Fabrication of Automatic Sewage Cleaning System

S. Jayasree, PG Research Scholar, Advanced Manufacturing Systems, Dept. of Mechanical Engineering, JNTUCEA, Anantapuramu-515002, A.P, India, jayaa3512@gmail.com

Dr. Smt. G. Prasanthi, Professor of Mechanical Engineering, Director, Faculty Development & IQAC, JNTUA, Anantapuramu-515002, A.P, India, dr.smt.g.prasanthi@gmail.com

Abstract: Now a day's automation gives the solution to all the problems and increases the chance of getting better accuracy in all industrial applications. But still it is not possible to get the better result in the issue of industrial drainage system and it is a challenging task to design the safe drainage system with optimum design. Drainage pipes are used for the disposal and unfortunately sometimes they may be loss of human life while cleaning the blockages in the drainage pipes.

To avoid this risk and also reduce the time of cleaning the drainage automated sewage cleaning system is designed based on the problems faced by the people. In this work automation approach will be used instead of normal cleaning method which will be designed to control the disposal of wastage in efficient manner. For control, the wastage regular filtration method may be used. IOT means internet of things. Here as and when the dustbin get filled up, a sms message is sent to the registered mobile number of the person. So cleaning of dustbin is done at the right time.

Keywords —Arduino UNO, Battery, Chain, Drainage, Gear, GSM, IR sensor, Wiper motor.

I. INTRODUCTION

In this research paper the proposed concept is to replace the manual work in drainage cleaning by automated system. Now a days in all industries the work takes place automatically this is necessary to all the industries without any system efforts. The work is going on by using automatic technique. In present days however automation plays on important role in all industry applications. Disposal of sewage waste from industries is a difficult job. This is one challenging task in industries and commercials. In older days people were using drainage pipes because they use to remove sewage water. There is a disadvantage which may be loss of human life when work in that drainage pipes is going on while cleaning the block. To reduce this problem and to save human life some external work is done in this project. The device is placed across drain so that only water flow through lower grids contain waste bottles paper etc are lifted by teeth which is connected by chain.

The chain drive is used for lift up the waste from the drain to waste storage tank. Power is supplied to the chain drive by the dc motor. The waste materials is separated by bucket and are in stored in the waste storage tank whenever the bucket is lifted up from the drain, with the help of dc motor. Dc motor control plays a major role in many applications. Whenever the motor is run automatically drainage water cleaning overcome all the short of drainage

problem and promote blockage free drain progress continuous flow of drain water. In the modern era there have been sufficient sewage dross problem when dross water need be separated to clean surrounding area. The waste and gases produced from the industries are very harmful to human beings and to the environment.
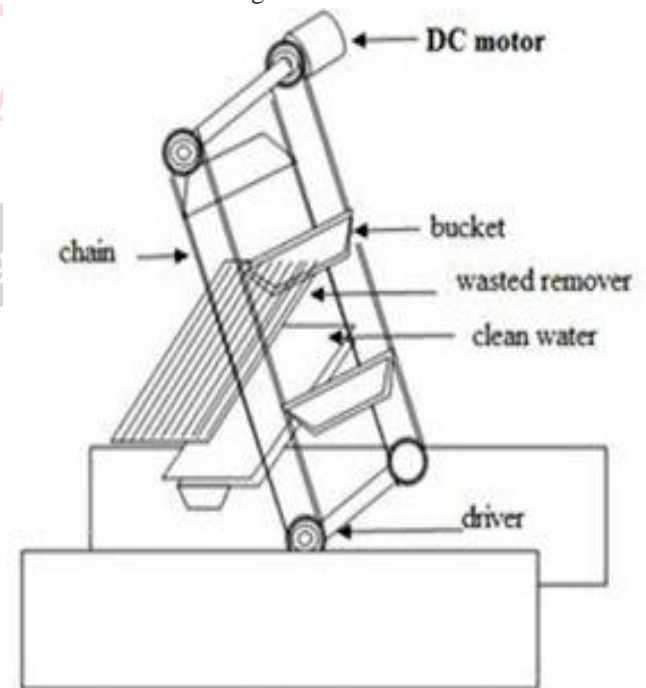

Fig. 1.1 Automatic sewage cleaning system.

