INTERNATIONAL JOURNAL FOR TRENDS IN ENGINEERING & TECHNOLOGY
VOLUME 20 ISSUE 1 –FEBRUARY 2017 - ISSN: 2349 – 9303

Survey On Sewage Maintanance System

K.Ramya[1]
[1]*Anna University, Electronics and Communication*
ramya.kalingaraj@gmail.com

M.PUSHPAVALLI[2]
[2]*Anna University, Electronics and Communication*
sowpush@email.com

Abstract—The advancement in the field of robotics have created automation in all the fields. It helps to solve many practical problems that the human encounters in day-to-day activities. But, even today manual scavenging of corporation sewage is practiced in urban areas of India, where a man is supposed to enter in to the manhole to clean the clots that restricts the flow of water in the sewage pipe line without using any equipment. This might be a death causing practice for those person who are involved in this job. The concept of using automation came out of the realm of the virtual for the betterment of human's life. Most of the municipalities in world runs sewers will be different in the length and cross sectional area. A prototype of the manipulator has been developed based on the working environment i.e, various instruction that robot has to do once it enters in to the manhole. It consist of various links and joints. The joints are drive through the various motors.

Index Terms— Minimum Arm system, Alert system, Gas identification sensor.

1 INTRODUCTION

In olden days, robots were large, slow and were not easy to handle. Fortunately, the advancement in technology have created many automation that helps to protect the human from the harmful activities that need to be practice in day-to-day life. Microprocessor have become cheaper and more powerful, motors are smaller and stronger. This ensures the concept of using a robot is a realm of the virtual world for the betterment of human lives to protect human from doing dirty, dangerous and other dull jobs like nuclear power plant inspection, sewage cleaning. Most of the municipalities in the world run sewers. Sewer pipelines in India are usually existed from 200 to 2000 millimeter in diameter for sewer transmission from houses to refineries. The hole can be either in circle or rectangular. Normally, our sewer pipes are made of plastic, ceramic and concrete. The sewage pipes get lock due to the waste materials like (shampoo covers, minute hair particles) from every houses and deformation of pipes and change in cross sectional area. Only large cities of India consist of manhole pits each manhole pit is dinged in every 10 meter distance. Each manhole will be connected to the large one which is directly connected to the sewage collection area. In many dangerous place the vehicles are using autonomous mobile robots. However, sewer is not an easy place to use robot inside so we do some automation to clean the pipes instead of a manual cleaning. Some people tried to give their solution to this death causing problem. In this paper we can discuss about some of their ideas.

2 LITERATURE SURVEY

K.Ramya is currently pursuing masters degree program in electronics and communication engineering in Anna University, India, E-mail: ramya.kalingaraj@gmail.com

- *M.Pushpavalli is currently working as assistant professor in Electronics and communication Department in Anna University, India, E-mail: sowpush@gmail.comThe IR sensor mounted with the reconfigurable disc will help to determine the diameter of the mobile manipulator robot. The feedback from the IR proximity sensor is amplified and compared with*

Many people have published their view and developed a prototype to give a solution for the death causing practice like scavenging.

P. Dhananchezhiyan[1] etal, Design and Development of a Reconfigurable Type Autonomous Sewage Cleaning Mobile Manipulator The solid model of various components and their assembly which mainly consist of reconfigurable disc with various associated links and joints. The selection of various component is based on the low cost and easy controllability. The cleaning of sewer is the most essential design aspect and effectiveness with high priority. There are three methods considered as 1) the robot head has a pneumatic cylinder which can push the clog forward. 2) Drill bit and saw tooth bit can be used to disentangle the clog and clot. 3) Pressured water jet can also be used to flush the clog. A clogged pipeline contain sewage water already on the one end, due to the obstacle it is unable to flow. So the robot is designed to crush the clogs, then the sewage water can flush them away acting like pressure water jet. The large cutter designed in front end will be used in penetrate into the clogs and crush it. Sewage water will then act as a flush to carry the loosened clog along with it.

In this paper, the author came with variable solution for the sewage maintenance system. The waste block in the pipe will be grind into fine particles and mix up with water. But even there is a chance for those bulk of fine particles can get block somewhere.

