

AUTOMATIC SEWAGE CLEANING SYSTEM

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report “**AUTOMATIC SEWAGE CLEANING SYSTEM**” is the bonafide word of “**DINESHRAM.R (927622BME014), ELAVARASAN.R (927622BME015), HARIHARAN.K (927622BME014)** ” who carried out the project work during the academic year 2023 – 2024 under my supervision. Certified further, that to the best of my knowledge the work reported here in does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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EXTERNAL EXAMINAR

DECLARATION

We affirm that the Project titled “**AUTOMATIC SEWAGE CLEANING SYSTEM**” being submitted in partial fulfillment of for the award of Bachelor of Engineering in Mechanical Engineering, is the original work carried out by us. It has not formed the part of any other project or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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INSTITUTION VISION & MISSION

Vision

- ❖ To emerge as a leader among the top institutions in the field of technical education.

Mission

- ❖ Produce smart technocrats with empirical knowledge who can surmount the global challenges.
- ❖ Create a diverse, fully-engaged, learner-centric campus environment to provide quality education to the students.
- ❖ Maintain mutually beneficial partnerships with our alumni, industry and professional associations.

DEPARTMENT VISION, MISSION, PEO, PO & PSO

Vision

- ❖ To create globally recognized competent Mechanical engineers to work in multicultural environment.

Mission

- ❖ To impart quality education in the field of mechanical engineering and to enhance their skills, to pursue careers or enter into higher education in their area of interest.
- ❖ To establish a learner-centric atmosphere along with state-of-the-art research facility.
- ❖ To make collaboration with industries, distinguished research institution and to become a centre of excellence

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

The graduates of Mechanical Engineering will be able to

- ❖ PEO1: Graduates of the program will accommodate insightful information of engineering principles necessary for the applications of engineering.
- ❖ PEO2: Graduates of the program will acquire knowledge of recent trends in technology and solve problems in industry.
- ❖ PEO3: Graduates of the program will have practical experience and interpersonal skills to work both in local and international environments.
- ❖ PEO4: Graduates of the program will possess creative professionalism, understand their ethical responsibility and committed towards society.

PROGRAM OUTCOMES

The following are the Program Outcomes of Engineering Graduates: Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary

environments.

- 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of
- 13.** technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The following are the Program Specific Outcomes of

Engineering Graduates: The students will demonstrate the abilities

1. **Real world application:** To comprehend, analyze, design and develop innovative products and provide solutions for the real-life problems.
2. **Multi-disciplinary areas:** To work collaboratively on multi-disciplinary areas and make quality projects.

Research oriented innovative ideas and methods: To adopt modern tools, mathematical, scientific and engineering fundamentals required to solve industrial and societal problems

Course Outcomes	At the end of this course, learners will be able to:	Knowledge Level
CO-1	Identify the issues and challenges related to industry, society and environment.	Apply
CO-2	Describe the identified problem and formulate the possible solutions	Apply
CO-3	Design / Fabricate new experimental set up/devices to provide solutions for the identified problems	Analyse
CO-4	Prepare a detailed report describing the project outcome	Apply
CO-5	Communicate outcome of the project and defend by making an effective oral presentation.	Apply

MAPPING OF PO & PSO WITH THE PROJECT OUTCOME

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO - 1	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 2	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 3	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 4	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 5	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3

ABSTRACT

In this project we proposed the concept of "AUTOMATIC SEWAGE CLEANING SYSTEM", which replace the manual work of cleaning sewage by humans. AUTOMATIC SEWAGE CLEANING SYSTEM (ASCS) proposed to overcome the real time problems. This system is used for automatic cleaning of sewage. This proposed system uses an automatic drain cleaning system that lets fluid flow through it but removed large solid waste like bottles, plastic and accumulates are blocked in sewage. Labour cleaning sewage leads to a high risk of them catching infections or poisoning due to large amount of waste/chemical in them .so for reducing work of humans and analysing several problems Water is the basic need for the existence of life on earth. . More than 70% of water is being wasted only for our daily needs, Now a day automation plays a vital role in industrial application. By having this project the instant block in the sewage system is being avoided. we proposed our project ASCS.