Methodology used for whole processing of drainage cleaning machine is give below; this methodology gives way about how work is to be carried out in systematic direction. It is standard process of describing process, how it is done in simplest manner.
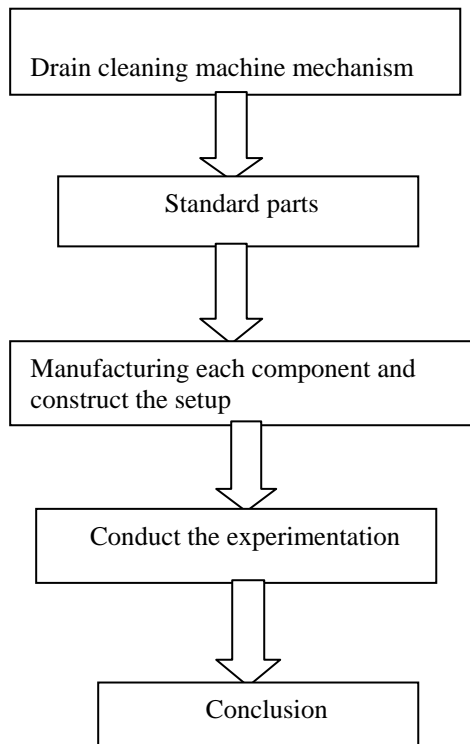

Fig.1.2 Methodology

Automation is mandatory to handle all type of systems. It is made possible by embedded design which is a combination of both computer and mechanical system, often with real-time computing constraints. In today's world, it is common to control most of the devices, by automation since it optimizes by reducing the size and cost of the product and increase the reliability and performance. Embedded systems are based on Microcontroller and their applications range from portable devices to large installations and it also extends to large complex systems.
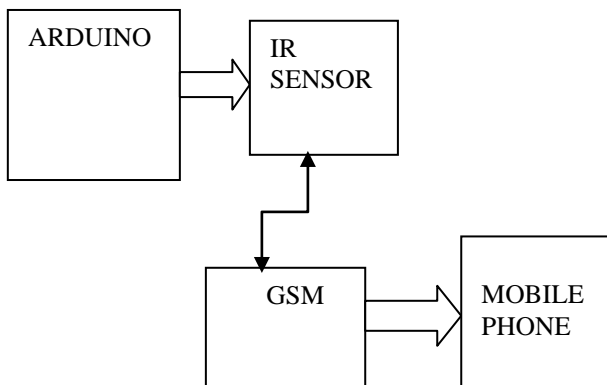

Fig. 1.3 Block diagram of the system

IOT means internet of things. The internet of thing represent formulated through Kevin Ashton in 1999.IOT is a system of recticulate lots computing devices, digital machines, article, brute or people that are furnish with specific identifiers and the ability to conveyance data throughout network without necessitate human to human (or) human to computer devices. In this present work, it is proposed a novel method of automation in sewage cleaning mechanism. Here IR sensor along with arduino and GSM is used. The IR sensor is used for detection of the waste. Once the waste is detected the motor runs thereby collecting the waste and inserting into bin. At last the GSM is used to convey a message to the user about the status of the bin.

PROBLEM IDENTIFICATION

A. Motivation and objective

The problem of water logging due to plastic, thermocole and metal leads to pest growth and it favors diseases like malaria, typhoid etc. 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.

Existing method

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.

II. PROPOSED SYSTEM

Table 1: Material used

S.no.	Name of Component	Quantity	Specification
1	L-shaped Mild Steel rods	10 feet	NA
2	Chain Set	2	Pulsar Bike
3	DC motor	1	12V, 65nm torque
4	Sprocket	4	Pulsar bike
5	Metal Sheet	NA	NA
6	Universal Bearing	4	NA
7	Battery	1	12V
8	Welding Cost	NA	NA
9	Shaft Rod	2	Mild steel

Generally dc current motors are used in all industrial and any current application because it gives better result to ac current. So in this dc current motor is used. Dc motor produce continuous movement and whose speed of revolution can easily be control it makes them ideal. The system is run by a DC motor. This motor rotates the chain drive which is used to collect the sewage waste materials in the sewage water. The specifications of the DC motor used are power 60 rpm. Dc motor consists of two parts. Dc motor one is stator and another is rotor. Stator is stationary part and rotor is rotating part.