Balachandra.G[2] etal, Automatic drainage water pump monitoring and control system using PLC and SCADA. To control the pollution and protect the environment the problem of sewage water must be treated urgently. The waste and gas produce from this sewage is harmful to human health. This system can be effectively utilized in industries, hospitals etc… A gas sensor is used in this system to detect the presence of gases in the drainage pipe area, often as a part of safety system. The toxic and non-toxic gases were exhausted. The level sensor and pressure sensor activated simultaneously to detect the water level in the drainage system. When the pressure exceeds the limit the pressure valve will open. If the water level compressor operates with minimum pressure. When it goes to extreme level the compressor operates in maximum pressure. Aluminium or other metal plates are two plates might using for the purpose of filtration. The stepper motor is used to control the action

of those plates. Drainage from industries is treated through this project to attain the national emission standards, with low cost and good effect. This drainage water can be effectively used for the irrigate plants, clean toilets etc… Implementation of this project will generate a good economic and environmental benefits.

The author gave a good solution to alert the corporation about the overflow of sewage from industrial and other sources without affecting the environment. But he doesn't gave a solution for removing them out.

S.D.Anap[3] etal, Wireless Based Water Level Monitoring and Control System. Now a days drainage blockage is a major cause of pollution and flooding causing metro manila cities. Because of the heavy population in metro cities the people are supposed to use many pollution causing things that may cause bad to human health even death. This design is to implement a wireless sensor network in the monitoring of drainage system using GSM. Level sensor and IR sensor are used to detect the water level and the block in the drainage. The data obtained from the level sensor and IR sensor are send through the GSM module to the central corporation office.

This system is mainly designed to control and monitoring the drainage systems. This system mainly consist of three important parts are: microcontroller which controls and monitor the whole operation of the system, GSM module is a wireless network technology which can collects the information and send to the server terminals. IR and level sensors will provide the data about the blockage and water level in the drainage system. For the temporary control of water level we provide bypass system by using solenoid valve is open and buzzer gives indication. If the level goes above prediction level then for controlling purpose we have used bypass system, the solenoid valve used. Which has one inlet and one outlet valve, once it reaches the above level it makes the buzzer to give alert signal.

Frank kirchner[4] etal, A prototype study of an autonomous robot platform for sewage system maintenance. Its sensor configuration consist mainly of stationary and one flexible ultra sound transducer and of two inclinometers. In the experimental run in a test and found the concrete pipe of sewage system is about 600mm in diameter, an automation robot named KURT can has proven it can pass through it safely even in the different type of pipe crossing and turnings. The public sewerage system in germany's is about 400,000 km long, and it is in no good condition. The leakage of sewage may, possibly polluting soil and ground water, it may wash away soil possibly eroding the foundation of buildings or the underground of streets and pavements. Obviously, they are not accessible for humans. Currently they are using a tele-operated robot to maintain the city. These platforms are connected the outside world by a cable that gets used for energy supply, for transmission of commands from the human operator to the device.An enviable alternate to such tethered vehicle is using autonomous mobile robots. However, sewer is no easy place for such robot to work. It is narrow, slippery, dirty, and wet. It can involve all levels of water from dry to completely flooded. If it dry weather during the inspection and repair work means the water level of sewer will be 5%, but the water may splash on the vehicle at any time from joining pipes. The sewage pipe can be made in PVC, concrete and any other frequently used. There may be junction of pipes of different diameter. It may contains damages, cracks, hole or roots grown into the pipes through cracks or leakage joints.

Some of the problems that are really very difficult to overcome is, providing a transport through the system like, e.g, in an oil pipeline, sewage and some other underground maintenance systems. The sewage robots must travel over relatively large distances, carry load like their batteries and consume few energy. KURT has wheels. From time to time, a sewer robot has to climb over small obstacles or over steps in junctions where pipes of different diameter meet. The system must be designed such that, it can move into turning narrow pipes and slippery junctions also. Even if some sensor redundancy id=s desired, the benefit of having more sensor information must be weighed against the computer power required for exploring it. In our case, one should use few sensors and implement domain dependent and cheap, yet robust algorithms instead, it can compensate for any uncertainty in sensor interpretation and the resulting in completeness of the internal representation. To make it more reliable and robust, the controller should be modular and reflect a probably hierarchical decomposition of the global task in to a set of robust functional modules.

