

ABSTRACT

Traditionally, radar has been the backbone of air traffic surveillance, but high operational costs and coverage limitations drive the development of alternatives. Automatic Dependent Surveillance-Broadcast (ADS-B) offers real-time radio-based surveillance, efficiently tracking aircraft position, speed, and altitude.

This research designs an ADS-B receiver system using Software Defined Radio (SDR), specifically RTL-SDR, on an embedded Linux platform. This combination provides a flexible, cost-effective, and integrable solution for air surveillance, ideal for remote areas with limited radar infrastructure.

The receiver processes 1090 MHz signals using a directional antenna, power divider, and filters to enhance sensitivity and reduce interference. Received data is converted by RTL-SDR into digital form, analyzed by the embedded Linux system running GNURadio.

Results show the system accurately detects and decodes ADS-B signals. Omnidirectional antenna tests reached 107.0 km, while the directional antenna extended detection to 119.4 km. The system effectively maps air traffic activity real-time with high accuracy and efficiency, validated against Flightradar24. This flexible, cost-effective air monitoring solution significantly contributes to aviation safety and efficiency.

Keywords: *ADS-B, RTL-SDR, GNU Radio, Linux*