

ABSTRACT

This final project discusses the design and implementation of an ESP32 microcontroller-based internet radio receiver system to support community radio broadcasts that have limited conventional broadcast range. This system utilizes ESP32 Wi-Fi connectivity to access radio broadcast sources via the internet and stream them to external audio devices. Hardware design includes the creation of a printed circuit board (PCB) that integrates the ESP32, an audio decoder module, a power supply circuit, and connections to speakers, while software is developed to handle network connections, audio streaming protocol implementation, digital signal processing, and device control. System integration is carried out in the form of a practical and reliable prototype, and is able to work independently. Testing includes evaluating the ability to connect to the internet radio server, audio streaming quality, and connection stability. Test results show that Wi-Fi signal strength has a significant effect on streaming stability. A strong RSSI (> -30 dBm) results in smooth playback without lag. At < -31 dBm, short lags or audio drops appear, while below -40 dBm, interference often occurs, resulting in buffering/disconnections. The weaker the RSSI, the greater the risk of buffering. This is proven by the test results on Cosmopolitan FM Jakarta radio broadcasts with 64k Bits and RSSI -18 dBm producing clear and stable audio quality compared to Female Radio Jakarta which has the lowest bit rate, namely 31k Bits, and RSSI -53 dBm, showing poor performance with intermittent and less stable sound output.

Keywords: esp32, internetradio, communityradio, audio streaming