Keyword: Sewage Cleaning, Society

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SCOPE OF THIS PROJECT

As this project has been based on the baseline to make integration's of the benefits for human health, societal concerns and national cleanliness policy. Therefore it covers many sections of proportionate benefits to all sphere of our present life. The main objective of this project is to reduce the human effort in cleaning the drainage system .The frequent blocks in the drainage system can be avoided which also offers the efficient flow of drainage water. The plastic waste can be removed and allow only the water to pass through. These health hazards include exposure to harmful gases such as methane and hydrogen sulfide, cardiovascular degeneration, musculoskeletal disorders like osteoarthritic changes and intervertebral disc herniation, infections like hepatitis, leptospirosis and helicobacter, skin problems, respiratory system problems . The sewage blockage removal in India can stink due to the presence of hydrogen sulphide along with organic acids and mercaptans which then grows bacteria that reduces sulphur. This bacteria then produce H_2S , i.e., hydrogen sulphide which is a foul-smelling colourless gas that is extremely corrosive.

CHAPTER – 1

INTRODUCTION

Water is the basic need for human and all living beings. There is plenty of water on earth but it is not suitable for human use. Clean water is more important for various purposes. The impurities in the water can cause hazardous and disease. As long as the draining system is considered, the function of the drainage system is to collect ,transport and dispose of water through an outfall or outlet. The impurities gift within the evacuation water includes bottles, polythene bags, papers etc. Swatch Bharat Mission is peak at our age and everybody operating towards creating their encompassing and country clean. Our group sort out a way in getting rid of solid waste from the drainage thereby contributing our part in this mission. The drainage system constructed by people belonging to Harappan civilization is mainly based on scientific lines but it not in case of our civilization. House drains are emptied into the main drains which ran under the main streets and below many lanes. Semisolid or solid matters that are created by humans and animal activities which are disposed because of their hazardous nature is known as solid waste. Solid waste include paper, plastic containers, bottles, cans and electronic goods are notbiodegradable, which means they cannot be carried out through organic or inorganic processes. They cause health threat to humans, plants, animals etc. They also the fertility content of the soil. The impurities present int the drainage can cause instant blocks. The cleaning of drainage system is carried out by manually.

CHAPTER-2

LITERATURE REVIEW

Ankita B.Padwal, et.al. - proposed the replacement of mechanical work for cleaning the drainage. Drainage mostly carries of solid wastes that forms as block over a period of time when it is not cleaned periodically. Due to this blockage, the flow of waste water is been affected and there is a chance of overflow in public places. A manual labor work has been made to clean the wastes by sticks which may lead to high infection. To overcome this, they made a mechanical semi automatic drain cleaner for the replacement of man work.

Mhael Okpara (2014), et.al. - reviewed about drainage cleaning to replace manual work to automated system because manually cleaning system it is harmful for human life and cleaning time, is more so to overcome this problem they implemented a design automatic drainage water pump monitoring and control system using PLC and SC ADA. the use efficient way to control the disposal of wastage regularly treatment of disposal in different way toxic and non toxic.

Dr .K.Kumaresan, et.al. - explained manual work converted to automated system. Drainage pipe using for disposal and it may be loss for human life while cleaning the blockage in the drainage pipes. To overcome this problem they implemented Automatic Sewage Cleaning System. They designed their project different way clearance of gaseous substance are treated separately so the flow of water efficiently. This project may be developed with the full utilization of men, machines, and materials and money. They made their project economical and efficient with the available resources. They used automation technology related with his application of mechanical, electronics, computer based systems to operate and control production.

