Design and Development of an Automated Drain Cleaning System: A Case Study in Urban Drainage System in Shah Alam, Malaysia

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Abstract

Clogged drains in storm and street drains pose significant infrastructure, environmental, and health challenges. Traditional cleaning methods are inefficient, labor-intensive, and expose workers to safety hazards. Hence, this project is an innovative application of technology that can revolutionize traditional drain cleaning by integrating it with the Internet of Things (IoT) system. The project involves the development of a system that can automatically detect rubbish and clear clogs using advanced sensors and algorithms. The primary aim of the project is to improve the functionality and reliability of drain systems by reducing the need for manual intervention and preventing potential damage to the drainage system. The system typically includes various sensors such as an automatic on-off switch, and a water level sensor which can detect when a drain is clogged and trigger the cleaning process. The system works by collecting data from these sensors and analyzing it using advanced algorithms namely BLYNK IOT to determine the appropriate action to take. If a clog is detected, the system can initiate a mechanical or chemical cleaning process to clear the blockage. The project is designed to be highly efficient and reliable, with minimal manual intervention required. This not only saves time and effort but also reduces the risk of human error, which can lead to further damage to the drainage system. Moreover, the use of this project can also significantly reduce the need for costly repairs or replacements of drain systems. By detecting and clearing clogs early, the system can prevent further damage to the drainage system, which can save homeowners and businesses a significant amount of money in the long run. The conducted test demonstrated that the project is effective in removing various types of debris from a simulated drain environment. The system successfully removed all six predefined debris types, including dried leaves, plastic bags, and different sizes of bottles and cans, as well as a medium polypropylene lunch box. This indicates that the system can handle a wide range of waste materials commonly found in storm drains.

Keywords

Arduino, automated drain cleaning system, sustainability, ultrasonic sensors.