

How Northeastern University's AI Solutions Hub Helped Radiolife Validate a Clinical-Grade AI Diagnostic Platform

Advancing regulatory-ready machine learning for rapid infectious disease detection

PARTNER **SNAPSHOT**

Radiolife is a diagnostics company developing Cube Scan, a reagent-free radio frequency-based AI platform for ultra-rapid detection of infectious diseases across human health, veterinary medicine, food safety, and biodefense.

Through the Roux Institute's Future of Healthcare Founder Residency, Radiolife refined its clinical validation strategy, strengthened its technical and regulatory foundations, and launched collaboration with the Institute for Experiential AI and Northeastern researchers to advance its AI model.

THE **CHALLENGE**

Radiolife needed to validate a novel diagnostic modality combining radiofrequency spectroscopy and machine learning at clinical-grade performance while maintaining speed, scalability, and hardware independence. After achieving 93% specificity in an early E. coli study, and later securing BARDA funding for arbovirus detection, the company required a partner capable of building robust ML systems and delivering defensible, regulatory-ready results.



— **RADIOLIFE** REQUIRED —

- **Robust ML pipelines** for high-dimensional radio frequency data
- **Management of environmental confounders** (temperature, humidity, device variability)
- **Defensible performance metrics** suitable for regulatory and scientific scrutiny



— **NORTHEASTERN** DELIVERED —

- **Multiplex AI models** for Dengue (1-4), Chikungunya, and Oropouche
- **Validated performance** across Cube Scan devices with optimized model efficiency
- **Publication-grade documentation** supporting regulatory and commercialization pathways

HOW THE AI SOLUTIONS HUB DELIVERS CLINICAL-GRADE RESULTS



Working with Northeastern's Institute for Experiential AI gave us the level of rigor and depth we needed to validate a completely new diagnostic modality. The collaboration went far beyond model training—it shaped how we think about robustness, scalability, and regulatory readiness.”

*Sergio Schirmer Almenara Ribeiro
Founder & CEO, Radiolife*



RESULTS & IMPACT

Performance Outcomes

- 88% to 90% multiclass accuracy with a specificity of 93%
- AUROC greater than 0.98
- Greater than 97 percent accuracy for several single-pathogen models

Efficiency Gains

- Feature compression ratio approximately 15 to 1
- Scan times reduced to 30 to 60 seconds per sample

Strategic Impact

- Regulatory-ready technical dossier
- Reusable ML framework extensible to additional pathogens
- Supports future FDA Breakthrough Device Designation engagement

PROJECT SCOPE & EXECUTION

Data Engineering and Preprocessing

More than 7,500 RF scans analyzed with environmental metadata and device identifiers

Model Development

Logistic Regression, Decision Trees, Random Forest, and XGBoost architectures

Feature Optimization

Reduction from more than 3,600 frequency variables to 235 without material loss of performance

Validation and Robustness

- Bootstrapped confidence intervals
- Calibration analysis
- Cross-reactivity testing
- Inter-device error profiling



This project reflects how we work. By mobilizing applied engineers, researchers, and student teams across Northeastern, we delivered a high-performance system engineered for clinical validation and regulatory scrutiny. We also helped establish a reusable machine learning framework that can extend to additional pathogens and devices.”

*Omer Alis
Director, AI Solutions Hub*



About the AI Solutions Hub

The AI Solutions Hub collaborates with multidisciplinary faculty, industry-expert researchers, applied engineers, co-op students, and staff from The Roux Institute, The Institute for Experiential AI, and across Northeastern University to design and deliver production-ready AI solutions for industry partners.