CHAPTER-3

MATERIALS & METHODS

Materials used :

- Under Water Drone
- Water Pressure Pump
- Nozzle
- Water Tube
- Cost Estimation

3.1.UNDER WATER DRONE

Under water drone are defined as underwater vehicles that can operate with a human operator. Sizes can range from just a few kilograms up to thousands of kilograms. The Woods Hole Oceanographic Institution employs a vehicle called the Sentry, which is designed to map the ocean floor at depths of six thousand meters. The vehicle is shaped to minimize water resistance during dives, and utilized acoustic communications systems to report the vehicles status while operating. Unmanned underwater vehicles are capable of recording conditions and terrain below water ice, as the risk of sending an unmanned vehicle into unstable ice formations is much lower than that of a manned vessel. Glider type unmanned vehicles are often used to measure water temperatures and current strengths at various depths. Their simplicity and reduced operating costs allow more UWD to be deployed with greater frequency, increasing the accuracy and detail of weather reporting.. Towed vehicles may be selected for tasks which require large amounts of power and data transmission as their tow cable serve as the method of communication between controller and craft. In 2021, scientists demonstrated a bio inspired self-powered soft robot for deep-Water operation that can withstand the pressure at the deepest part of the ocean at the Mariana Trench. The robot features artificial muscles and wings out of pliable materials and electronics distributed within its silicone body and could be used for exploration and environmental monitoring. Plastic materials are lightweight, corrosion resistant, and durable, which makes them excellent choices for use in marine ROVs. Curbell Plastics understands the challenges associated with designing equipment for marine environments. Drone top connect the nozzle. `1



Fig 3.1. Photography of Under water drone

3.2 WATER PRESSURE PUMP

Water pressure pump is a machine which increases the pressure of a fluid. It may be used with liquids or gases, and the construction details vary depending on the fluid. Constant speed pumps are switched on by a normally closed low-pressure switch and will content to run until the pressure rises to open the high pressure switch. They will cycle whenever enough water is used to cause a pressure drop below the low set point. An accumulator in the upstream pipeline will reduce cycling. Water pressure booster pumps are used to provide adequate water pressure to upper floors of high rise buildings. The need for a water pressure booster pump can also arise after the installation of a backflow prevention device (BFP), which is currently mandated in many municipalities to protect the public water supplies from contaminants within a building entering the public water supply. Pressure pump to connect nozzle with water hose.



Fig : 3.2. Photography of Water Pressure Pump

3.3 NOZZLE

A nozzle is often a pipe or tube of varying cross sectional area, and it can be used to direct or modify the flow of a fluid (liquid or gas). Nozzles are frequently used to control the rate of flow, speed, direction, mass, shape, and/or the pressure of the stream that emerges from them. In a nozzle, the velocity of fluid increases at the expense of its pressure energy. Increasing the nozzle pressure ratio further will not increase the throat Mach number above one. Downstream the flow is free to expand to supersonic velocities; however, 1 can be a very high speed for a hot gas because the speed of sound varies as the square root of absolute temperature. This fact is used extensively in rocketry where hypersonic flows are required and where propellant mixtures are deliberately chosen to further increase the sonic speed. Nozzle fit in top of the drone. Nozzle connect with water hose.

