Sewage Sludge Removal Method Through Arm-Axis by Machine Robot

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Abstract. An Robots in traditional circumstances and through the Middle Ages were used basically for preoccupation. Regardless, the twentieth century incorporated an impact in the headway of present day robots. Through the straggling leftovers of the century, robots changed the structure of society and mulled over more secure conditions for work. Additionally, the execution of bleeding edge mechanical self-sufficiency in the military and NASA has changed the scene of national assurance and space examination. Robots have moreover been effective in the media and beneficial for toy producers. In later days itself, we are confronting numerous issues in regards to the Sewage Treatment Method and how it is cleaned. Because numerous poisonous conditions and rust materials in sewage are largely causing the human individual effectively. This drives people to cause numerous infections and influence them to endure lastly prompts passing also. So, this can be illuminated by acquainting the Machine Robot with make spotless and unadulterated the Sewage Treatment Method. By utilizing Machine Robot, numerous issues are altogether overcome by humans. In that Machine Robot, we are settling the Robot-Arm and through a few Axis they are utilized. Then it can be done with Stepper Motor to move with different angles from left to right and then from top to bottom and they are utilized. Then, with the help of LCD Module display it helps to view what the process is happening in the Sewage cleaning process. With the help of Lead Acid Battery, they can be charged after the completing the process.

Keywords: Robotic Arm · Arm axis · Arduino UNO · Gas monitoring · Stepper Motor · LCD

1 Introduction

Robots in customary conditions and through the middle Ages were utilized fundamentally for distraction. In any case, the twentieth century joined an effect in the progress of present day robots. Through the straggling remains of the century, robots changed the structure of society and considered more secure conditions for work. Moreover, the execution of cutting edge mechanical independence in the military and it has changed the scene of national confirmation and space examination.

Nowadays, robotics is a quickly developing field, as mechanical advances keep; looking into, outlining, and fabricating new robot [3] fills different commonsense needs, regardless of whether locally, economically, or militarily. Robotics is a key

innovation in the advanced world. Numerous robots do tasks that are perilous to individuals, for example, defusing bombs, mines and investigating wrecks. Robotics can be characterized as the science or investigation of the innovation basically connected with the outline, creation, hypothesis, and utilization of robots.

Consistently several men slip into the rotten, noxious sewage for cleaning with no wellbeing gear. Laborers who handle the upkeep and cleaning of sewage funnels are at expanded danger of genuine sicknesses like Hepatitis A. Numerous deaths happen because of suffocating, trench breakdown, falls, and presentation to chlorine or Hydrogen-sulfide gas. The individuals who bite the dust amid the obligation are supplanted by others, holding up to put their lives in threat just to win a living for themselves and their families. Consistently, young people line up for Rs 200 that they get the opportunity to clean 20–25 canals, putting their valuable lives [2] in danger. The polluting influences introduce in sewage water can cause risky ailments (Fig. 1).
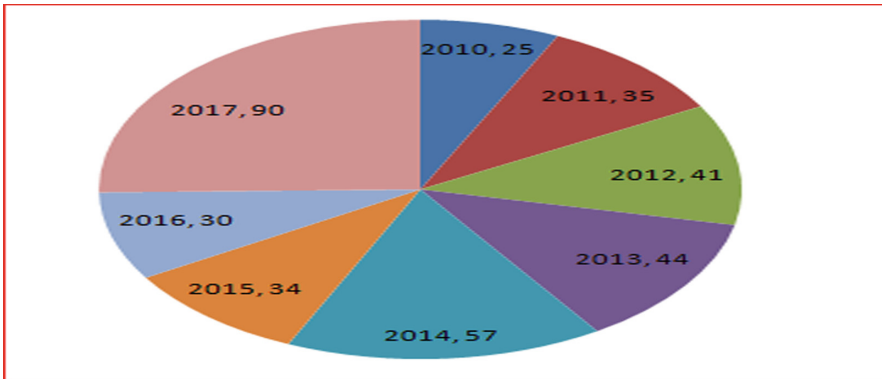

Fig. 1. Survey of death in sewer lines [1]

In the present time robot assumes a vital part in every single modern application for the best possible transfer of sewage from ventures and family unit is as yet a testing errand. In India sewage frameworks are typically open which prompts transfer of strong waste and that causes blockage. Channels are utilized for the satisfactory transfer of waste and sadly once in a while there might be a danger to human life amid the cleaning of blockage in the channels or it can cause genuine medical problems [16] as a result of the relating issues like malaria, dengue, and so forth.

