

ABSTRACT

This study aims to design and build a remote control prototype based on the ESP32 microcontroller for the education of kindergarten students. In the 21st-century technological era, the integration of technology in early childhood education, particularly in kindergarten, plays a crucial role in creating interactive and enjoyable learning experiences. This prototype is designed to intuitively introduce the concepts of Science, Technology, Engineering, and Mathematics (STEM) to children aged 4-6 years through a game-based approach.

This prototype integrates a Radio Frequency Identification (RFID) sensor to read commands from cards, an MPU6050 sensor to detect 6-axis motion, and a joystick for direct control, with wireless communication using ESP-NOW and Wi-Fi. It features an ergonomic design with safe Polylactic Acid (PLA) material and compact dimensions (138 mm x 60 mm x 35.5 mm) to ensure comfort and safety for children's use.

Keywords: *microcontroller, STEM, Prototype, Remote Control, RFID, MPU6050, Game-Based Learning.*