

PROJECT ABSTRACT

WiFi Coverage Mapper and Speed Test App

An Android app (web prototype) that scans nearby WiFi networks with band/channel/RSSI detail, builds a room-by-room coverage heatmap, runs guided speed tests, and keeps a test history. Delivered built-to-order with the app prototype, report, PPT and viva kit.

01. Title

WiFi Coverage Mapper and Speed Test App

02. Introduction / Background

Everyone has a dead zone at home — the corner where video calls freeze — but nobody measures it; they just move the router by guesswork. Phone WiFi APIs expose exactly the data needed: scan results with SSID, band, channel and RSSI, plus the ability to run throughput tests. This project builds WiFiMapper, an Android app that turns those readings into decisions: a network scanner listing every nearby AP with signal bars, a coverage mode where you walk room to room logging RSSI to paint a heatmap, a one-tap speed test (download/upload/ping/jitter), and a history with CSV export — so 'the internet is slow here' becomes a measured, mapped fact.

03. Problem Statement

Users diagnose WiFi problems by feeling, and free speed-test apps give a single number with no spatial context — they cannot tell you the bedroom is a dead zone or that channel 6 is congested. The project addresses this by combining scanning, spatial logging and speed testing in one app, so the output is an actionable map: where signal is weak, which channel to switch to, and whether the extender actually helped.

04. Objectives

- Scan nearby networks showing SSID, band, channel, security and live RSSI with signal bars.
- Detect channel congestion and recommend a clearer channel.
- Let the user log RSSI room-by-room and render a coverage heatmap with dead-zone detection.
- Run a guided speed test with animated gauge: download, upload, ping and jitter.
- Keep a timestamped history of tests with location tags and CSV export.
- Deliver the complete student kit: working web prototype of all screens, report, PPT and viva Q&A.;

05. Proposed Methodology

The app is prototyped as an interactive single-file web app mirroring the Android screens.

(1) Scanner screen: a realistic AP list with band/channel/RSSI and a congestion note computed from channel overlap. (2) Map screen: a floor-plan canvas where tapped points log RSSI and re-render the heatmap gradient; averages per room drive the dead-zone verdict. (3) Speed screen: an animated gauge driven by a simulated multi-thread download curve, then upload/ping/jitter readouts. (4) History: timestamped result cards. Bottom-tab navigation switches screens; the prototype demonstrates the full flow the

native app implements with Android's WifiManager and throughput APIs.

06. System Architecture / Working

In the native design, WifiManager scan results feed the scanner list, sorted by RSSI, with channel utilization derived from overlapping APs on the same channel. Coverage mode stores (x, y, RSSI, room) samples in a local database; the heatmap renderer interpolates signal strength across the floor plan and flags rooms averaging below -70 dBm as dead zones. The speed test opens parallel HTTP connections to the nearest server, measures bytes/time for download and upload, and pings for latency and jitter. The prototype reproduces each screen's UI and logic with realistic data so the flow is fully demonstrable.

07. Hardware / Software Requirements

- Android phone (Android 10+) for the native build; the prototype runs in any browser
- Prototype: single HTML/CSS/JS file (vanilla JavaScript, no dependencies)
- Native build path: Kotlin, WifiManager / ConnectivityManager APIs, Room database
- Report: LibreOffice/MS Word; presentation: PowerPoint-compatible slides

08. Expected Outcomes

- A scanner screen correctly ranking networks and flagging congested channels.
- A heatmap that visibly distinguishes excellent, fair and dead zones across rooms.
- A speed test reporting the four standard metrics with history persistence.
- A complete report, PPT and viva Q&A; on WiFi measurement, RSSI interpretation and app design.

09. Applications

- Home users deciding router placement or whether an extender is needed.
- Small offices auditing coverage before buying access points.
- Students learning applied wireless concepts: RSSI, bands, channels, throughput.

10. Future Scope

- Automatic channel-change suggestions pushed to supported routers.
- Multi-floor 3D heatmaps for larger buildings.
- Crowdsourced building-level coverage from anonymized samples.