In numerous unsafe place the vehicles are utilizing self-ruling versatile robots. Be that as it may, sewer isn't a simple place to utilize robot inside so we do some robot to clean the sewage rather than a manual cleaning. A few people endeavored to give their answer for this death causing issue. Sewage Cleaning by Employing Labor is made Illegal by Government, yet despite everything it wins in our nation. The suffocation or presentation of dangerous and non harmful gases created and gathered in sewage frameworks by the deterioration of natural family unit or mechanical squanders, they regularly encompassed by swarms of cockroaches, and the laborers working under sewage channels have no veil to shield him from the toxic exhaust that the sewage

emanates. Keeping in mind the end goal to decrease such Human Death because of sewage cleaning, we have actualized a Robot. The fundamental point is to diminish the human death loss when they are doing the sewage cleaning process and to decrease their cost of maintenance.

2   Convoluted Methodologies

Convoluted methodologies are involves implementing the idea of Robotics. In this thesis we will focus on these.

- Pipeline Inspection
- Robotic Arm
- Gas Monitoring
- Sewage Detection and Removal

2.1   Pipeline Inspection

On the off chance that a pipeline robot can travel, find and expel these things in pipelines, we can fundamentally lessen the recuperation cost and also time. An ease, versatile Pipeline [15] investigation robot configuration has been proposed. In these cases, the robot should be removed from the pipeline [6] by utilizing some recovery work. The trouble here is a finding obstructed zone and it likewise requires long investment and huge cost. Answer for these issues is pipeline robot. In the event that an oil or compound pipeline spills, it can be the natural and biological calamity.

DC engine is utilized to control the moving velocity of the robot. The pneumatic stress [8] framework is made out of air blower, solenoid valves and air hoses. Principally vary by guiding instrument, control source. Created in-pipe examination robot can go through straight pipelines, elbows and reducer. Uses of in-pipe [9] examination robots are constrained by pipeline material, pipe size and workplace (Fig. 2).
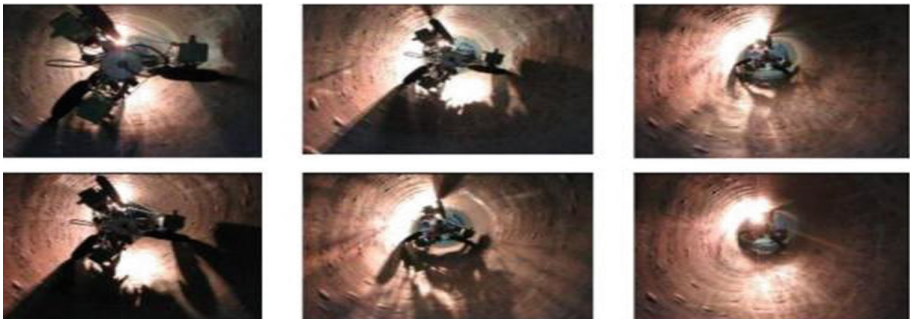

Fig. 2. Pipe inspection robots test [13]

To supplant the manual work in waste cleaning by a mechanized framework. Sonar Sensors [17] are additionally used to keep away from the obstructions in the way of device which isn't utilized.

The development of robot is controlled by arduino programming. Gadget will clean delicate to direct level of blockage proficiently. Higher torque is required causes low horsepower. There are numerous issues that affected the execution of pipelines [18] to be specific maturing, consumption, splits and use to stop up with garbage, or residue after long utilize. To beat [12] the issues that impacted execution of the pipelines to be specific maturing, erosion, splits.

