

210 Wireless Experiments on Real Software Defined Radio (SDR)



The MMT Advanced Lab Platform Software – your course, the experiment library, hardware, progress and the Play & Tools (Fox Hunt, Leader board, GRC Lab) all live in the left sidebar.

A hands-on Wireless & Communication Engineering learning platform. Every experiment ships with theory, animation, a slide deck, a hands-on lab, a quiz and an auto-graded challenge – and runs on real SDR hardware (ADALM-Pluto, bladeRF etc.) through a TX→RX loopback, falling back to a built-in channel simulator when no radio is attached.

MMT – GNU

Wireless & Communication Engineering – Hands-On

Learn 4G/5G the way engineers built it – on real software defined radios.

210 experiments – DSP – 5G & MIMO – real SDR – Simulation

THE CHALLENGE

Wireless is invisible – and that makes it hard to teach

Theory without signals

Equations and block diagrams, but students rarely see a real waveform spectrum or constellation.

Lab benches are expensive and don't scale

Spectrum analyzers and instruments are costly, shared, and stuck in one room.

Graduates have never touched real RF

They learn 4G/5G on slides, then meet a radio for the first time on the job.

THE SOLUTION

Every concept becomes a hands-on experiment

Learn by doing – on a real radio

Transmit and receive actual signals over a software-defined radio then see exactly what you sent and got back.

A full curriculum, one platform

210 guided experiments from sampling and modulation to OFDM, MIMO and SC – structured as a course.

No hardware? No problem

Every experiment also runs in a built-in simulator. So a whole class can start today and add radios when ready.

AT A GLANCE

A complete wireless engineering lab in one Software (app)

210

Hands-on
experiments

16

Chapters
DSP to 5G/6G

2

Real SDRs supported
(Pluto – bladeRF)

100%

Runs with or
without hardware

From a pure tone to OFDM, MIMO and modern standards – every topic is something you build, transmit and receive.

HOW IT WORKS

Each experiment is a complete learning loop

Theory

Plain-language explanation with the match when you want it.

Animation

Watch the idea move - chirps, constellations, spectra.

Slide deck

A built-in presentation for every topic

Hands-on lab

Run it on the radio (or simulator) and see live results.

Quiz

Check understanding with instant feedback

Challenge

Beat an auto-graded target - tune the link to win

REAL RADIOS, REAL SIGNALS

See your own waveforms - not a textbook picture

Transmit - Receive on real SDRs

Send a signal and capture it back on an ADALM-Pluto or bladeRF: the constellation on screen is yours

From SISO to 2x2 MIMO

Single-antenna links and real two-by-two MIMO (spatial multiplexing, Alamouti, diversity) on a bladeRF 2.0.

One platform, many radios

Device agnostic by design, pick your SDR the experiments stay the same and new radios drop in over time

CURRICULUM

The whole wireless stack - 15 topic areas

DSP
Foundations

Analog
Modulation

Digital
Modulation

Channel
coding

OFDM &
Multicarrier

Spread
Spectrum

MIMO &
Antennas

Channel &
Propagation

Synchronization

Standards : Wi-Fi/4G/5G/LoRa

Radar &
sensing

RF & spectrum

Cognitive radio

Audio &
Multimedia

Advanced
topics

EXPERIENCE

A guided journey, not a pile of demos

Course – Chapter – Experiment

A clear path from fundamentals to advanced standards in the right order.

One click guided flow

Press start and move through every lesson with next always knowing where your are and what's running.

Progress that sticks

Per student profiles track what's done started and mastered.

ENGAGEMENT

Gamified mastery that keeps students coming back

XP, levels & badges

Earn recognition as skills grow.

Auto-graded challenges

Hit a measured target-real metrics instant score.

Class leaderboard

Friendly competition across the cohort.

Spectrum Fox Hunt

Find the hidden signal – a radio treasure hunt.

WHO IT FOR

Built for anyone teaching or learning wireless

Universities & colleges

A ready lab for communications, DSP and RF courses.

Training labs & bootcamps

Hands-on RF/PHY skills, fast.

Industry upskilling

Bring engineers up to speed on 5G & MIMO.

Self-learners & makers

Own an SDR and go from zero to 5G.

WHY MMT-GNU

What sets it apart

Real hardware, not just simulation

Students transmit and receive actual signals – the difference between knowing and doing.

Complete path to 5G & MIMO

One coherent curriculum instead of scattered scripts and slides.

