🚀 **Bridging RF Engineering and Deep Learning — with a $50 NanoVNA**

I’ve been working on a project that combines **low-cost vector network analysis (VNA)** with **modern machine learning (ML)** and **deep learning (DL)** — transforming a simple **NanoVNA test board** into an intelligent, data-driven RF analysis system.

Traditionally, RF component testing relies on expensive lab equipment and manual interpretation of plots. My goal was to show that with open-source tools and deep learning, even a hobbyist-grade setup can achieve advanced analysis capabilities once reserved for high-end systems.

🔍 **What the project does:**

* Automates **S-parameter data collection** directly from the NanoVNA using Python
* Trains **1D CNNs** to classify filter types (LPF, HPF, BPF, Attenuator) from frequency responses
* Uses regression models to **predict real component values** (e.g., attenuation, impedance)
* Implements an **autoencoder** to detect calibration drift — a self-monitoring “health check” for your RF setup

💡 **Why it’s novel:**

* It’s the **first open-source framework** that unites classification, regression, and anomaly detection for NanoVNA data
* Demonstrates **AI-driven RF analysis on affordable hardware**
* Bridges hardware, data science, and RF measurement in one repeatable workflow
* Makes **intelligent RF testing accessible** to students, researchers, and hobbyists alike

📘 Full project, architecture, and code are available here:  
👉 [GitHub Repo Link]

This is just the beginning — imagine what’s possible when we bring **AI-driven intelligence** to everyday lab tools.

#RFEngineering #DeepLearning #NanoVNA #MachineLearning #SignalProcessing #DataScience #HardwareAI #OpenSource #Python #Innovation