2.2   Robotic Arm

An overview of how we can to make use of servo motor to make joints of a robotic arm and control it using potentiometer and arduino UNO. And used high loaded industrial application. It can reduce in the future enhancement that is maybe we can use high power [4] servo motor and by the help of it vibration can be reduced even the grabbing power is less that it can pick a very heavy object just a lighter object. Now talking about servo motors they are excessively used when there is a need for a accurate shaft movement or position. Servo motors are proposed for low speed, medium torque and accurate position application.

While men enter the sewers vents and clean the waste materials in the seepage manually. It is a horrible procedure where the seepage squanders are cleaned by the general population that may incorporate the essential apparatuses like basins, floor brushes for arranging the waste squanders. Decrease in the manual scroungers in our nation which diminishes the wellbeing risks [5] for people consequently lessening the natural contamination in our nation. It might be utilized for future age. Financially savvy and this strategy require prepared experts to work the mechanical arm.

Arduino for remote task for observing reason. Mechanical frameworks used to pick and drop objects, catch continuous picture in night vision, transmit and get the RF signals. Numerous capacities together in the meantime can't be performed by robots. RF Arduino board [14] and its activity to control remote robot. The robot can transmit ongoing data with the assistance of Arduino board associated with PC or any shrewd gadget (Fig. 3).
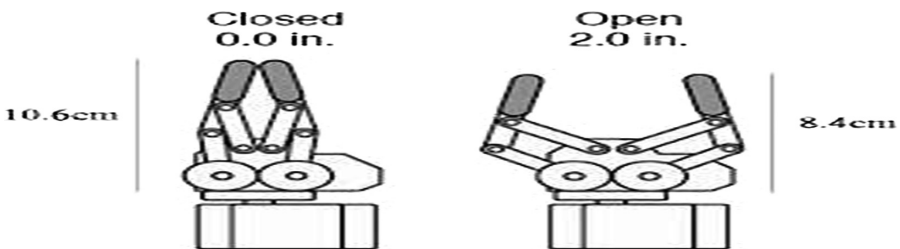

Fig. 3. Robotic pic arm opening and closing [10]

Comprehend which factor influence the execution of a mechanical arm and how it change an automated arm in work productive arm. Speed and increasing speed shift in various works, precision and repeatability is the imperative factor for any automated arm. Robot kinematics [19] is use for finding the development of multi-pivot and multi-level of flexibility. Mechanical arms are fabricated by utilizing diverse parameters like number of pivot, level of opportunity, working envelope and working space that arm cover, kinematics, payload, speed and quickening, precision and repeatability, movement control and drive of an arm and so on.

To build up an idea of a lightweight robot utilizing lightweight materials, for example, aluminum and carbon fiber together with a recently created stepper engine model. The automated arm [20] control technique is required to defeat the issue, for example, putting or picking object that far from the client, pick and place dangerous question in a quick and simple way.

Robot has a Bluetooth beneficiary unit that gets the charges and move left, move right utilizing these orders which are given from the Android versatile and send it to the Arduino circuit to control the engines. The Wireless control [22] is a standout amongst the most critical essential requirements for every one of the general population everywhere throughout the world. In any case, shockingly the innovation isn't completely used because of a tremendous measure of information and correspondence overheads. Utilizing Bluetooth correspondence to interface Arduino UNO and android.

A mechanical framework that grants clients to deal with A modern robot [7] utilizing arm signals and stances was arranged. ANN framework prepared with a back-engendering calculation was acclimated recognize signals and stances. The mechanical arm [28] where the capacity of a human to complete an assignment is constrained however not by his psychological power but rather by his physical quality.

Building up the equipment and programming for a sensor controlled automated arm. The mechanical arm technique is relied upon to beat the issue, for example, picking object that far from the client, pick and place dangerous question in quick and simple way. The Robot arm [30] has a few fragments and each portion is tied with Servo engine. The potentiometer and the servo are appended to the body of the automated arm.