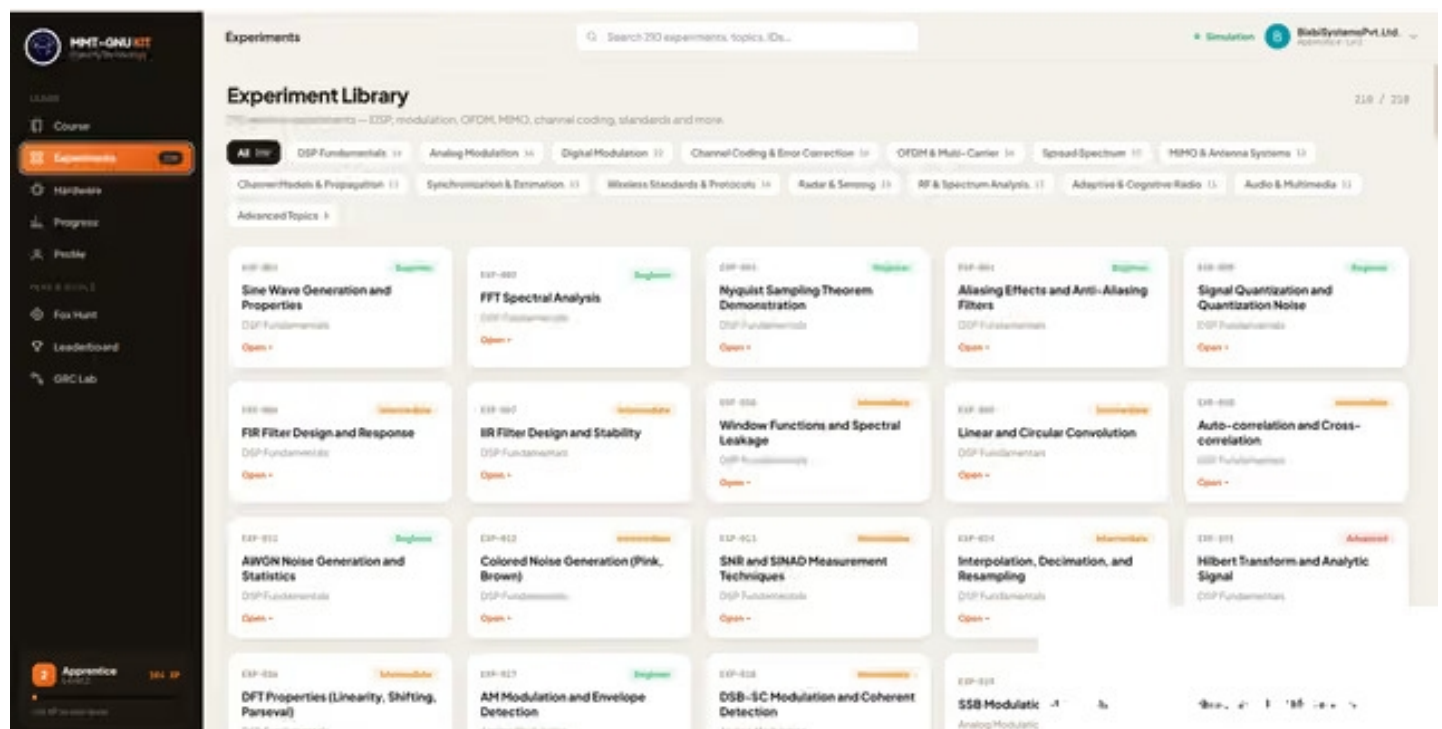
Open foundation, runs everywhere

Built on GNU Radio, Windows, Linux and macOS: one-click install or a no-install simulation build for any classroom.