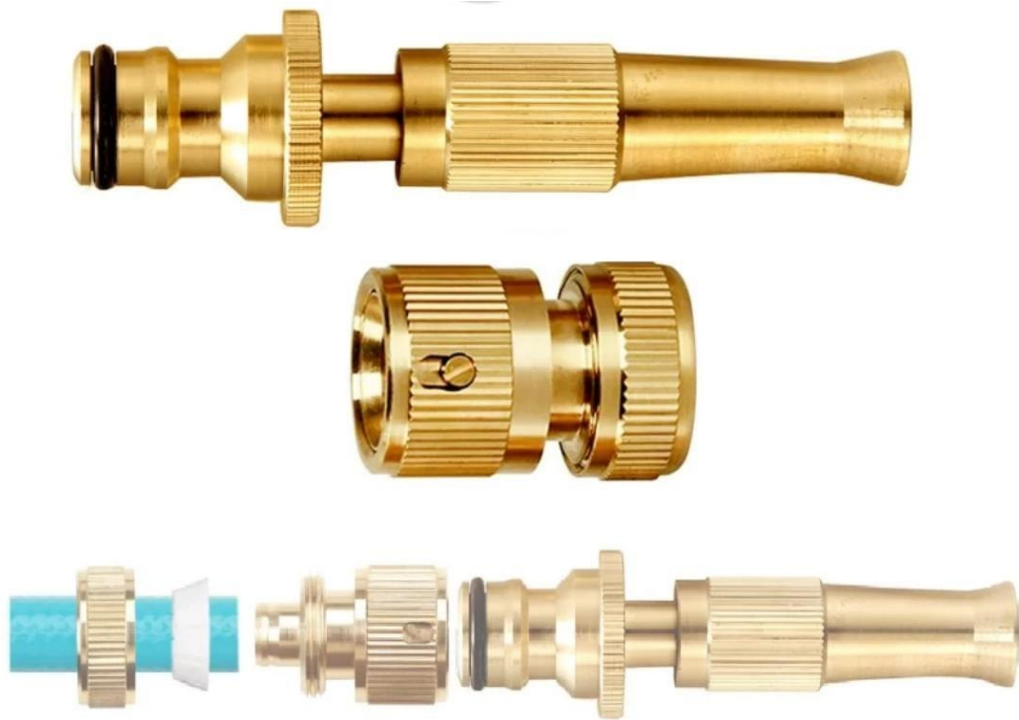


Fig : 3.3.photography of Water Nozzle

3.4.WATER HOSE

. A hose is a flexible hollow tube designed to carry fluids from one location to another. Hoses are also sometimes called pipes (the word pipe usually refers to a rigid tube, whereas a hose is usually a flexible one), or more generally tubing. The shape of a hose is usually cylindrical (having a circular cross section).Hose design is based on a combination of application and performance. Common factors are size, pressure rating, weight, length, straight hose or coil hose, and chemical compatibility. Hose is connected to water pressure and nozzle



Fig : 3.4.Photography of Water Hose

3.5.COST ESTIMATION

Components	Cost(Rs)	Total(Rs)
Water Drone	1,800	1,800
Water Pressure Pump	2,200	2,200
Nozzle	200	200
Water Hose	240	240
	Total Cost	4,440

CHAPTER-4

WORKING

The mechanism is basically designed to remove blocked solid waste from the running sewage. Drone camera identify the blocked in sewage. Water pressure to nozzle remove the blocked in sewage..

Nozzle process of shooting high powered streams of water through the sewer in order to blast away any debris blocking the passage of water. Easily removed the blockage

4.1.WORKING PRINCIPLE

The device is placed across the sewage so that only water flows through the fluid. Solid waste like bottle .tree branches blocked the sewage. Nozzle is attached to the drone. Nozzle high pressure water remove the blocked. The project Automatic Sewage cleaning system definitely serves the many dimensions the human needs and definitely presents a bright future aspects in the domain. With technological advancement the project can be provided with the automatic sewage cleaning system. It is a technological and economical instrument which can change the pathetic sewage conditions of town and cities of mediocre (average quality) India.

4.2. ADVANTAGES

- Low cost
- Reduce men power
- Simple in construction
- It is compact and portable

4.3.DISADVANTAGES

- Continuous power required to operate
- Continuous need to be clean time to time
- Material selection & design

4.4.APPLICATIONS

- Sewage cleaning
- All type of drainage (large, medium, small)