KURT is six wheeled vehicle of 38X28X30 cm size. The three wheels on both the side are connected by transmission belts, forming two separate propulsion units. The robot can move in any direction by rotating its wheel to its left and right. The DC motor is equipped with odometer measuring the number of shaft revolutions. KURT contains a rechargeable battery which will provide a sufficient energy for the operation. The system has to operate in the sewage pipe, and it is very difficult to work in the real one say, 4 m below street level, there is no guarantee to give continuous wireless contact to the robot. KURT has a CCD camera and radio link module. The camera can rotate 180 degree, horizontally so that it can cover the total front area. Level 1 is a set of finite state automation it implements the fundamental abilities of robot in sewer. Level 2 contains high level control algorithm such as a graph search algorithm, which given a map of the environment, start and goal position computes an optimal path to that goal. At junction KURT drives forward into the junction and tries to turn by 45 degrees. The drawback of this project is KURT can detect the upcoming junctions. Originally, KURT's oscillation in a pipe was something utterly worked. Even after a hard work to damp it in early stage it was found to be not possible.

Aurecon port Elizabeth[5] etal, Outcomes from a sewer maintenance backlog investigation. In order to prepare a programme for the systematic elimination of the backlog, a method was required to maintain expenditure. A prioritisation of the existing sewerage network was required. From literature reviews, it became clear that the international methodology

focused mostly on assessment in condition of sewer by Closed Circuit Television Camera (CCTV) survey. Only very little has been published on the pre-CCTV stage, because the authorities and utilities that publish their work have the financial resources to survey all or most of the sewage infrastructure, eliminating the need to identify those sewers that need to be surveyed. Sewer failure generally because of poorly made joints or that become defective due to usage it starts to leak. At high flows, the effluent leakage from faulty joints saturating the surrounding environment. During low flow, the groundwater infiltrates into the sewer and brings bedding material with it, thus reducing the support around the sewer, thus the formation of dirt and the structural damage of pipes or the 'day lighting' of the dirt through to the surface as sinkholes. Currently, assessment of the maintenance backlog of the NMBM sewerage infrastructure design was initiated by the Municipality's Planning and Research. NMBM appointed local engineering consultants to devise a method of assessing the backlog, to physically assess the backlog, and to report the findings of the assessment. The major failure of the sewer system is due to its age and depth. In the past, only one of the two methods has been used. It was decided to combine the two methods to assess the existing condition of the sewer network, and to focus the inspection, maintenance and rehabilitation programmes and budgets are most needed, i.e. in those areas the failure is imminent and would result in severe disruption to the surroundings.

The theoretical approach involved the development of GIS based IT tool called the Sewer Maintenance Planner (SMP) especially for this project. The SMP uses the characteristics of each sewer to predict the risk of sewer failure. This done by calculating a Probability Index and a Consequence Index. These two indices are then plotted on a two dimensional matrix, and the point where two indices met on the matrix determines the sewer Inspection Priority. The Inspection Priorities are then grouped together to allocate the sewer into a risk category. The maintenance requirements that have been identified in this assessment are corrective maintenance, or maintenance that is necessary to repair/replace defective infrastructure. This is different from preventative or routine maintenance that is carried out on a routine basis to maintain the current condition of infrastructure and to lengthen its useful life. The SMP is a useful planning tool that should be used to plan CCTV survey, routine dredging, and routine maintenance and to identify trouble spots before they manifest themselves. The GIS database must be updated. The flow of information from the NMBM field operatives (track inspectors, superintendents) to management needs to be reviewed and formalised, to improve the quality of information required for backlog assessment and decision making purposes.