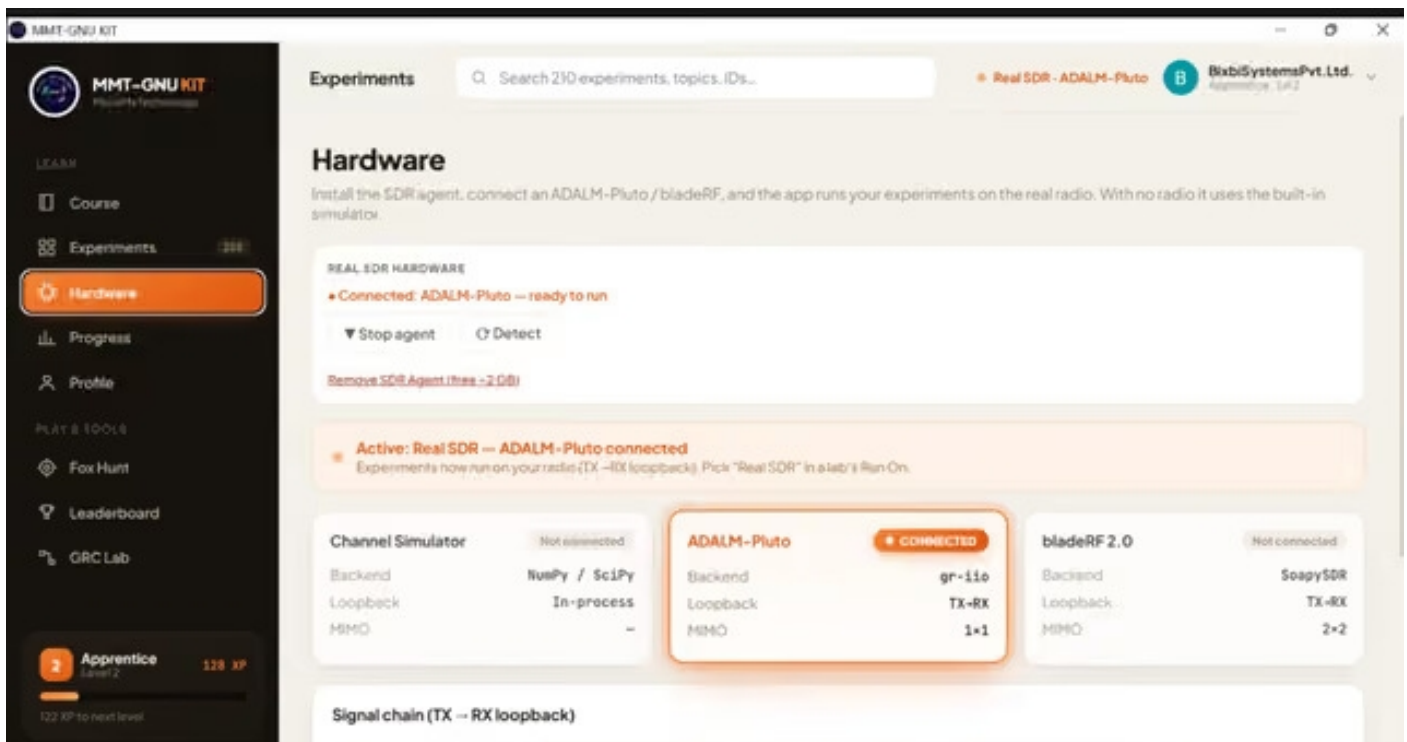
Bring real SDR to your classroom

Hands-on wireless & communication engineering – from first principles to 5G – on hardware your students keep their hands on.