2.3 Gas Monitoring

A few pilot establishments of the framework in the city of Dhaka have demonstrated that the proposed framework essentially beats the cutting edge manual frameworks winning in the city from the adaptability, and monetary perspective. For consistent independent power supply, a sun powered board setup might be included as utilizing battery cell may require routine support. Programmed blockage [25] identification framework. A computerized sewerage administration framework that utilizations Arduino microcontroller combined with a ultrasonic sensor, a NRF module and a GSM module to robotize the standard checkup and evacuation of deplete blockage fundamental for the persistent waste water stream in the huge urban communities.

The future work we recommend to exhibit more precise, productive and in addition quicker strategy for expelling the sewage squander from the pipe not to be stir up. The level sensor and weight sensor actuated all the while to recognize the water level in the

seepage framework. At the point when the weight surpasses the farthest point the weight valve will open. The robot head has a pneumatic chamber which can drive the stop up forward. Bore and saw tooth bit can be utilized to unravel the obstruct [31] and clump. Constrained water stream can likewise be utilized to flush the obstruct. Sewer isn't a simple place to utilize robot inside so we do some robot to clean the funnels rather than a manual cleaning. A few people attempted to give their answer for this demise causing issue (Fig. 4).

Fig. 4. The SewerSnort gas sensor board with a MicaZ mote [29]

The sewage laborers kick the bucket before age 60 in light of business related medical issues and as a result of inappropriate offices. Because of the suffocation or introduction of lethal and non dangerous gases [33] delivered and gathered in sewage frameworks. Rather than going human in sewage pipe a robot is sent for investigation and recognition of squares in the pipe. This lessens the human misfortune and tedious for the sewage laborers. In a few regions, specialists creep through the sewage, wearing no defensive apparatus. Because of the development of gas [32], they may cause the medical issue. The night vision camera is utilized for an unmistakable perspective of the pipe. Dc servo engine is utilized for 180° wheel pivot for the development of robot.

2.4   Sewage Detection and Removal

Give a generous answer for the issue of assembling automated cleaner using neighborhood assets while keeping it low expenses. Highlight of the planning and it would auto be able to deplete itself. This exploration make room for proficient floor cleaning with clearing and wiping activities. The mechanical angle [11] is generally the maker's answer for finishing the appointed assignment and managing the material science of nature around it.

Ultrasonic sensor can be utilized to decide the separation of the square from the robot. Doppler Shift. The proposed robot is composed with the rationale of helping the sewage cleaners [21] to keep them from getting influenced by genuine illnesses in view of entering the waste. This robot isn't completely mechanized. In spite of the fact that this robot takes out the requirement for laborers to get into the deplete, regardless it needs specialists to control its task.

The issue of flooding and environmental change [23] has turned out to be absurd due to its ongoing patterns in our condition today. This has turned into a reason for real

worry to the world, particularly the creating nations. Pushing down of structures, for example, wall, water logging of ranch lands and private building. Ecological contamination and spreading of viral illnesses are avoidable. By which the span of snow stockpiling territory can be controlled by the reducing return of sand recuperation.

Warm cushion were distinguished by utilization of a meta-heuristic improvement approach. Sun powered thermally got dried out ooze nearby constitutes another less diffused open door for advance power [24] and warmth age. Supplementary cremation of got dried out muck in a neighborhood kettle bolstering a steam turbine/generator set can give another amount of power.

To supplant the manual work in waste cleaning by mechanical deplete more clean. Keeping in mind the end goal to maintain a strategic distance from vibration the machine ought to be legitimately establishment with the floor. Engine runs the affix begins to course making the lifter to lift up the wastage material [26] are put away or gathering canister to evacuate it.

The robot's impetus framework comprises of thrusters which are a blend of engines and propellers. The sewer robot that is distinguish the blockages [27] that are existing in the sewers. The robot is intended to manage in unforgiving conditions and to distinguish the blockages in the sewer pipelines. The show of the infrared camera is associated with a workstation and the staff screens the development of the robot inside the sewer pipeline. Building up a sewage framework in a general public is to channelize the waste turning out from houses, enterprises and different offices.

