust according to the size or width of the drain. Hence enabling to be used for different sizes of drain



Final circuit view of project

It comprises of two motor drivers IC for controlling the motors used and Arduino Nano with a Bluetooth module placed in a handy zero PCB Board with all the necessary connections.



Conveyor System to lift the waste from the bottom

The mechanism used in the model to lift the waste material from the drain is a conveyor a system. The lifting part of the setup consist of conveyor belt that takes out the solid waste material from the drain the basis structure of this conveyor is shown in figure. The collection Pot is also shown with the mechanism to automatically dump the solid waste when it is filled.

V. RESULT AND CONCLUSION

Our literature review highlights the ongoing advancement in the drainage cleaning system. Many specific empirical studies have been carried out and categories such as semi automatic drainage cleaning system and its automation have been studied to a great depth. We focus more on making the system mobile in the drainage.

1. In the treatment system of drainage Waste water control by the motor, roller chain, lifter and the collecting bin to achieve semi-automatic control of sewage waste water treatment.
2. The system can move in the drain to collect the floating waste so as to reduce human labor.
3. The cleaner functioned move effectively during the heavier rains which had more volume of running water with garbage and high velocity.

VI. FUTURE SCOPE

For Future project this is going to be IOT Based and the mosquito repellent technology will be employed using 555 timer IC ,Sonar Sensors are also used to avoid the obstacles in the path of gadget and Display module will provide the necessary operation.

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