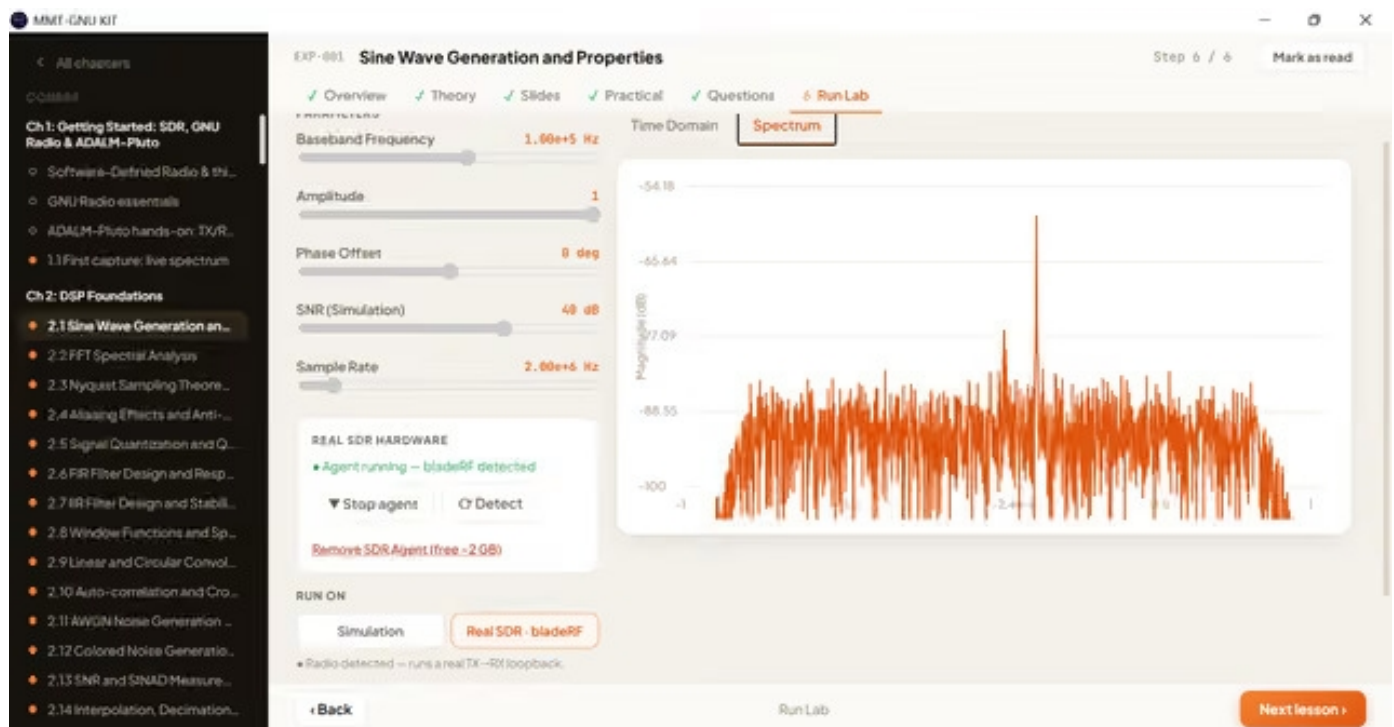
Gamified, auto-graded, live.



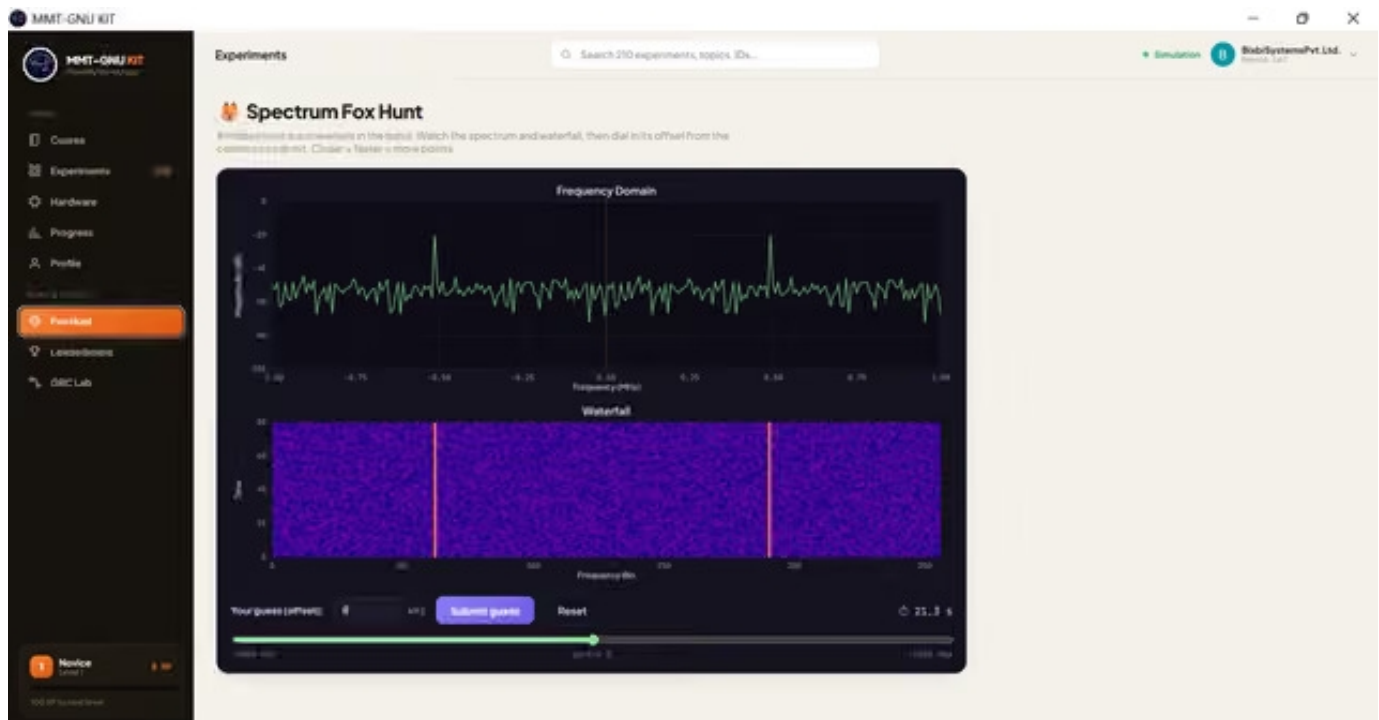
All 210 experiments across 15 categories – DSP, modulation, OFDM, MIMO, channel coding and more, filterable and searchable.