3 Conclusion

The proposed robot is mainly for helping the sewage workers to keep them from getting influenced by genuine infections due to entering the waste. The opportunity has already come and gone that this robot found to be executed to clean the sewage pipes everywhere throughout the world. In addition, this robot will locate the toxic gases inside the drainage system of untreated waste. This won't prompt joblessness of sewage laborers yet will simply make the activity less demanding and more advantageous for them. Thus, these robots have a spotless and clean deplete frameworks all over the place. In spite of the fact that the underlying setup may cost high but it gives a good environment for us and for our future generation.

References

1. Ramapraba, P.S., Supriya, P., Prianka, R., Preeta, V., Priyadarshini, N.S.: Implementation of sewer inspection robot. Int. Res. J. Eng. Technol. (IRJET) **05**(02), 1653–1657 (2018)
2. Harish, K., Megha, D., Shuklambari, M., Amit, K., Jambotkar, C.K.: Pick and place robotic arm using Arduino. Int. J. Sci. Eng. Technol. Res. (IJSETR) **6**(12), 1568–1573 (2017). ISSN: 2278-7798
3. Mishra, P., Patel, R., Upadhyaya, T., Desai, A.: Development of robotic arm using Arduino UNO. Int. J. Recent Res. Sci. Eng. Technol. **5**(5), May 2017

4. Sharmili, S., Saarika, T., Malar, R.: Intelligence drainage cleaning using arm robot. Int. J. Emerg. Technol. Comput. Sci. Electron. (IJETCSE) **24**(7), 63–66 (2017). ISSN: 0976-1353

5. Ghugare, S., Chhatre, U.: Pipeline inspection robot by using Arduino. Int. J. Electr. Electron. Data Commun. **5**(11), 90–93 (2017)

6. Baby, A., Augustine, C., Thampi, C., George, M., Abhilash, A.P., Jose, P.C.: Pick and place robotic arm implementation using Arduino. IOSR J. Electr. Electron. Eng. (IOSR-JEEE) **12**(2), 38–41 (2017). Ver. III

7. Rajesh Kanna, S.K., Ilayaperumal, K., Jaisree, A.D.: Intelligent vision based mobile robot for pipe line inspection and cleaning. Int. J. Inf. Res. Rev. **03**(02), 1873–1877 (2016)

8. Gargade, A.A., Ohol, S.S.: Development of in-pipe inspection robot. IOSR J. Mech. Civ. Eng. **13**, 64–72 (2016)

9. Alanabi, N., Shrivastava, J.: Performance comparison of robotic arm using Arduino and MATLAB ANFIS. Int. J. Sci. Eng. Res. **6**(1), January 2015

10. Kukde, M., Nagpurkar, S., Dhakulkar, A., Amdare, A.: Automatic & manual vacuum cleaning robot. Int. Res. J. Eng. Technol. (IRJET) **05**(02), 2196–2198 (2018)

11. Tamilarasia, T., Varunb, S., Saravana Kumarc, M., Sivaprakashd, S.: Design and development of pipeline cleaning robot. Int. J. Eng. Res. **5**(4), 315–317 (2016)

12. Singh, J., Singh, T., Singh, M.: Investigation of design & fabrication of in-pipe inspection robot. Procedia Eng. **3**(4) (2015)

13. Merlin Ruby, K.M., Anne Jenefer, F., Vidhya, D.: Study of Arduino controlled robotic system. Int. J. Innov. Res. Comput. Commun. Eng. **4**(6), June 2016

14. Balathangam, R., Mathipriya, P., Pavithra, R., Prithiviraj, G., Poornima, U.: Design and development of Arduino controlled writing robot. Int. Res. J. Eng. Technol. (IRJET) **04**(04), 366–368 (2017)

15. Singh, A., Parashar, A.B., Dewangan, P., Uma, K.: Drainage cleaning robot. Int. J. Adv. Eng. Res. Dev. **4**(12), 503–508 (2017)

