ABSTRACT

The development of the Educational Robot Kit aims to enhance technology learning among students. This kit offers a practical and interactive approach to understanding high-level concepts such as Artificial Intelligence and the Internet of Things. Focusing on the construction, design, and programming of robots, the kit provides students with direct experience in dealing with contemporary technology. To broaden students' technical skills and create a strong foundation for understanding and integrating modern technological concepts. Additionally, this invention aims to stimulate students' creativity and problem-solving abilities while introducing collaborative skills through robotics projects.

This kit consists of 3 levels, namely the Basic Level, there is an infrared sensor that allows the robot to move along the available path and a distance sensor that is useful for the robot to move to avoid obstacles. Both sensors can be used in the menu in the application. Intermediate level, includes a drive system such as a DC motor which functions to move the wheels freely such as forward, backward, turning right and turning left. The Advanced level includes a robot arm and camera that functions for image processing to detect the shape of the object, then the robot arm will pick up the object based on its shape, such as square, round, triangular. IoT and AI-based educational robot kits offer significant advantages in enhancing student learning in the era of advanced technology. Its advantages lie in its relatively cheap price, modular system and high level technology, namely artificial intelligence (AI) which is capable of detecting certain objects and can be controlled remotely connected via Bluetooth and WIFI.

Implementing remote control using a smartphone with ESP32 involves configuring both hardware and software components. The ESP32 was chosen as the microcontroller base due to its ability to communicate through Bluetooth and Wifi. On the hardware side, the ESP32 module is set up to connect to Wi-Fi and communicate through Bluetooth with a smartphone. Communication between devices and applications is implemented through the MQTT protocol, with ESP32 serving as an MQTT client connected to a broker, which can be hosted locally or in the cloud. Security aspects are considered by encrypting Bluetooth and Wifi connections and implementing authentication mechanisms in MQTT.

Keyword : educational robot kit, modular system , Artificial Intelligence, Internet of Things