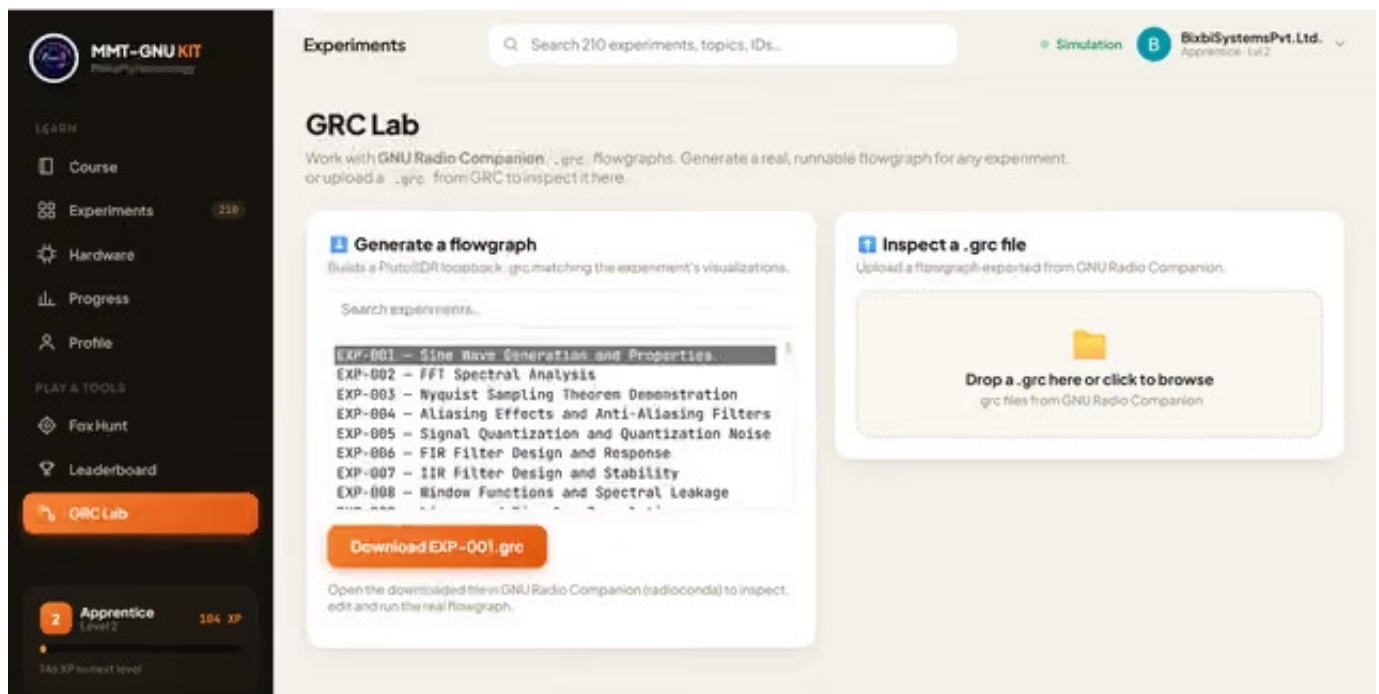
The TX-RX loopback signal chain with live device detection – ADALM-Pluto, bladeRF 2x2, and the built-in channel simulator.



Each experiment's workbench — tune parameters and run on real SDR or simulation, with live spectrum and constellation plots.



A gamified spectrum + waterfall challenge — find the hidden tone and dial in its offset for points.



Generate a runnable GNU Radio Companion .grc flowgraph for any experiment, or upload one to inspect it.