16. Thyla, B., Vaani, I.: A pipe cleaning and inspection robot. Techn. Res. Organ. **4**(9) (2017)

17. Abidin, A.S.Z., Zaini, M.H., Pauzi, M.F.A.M., Sadini, M.M., Chie, S.C., Mohammadan, S., Jamali, A., Muslimen, R., Ashari, M.F., Syahmiamaludin, M., Ming, C.Y.: Development of cleaning device for in-pipe robot application. In: 2015 IEEE International Symposium on Robotics and Intelligent Sensors, pp. 506–511 (2015)

18. Patidar, V., Tiwari, R.: Survey of robotic arm and parameters. In: 2016 International Conference on Computer Communication and Informatics (ICCCI 2016), 7–9 January 2016

19. Gautam, R., Gedam, A., Zade, A., Mahawadiwar, A.: Review on development of industrial robotic arm. Int. Res. J. Eng. Technol. (IRJET) **04**(03), March 2017

20. Aruna, R., Bhavishya, G., Venkatesh, S., Jessintha, D.: Intelligent detection and elimination of blockage in sewage pipes using a robot. Int. Res. J. Eng. Technol. (IRJET) **05**(04), 902–906 (2018)

21. Roy, S., Wangchuk, T.R., Bhatt, R.: Arduino based bluetooth controlled robot. Int. J. Eng. Trends Technol. (IJETT) **32**(5), 216–2019 (2016)

22. Padwal, A.B., Tambe, M.S., Chavare, P.S., Manahawar, R.K., Mhatre, M.S.: Review paper on fabrication of manually controlled drainage cleaning system. Int. J. Sci. Eng. Res. **8**(3), 204–208 (2017)

23. Truong, N., Krost, G.: Intelligent energy exploitation from sewage. IET Renew. Power Gener. **10**(3), pp. 360–369, 3 (2016). https://doi.org/10.1049/iet-rpg.2015.0154

24. Talukder, S., Sakib, M.I., Talukder, Z.R., Das, U., Saha, A., Bayev, N.: USenSewer: Ultrasonic sensor and GSM-Arduino based automated sewerage management. CTCEEC, September 2017

25. Rampur, V., Ganesh, U.L.: Semi-automatic drain for sewage water treatment of floating materials. Int. J. Res. Eng. Technol., July 2016

26. Sam Jeba Kumar, J., Tiwari, J., Khasnavis, S., Alen Joseph, S.: Design of a sewer robot to detect blockages in sewer. Middle-East J. Sci. Res. **24**(S1), 236–239 (2016)
27. Shas, A.R.: Design and implementation of robotic arm using proteus design tool and Arduino-Uno. Indian J. Sci. Res., January 2018
28. Shirgave, S., Salunkhe, A., Shirgave, K., Upadhye, S.Y.: Color sorting robot. Int. J. Adv. Res. Comput. Commun. Eng. **6**(3), March 2017
29. Garg, M., Sharma, R.K.: Robotic arm control through human arm movement using potentiometer. Int. J. Eng. Res. Manag. Technol. **3**(6) (2016)
30. Ambeth Kumar, V.D., Elangovan, D., Gokul, G., Praveen Samuel, J., Ashok Kumar, V.D.: Wireless sensing system for the welfare of sewer labourers. In: IET Conference & Seminar Publications, vol. 5(4), pp. 107–112, August 2018
31. Kumar, V.D.A.: Human security from death defying gases using an intelligent sensor system. Sens. Bio-Sens. Res. **7**, 107–114 (2016)
32. Ojha, V.K., Dutta, P., Saha, H.: Performance analysis of neuro genetic algorithm applied on detecting proportion of components in manhole gas mixture. Int. J. Artif. Intell. Appl. (IJAIA) **3**(4), 83–98 (2012)
33. Ojha, V.K., Dutta, P., Saha, H., Ghosh, S.: A novel neuro simulated annealing algorithm for detecting proportion of component gases in manhole gas mixture. In: International Conference on Advances in Computing and Communications, pp. 238–241 (2012)