

Design and development of an aquaponic system with a self-cleaning drainage pipe and real time pH monitoring system

ABSTRACT

This paper introduces a prototype of a sustainable aquaponic system with a self-cleaning drainage pipe design to control the water level and thus solves the problem of waste accumulation in the fish tank. An Internet of Things (IoT) based monitor system was designed to monitor in real-time the pH value of the water in the aquaponic system. This system is designed for local communities particularly small urban households or for educational demonstration purposes. The result shows that the prototype significantly reduces the waste accumulation, and therefore maintains the water pH levels between 6.5 to 8.0 which is ideal for fish growth. With the help of the self-cleaning mechanism and real-time pH monitoring capabilities, the plant growth was up to 18% better compared to 6% without using the system, and fish growth was 27% better compared to 10.2% to the one not using the system. The implementation of an IoT monitoring system and self-cleaning pipe installation had proven the success of the small-scale aquaponic system as shown by the healthy growth rate of the fish and vegetables.