

ABSTRACT

Hydroponic and aquaponic systems are modern agricultural technologies that use water as the primary medium. Water quality is crucial for plant growth and fish health. If water is polluted or has high levels of dissolved substances, plant growth can be disrupted and can cause losses. This research aims to design and build an IoT-based automatic water filtration system using an ESP32 microcontroller and a TDS sensor to directly monitor water quality. The methods used include designing hardware such as a TDS sensor, ESP32, a relay module, a water pump, and filter media (silica sand, activated charcoal, and zeolite), as well as developing software based on the Blynk platform for remote control and monitoring. The system is designed so that the filtration pump works automatically if the TDS value exceeds the specified limit, and stops working when the water returns to normal conditions. Test results show that this system is able to reduce the water TDS value from an average of 850 ppm to 320 ppm in approximately 30 minutes. The TDS sensor's reading accuracy compared to standard measuring instruments reached 97%, while the pump's response time to automatically activate was less than 5 seconds after the TDS value exceeded the limit. The system also ran stably during a view hours of continuous use without any interruption to the IoT connection. In conclusion, this IoT-based automatic water filtration system is effective in maintaining water quality for hydroponic and aquaponic farming efficiently, reducing the need for manual monitoring, and facilitating monitoring using mobile devices.

Keywords: *Hydroponics, water quality, TDS sensor, automatic system, water filtration.*