Machines are a means of converting energy. Motors take electrical energy and produce mechanical energy. Electric motors are used to power hundreds of devices we use in everyday life. Motors come in various sizes. Huge motors that can take loads of 1000's of Horsepower are typically used in the industry. Some examples of large motor applications include elevators, electric trains, hoists, and heavy metal rolling mills.

Table 2: DC Motor specification

Parameters	Specifications
Nominal Voltage	12V
Nominal Power	50W
Nominal Current	1.0-1.5A
High Speed	75-76 rpm
Low Speed	50 rpm
Noise	No gear noise
Rotational Output	CW/CCW

A. Chain

 Here chain plays a major role which rotates in clock wise direction. Most of these chains are made from carbon or alloy steel. But stain steels have good efficiency so here stain steel is used. They are type of chain roller chain, silent chain, pintle chain, leaf chain etc. In this project roller chain is used and material is stainsteel. Roller chain or brush chain is one of the types of chain drive. It is commonly used in transmission of mechanical is domestic, industrial and agricultural machinery.

B. Battery

   Now a day's people are using battery to store the electric power and it done there work automatically. They are two type of batteries nickel carbon and nickel metal. In this project battery used is alkaline, Nizn, NiMH, NiCD and lithium battery. It is a rechargable battery. That are available in today market   battery of probable the most common battery.

Table 3: battery specifications

Parameters	Specifications
Voltage	12v
Current	7.2Ah
Valve regulated type	Lead acid battery
Works	2hours

Table 4: constant voltage charge

Type	Voltage regulation	Max current
Standby use	13.6v - 13.8v	2.16Amps
Cycle use	14.4v – 14.8v	2.16Amps

C. Arduino UNO(Microcontroller)

Arduino is an open source equipment and programming organization utilized for building hardware ventures. Arduino board utilizes the assortment of microchip and microcontroller. The Arduino board is the gathering of computerized and simple info yield pins. Arduino Uno is most mainstream board in Arduino family. Uno implies one in Italian and was denoted the discharge Arduino software (IDE).

 Aurdino is open source PC equipment and programming organization, venture and client network that outline and producers single-board microcontroller and microcontroller packs for building advanced gadgets and intelligent protests in the physical world. The equipment comprise of a basic open equipment plan for the arduino Yun board on-board input yield support and Atmel atmega328 microcontroller. Arduino is an open-source single-board microcontroller and a successor to the opensource wiring stage. The equipment comprises of a straightforward open equipment plan for the arduino Yun board with an Atmel atmega328 microcontroller and on-board input/yield bolster. The microcontroller on the board is customized utilizing the arduino programming dialect and the arduino improvement condition. The created program can be aggregated, tried and can be transferred to the microcontroller board by all inclusive transport (USB). The arduino the advancement condition here utilized is Arduino 1.5.3 upheld on windows stage. The product comprises of a standard programming dialect compiler and a boot loader that keeps running on the board. Arduino equipment is customized utilizing a wiring-based dialect (sentence structure and libraries), like c++ with a couple of disentanglements and changes, and a preparing based coordinated improvement condition.

Fig.C. Arduino UNO

D. GSM

GSM (Global framework for portable correspondence) is a computerized versatile communication framework utilized as a part of all world. GSM utilizes TDMA framework. In this undertaking, we utilize SIM 800 GSM module. It is equipped for getting data from GPS satellite and after that computes the gadget topographical position. At the point when a mishap happens GPS tracks that area of the vehicle containing longitude and scope subtle elements additionally send to controller and message to be sent through GSM module to the specific coded number.

Fig.D. GSM module

F. IR Sensor

An infrared sensor is an electronic instrument which is utilized to detect certain attributes of its surroundings by either emanating or potentially distinguishing infrared radiation. Infrared sensors are additionally equipped for estimating the warmth being discharged by a question and distinguishing movement.

Infrared innovation discovers applications in numerous ordinary items. TVs utilize an infrared indicator to decipher the signs sent from a remote control. The key advantages of infrared sensors incorporate their low power prerequisites, their straightforward hardware and their convenient highlights.

G. Power supply

It is used 12v power supply in our project. It is mainly used to provide DC voltage to the components on board.

