

An IoT-based coastal recreational suitability system using effective messaging protocol

ABSTRACT

Coastal recreational activities are one of the main attractions for local public beachgoers and overseas tourists. The accessibility to better-quality coastal water will enhance safety and public health awareness when the information is available. Existing platforms showing the risk of whether a beach is suitable for public recreational use is less available in Malaysia. The Internet of Things (IoT) based system design specifically for coastal recreational suitability may differ from the existing configuration depending on the environment and requirements. This paper reports the design and implementation of an IoT-based system to capture the coastal environmental data and recommend recreational suitability. The system captures sensor data, store it in a database and displays the result using a dashboard. The variable data include the temperature, humidity, rain, pH, turbidity, oxidation-reduction potential (ORP), and total dissolved solids (TDS) in a coastal area. The hardware used in the design is the development boards such as Raspberry Pi, Arduino Uno, and ESP32 controller. The system is developed using PHP, MySQL, and Apache Web Server and can be accessed online at <https://ipantai.xyz>. When using Message Queuing Telemetry Transport (MQTT) as the effective messaging protocol and HiveMQ broker, the result has shown improvement for message size, throughput, and power consumption. The further potential of an IoT-based system is to bring value for coastal management and serve as a powerful tool to determine whether the coastal area is suitable for the public to access water recreational activities.