3 DISCUSSION FOR OUTCOME AND DRAWBACKS

Systems and Scientists	Outcome	Drawbacks
Program Logic and control (JIANG jing and Zhhang Xuesong (2014))	Automatic sewage treatment contro	In this paper the removal of sewage waste is not discussed
Akio Goto and Kazuyuki Yamasaki (2014)	Toxic and Non Toxic gases are separated using micro organism	Effect of Toxic gas will affect the human
Drainage pump monitoring and control system(WU jing CHEN, Guo jie 2014)	The underground drainage pump operation and its startup and shutdown of drainage pump is Automated	This paper does not gave a procedure for problem solving
Wireless real time system Yin Haling Xu Zuxin(2014)	The monitoring of drainage system only described	The removal of sewage and the control of drainage water is not defined
Wireless real time observation syatem Wang Juan (2014)	It shows how to control storm drainage so as to reduce dry eweather pump discharging	-
Semi-Automatic drain for sewage water treatment of floating materials	Large amount of Garbage will be collected and can be remanufacturable	Small vibration will occur and the initialization charge will be high

4 CONCLUSION

In all these papers, the authors have approached different ideas in their aspect to give a solution to the manual scavenging. This paper presents the review of different methods. Which is analysed so far, as well as both the advantages and disadvantages. For the future work we suggest to present more accurate, efficient as well as faster method for removing the sewage waste from the pipe not to be mix up.

ACKNOWLEDGEMENT

Corporation sewage maintenance system is developed in order to eliminate manual scavenging which is a death causing practise in our country.

REFERENCE

[1] P. Dhananchezhiyan, Somashekhar S. Hiremath*, M. Singaperumal, R. Ramakrishnan 'Design and Development of a Reconfigurable Type Autonomous Sewage Cleaning Mobile Manipulator' in the proceeding of the International Conference on Design an Manufacturing, Icondm 2013.

[2] Balachandra.G1, Karthikeyan.S2, Elangovan.K3, Divya.N4 'Automatic Drainage Water Pump Monitoring And Control System Using Plc and Scada'. In the proceeding of the International journal of innovative research in technology, 2014 IJIRT | Volume 1 Issue 11 | ISSN: 2349-6002

[3] Prof S.D.Anap1, Dengale Rani V2, Ghule Suvarna U3, Jadhav Shradha B4, 'Wireless Based Water Level Monitoring and Control System' in the proceeding of International Advanced Research Journal in Science, Engineering and Technology Vol. 3, Issue 4, April 2016.

[4] Frank Kirchner, 'A prototype study of an autonomous robot platform for sewerage system maintenance'. https://www.researchgate.net/publication/2681599.

[5] Aurecon Port Elizabeth, 'Outcomes from a sewer maintenance backlog investigation' As presented at the Institute of Municipal Engineering of South Africa (IMESA) conference 2013.

[6] Design and Data hand book for Mechanical Engineers by K Mahadevan and K Balaveera reddy. Fourth edition 2013

[7] International Refereed Journal of Engineering and Science (IRJES)ISSN (Online) 2319-183X, (Print) 2319-1821Volume 3, Issue 3(March 2014), PP.54-60.

[8] International journal of innovative research in technology 2014 IJIRT Volume 1 Balachandra.G1, Karthikeyan.S2, Elangovan.K3, and Divya.N4. 1,2,3B.E/EEE Final year, Knowledge Institute of Technology, Salem, India4Assistant professor, Department of EEE, Knowledge Institute of Technology, Salem, India.

[9] Theory of machines –S S Rattan Department ofMechanical Engineering Regional Engineering College Kurukshetra (2004). Publication: Tata McGraw-Hill Publishing company Limited.

[10] Design of machine elements (DME-II) by KRaghavendra .first edition 2015.

[11] Wireless Real-time System for Monitoring the Storage of Urban Storm Drainage,YinHailongXuZuxin, DOI 10.1109/NCIS.2011.18711.

[12] S. M. Khaled Reza., Shah Ahsanuzzaman Md. Tariq., and S.M. Mohsin Reza., "Microcontroller Based Automated Water Level Sensing and Controlling: Design and Implementation Issue", Proceedings of the World Congress on Engineering and Computer Science, Vol 1, pp.1-7, 2010

[13] Design and Data hand book for Mechanical Engineers by K Mahadevan and K Balaveera reddy. Fourth edition201