III. FABRICATION AND WORKING

In drainage pipes when the water is flowing, place the device, then it works automatic they remove waste material like bottle, paper etc and also external work is iot. Iot means internet of things. Here as and when the dustbin get filled up, a sms message is sent to the registered mobile number of the person. So cleaning of dustbin is done at the right time.

The chain drive is used to lift up the waste from the drain to waste storage tank. Power is supplied to the chain drive by the dc motor. The waste materials is separated by bucket and are in stored in the waste storage tank whenever the bucket is lifted up from the drain.

Fig.3.1.1 Fabricated model

Chain Drive mechanism

In automatic drain cleaner the lifting pans are lifted by the chains which are in-line with the sprockets. This mechanism is known as chain drive mechanism.
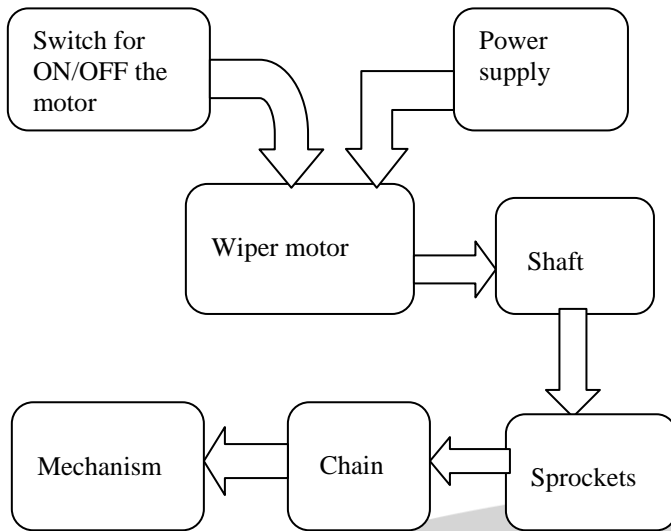
3.2 Working Procedure

Fig.3.1.2 working flow chart

IOT means internet of things. So here ardiuno software is used. Using the coding, input and output are got from starting point. The drainage process is the input and the output is when the dustbin was fully loaded then it the sensor sends the message to mobile phone. This is done output. In iot process microcontroller ardiuno is used for easy hardware and software usage.

Research work smart dustbin consists of various modules like gsm ir sensor and microcontroller the ir sensor is connected to microcontroller and the gsm is connected wirelessly to the modules. Whenever the ir sensor is detected which means the dustbin is filled with waste the ir sensor detects and the signals are sent to the microcontroller and then the gsm will be actived with the help of certain sets of codes and programs. The gsm will be activated thus sending a message to the concerned person that is initially fed to the system.
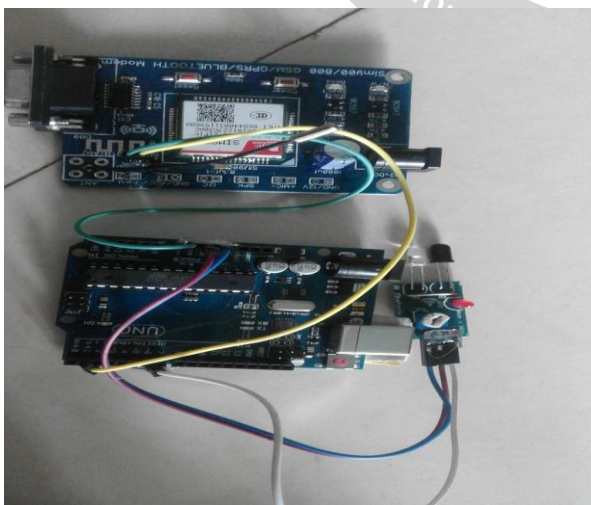

Fig.3.1.3 Garbage setup

IV. APPLICATIONS

- ➢ It can be used in plastic industries.
- ➢ It can be used to separate plastic, thermocal from sewage.
- ➢ It is used for removing the waste for the drainages automatically to prevent blockage of drainage.
- ➢ This project can also be used in the" SMART CITY".

