ABSTRACT

Measurement of water waves in seas, rivers and coasts is something that needs to be done by the government and researchers in order to obtain information about the speed of water waves and water levels. Water waves have complex movements that are difficult to measure because they are formed by winds with periods that are difficult to observe. This study aims to measure water waves in the sea, rivers and coasts using a smart buoy device by making a simple device, namely a smart buoy in which there is a series of microcontroller devices. To measure the speed of the water waves and the water level in this study, several pieces of equipment were used, such as the MPU-6050 sensor, Ultrasonic HC-SR04, and the Arduino Mega 2560 module, ESP32 Devkit V1 which was inserted into a buoy, each device has a function to determine speed of waves and water level with the Arduino Mega as the brain of the buoy. This study uses the Sugeno fuzzy logic method to classify wave height and water waves speed. Then the motion reference unit (MRU) sensor on the MPU-6050 sensor functions to measure the value of gravity and angular velocity. The test results show that the calibration of the MPU-6050 sensor goes well, the ultrasonic sensor gives results that are almost the same as real measuring instruments, and the water wave height detector successfully displays results according to the fuzzy classification used. The defuzzification results to determine the danger level have 100 percent accuracy, as well as the data sent by ESP32 to the website.

Keywords : water waves, fuzzy logic, Ultrasonic HC-SR04, arduino mega 2560, mpu-6050, esp32 devkit v1