CHAPTER-5

DESIGN OF ASCS

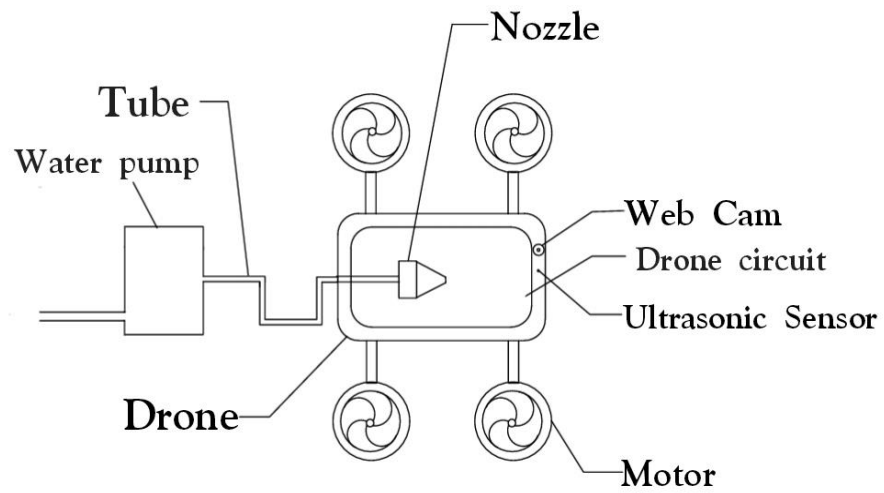


Fig 5.1. 2D diagram

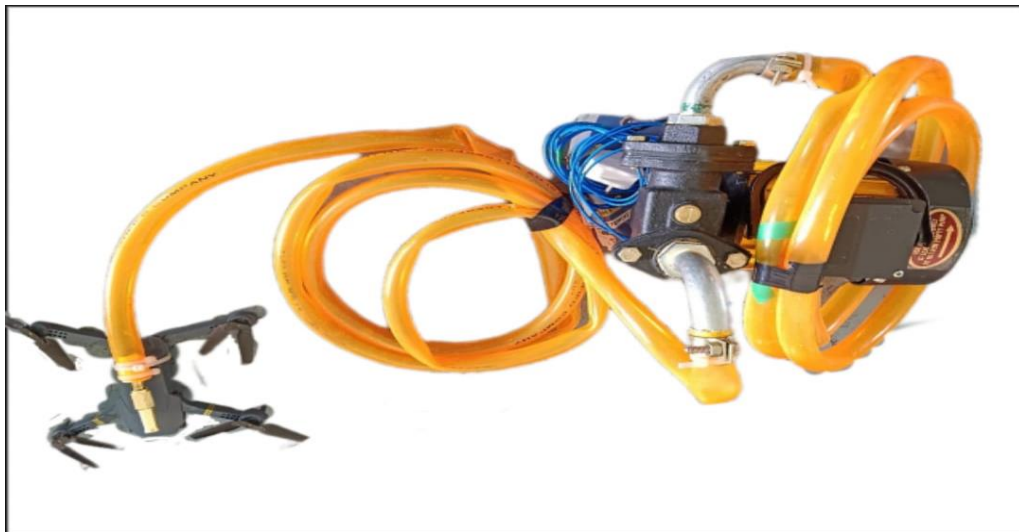


Fig.5.2. Automatic Sewage Cleaning System Top view



Fig.5.3. Automatic Sewage Cleaning System Front view



Fig.5.4. Nozzle attach with Drone

CHAPTER-6

FUTURE SCOPE OF THE PROJECT

We gathered information and equipment required for the Automatic Sewage cleaning system.

- * Studied the construction and principle of ASCS.

- * To Fabricate the ASCS and to test its working.

We hope that this will be among the most versatile and interchangeable in cleaning system. As the project has been based on the concept, to integrate the benefits for human health, societal concerns and national cleanliness policy. Therefore it covers many sections of proportionate benefits to the all sphere of our present life.

For Society

- * . Sanitations is one of the very basic amenities required for the basic living of a man and providing with such a technological and economical instrument which can change the pathetic sewerage condition of the town and cities of mediocre India.

- * With such a potential instrument of employment generation in the society through industry cooperation, these products land you in the win-situation for the people.

CHAPTER-7

CONCLUSION

- ❖ We can apply this project in remote and slum areas with effectiveness.
- ❖ Since the drains are linked with hygiene and in slum areas this is the major problem and we can apply this project in those areas and can safeguard the health of the people.
- ❖ This project is very useful in monsoon because during this seasons the drains are overflowing and they are blocked by the solid waste.
- ❖ Labors cleansing gutters and drains looks unethical and conjointly ends up in the high risk of obtaining infected or poisoned thanks to the large amount of waste chemicals in them.

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