V. CONCLUSION

Modern services are becoming polarized. With the emergence of more and more automatic terminal services, modern services are also gradually becoming unmanned. Thus this semi automated sewage cleaning system helps in cleaning the sewage automatically and helps in decreasing the spread of diseases due to direct human intervention into the sewage. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Thus the project has been successfully fabricated and tested.

REFERENCES

[1] R.Sathiyakala et.al., "Smart Sewage Cleaning System" International Journal of Innovative Research in Computer and Communication Engineering, Vol No-4, February 2016.

[2] Ganesh U L,et.al. "Semi-Automatic Drain For Sewage Water Treatment Of Floating Materials", International Journal of Research in Engineering and Technology, Vol No- 05, Jul-2016.

[3] Balachandra, et.al."Automatic Drainage Water Pump Monitoring and Control System Using PLC and SCADA" International Journal of Innovative Research in Technology, Vol No- 1, March 2014.

[4] S D Rahul Bharadwaj, Shraddha R Jogdhankar, "Automatic Wastewater treatment process to reduce global warming" International Journal of Environmental Science: Development and Monitoring, Vol No- 2, March (2013).

[5] P.Sandhya, S.Venkateswarlu, Dr.G.Prasanthi, "Ignition Interlock by Alcohol Breath Analyser using GPS and GSM", International Journal Of Trend in Research and Development, IJTRD, http://www.ijtrd.com/papers/IJTRD5460.pdf, ISSN:2394-9333,Nov-Dec 2016, Vol:3(6), pp. 626-628.

[6] NDUBUISI C. Daniels, "Drainage System Cleaner A Solution to Environmental Hazards", International Refered Journal of Engineering and Science, Vol No-3, March 2014.

[7] Nitin Sall, et.al., "Drain Waste Water Cleaner", Global Journal of Researches in Engineering: J General Engineering Vol No- 16, July 2016.

[8] Ms T.Deepiga, et.al., "Smart Water Monitoring System Using Wireless Sensor Network at Home/Office",

International Research Journal of Engineering and Technology, Vol- 02, July-2015.

[9] N. Yashaswini, et.al. , "Design and Optimization Of Bucket Elevator Through Finite Element Analysis", International Journal of Mechanical Engineering, Vol No-2, September 2014.

[10] S.Aliyaz Basha, Dr.Smt.G.Prasanthi, "A Sophisticated Iot Hand Stick for Aged People", International Journal of Technology Innovations and Research (IJTIR), ISSN:2349-5162, Vol: 4 Issue 10, October 2017, pp.220-224.

[11] Sankalp Verma, P. B. Deshmukh, "A Review Of Structural Analysis Of Kinematic Chain", International Journal of Advanced Engineering Research and Studies, March 2015.

[12] Ganesh U L, Vinod V Rampur Assistant Professor, Mechanical Department, PESITM, Shimoga, Karnataka, 'Semi-Automatic Drain For Sewage Water Treatment of Floating Materials', India International Refereed Journal of Engineering and Science (IRJES) ISSN (Online) 2319-183X, (Print) 2319-1821Volume 3, Issue 17(March 2013), PP.54-60.

[13] Dr .K.Kumaresan et.al., "Automatic Sewage Cleaning Equipment", International Conference on Explorations and Innovations in Engineering and Technology , September, 2016.

[14] Prof. Nitin Sall, Chougle Mohammed Zaid Sadique,Prathmesh Gawde,Shiraz Qureshi and Sunil Singh Bhadauriya, 'Drain Waste Water Cleaner', International Journal of research in aeronautical and Mechanical Engineering ISSN (Online): 2321-3051,Vol.4 Issue 2, February 2016.

[15] Mude Dhanunjaya Naik , Dr.Smt.G.Prasanthi, "IoT Based Soil Moisture and Temperature Monitoring Device for Irrigation Water Pump " International Journal of Technical Innovation in Modern Engineering & science (IJTIMES) http://ijtimes.com, e-ISSN: 2455-2585, Online ISSN:2455-2585, Vol: 03 Issue 10, October-2017, pp.39-43.

[16] Harshal S Shinde Asst. Professor Shatabdi Institute of Engineering & Research Nashik, 'Automatic Drainage Cleaning System', India International journal of innovative research in technology 2014 IJIRT, Volume 1 1,2,3B.E/EEE/ Issue 3(March 2014).