

DR. SYEDA SHAFIA RUBBANI

AI Research Scientist · AI Governance Specialist · Trustworthy & Responsible AI | Ph.D. Artificial Intelligence · FHEA
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PROFILE

Ph.D. AI researcher, educator and hands-on builder spanning three tracks: (1) applied AI engineering - designing, shipping and operating production LLM systems including RAG pipelines, multi-agent orchestration and evaluation harnesses, with four systems currently live; (2) research - eight years of self-directed empirical work on edge-AI protocol optimisation, information theory, neuroevolutionary algorithms and adversarial robustness in distributed systems; (3) research translation and governance, turning technical findings into evidence non-specialists act on, including a market-validation study underpinning a £300M healthcare-AI investment case, grant proposals, and stakeholder research across regulators, healthcare providers and government. 15 years of combined research, teaching and industry-facing experience across India, UAE, UK and Europe.

CORE COMPETENCIES

Generative AI & LLM Systems · Multi-Agent Orchestration · RAG Architecture · LLM Evaluation · AI Governance & Responsible AI · Edge AI & IoT · Information Theory · Neuroevolutionary Optimisation · Adversarial Robustness · Statistical Experiment Design · Research Strategy & Commercialisation · Grant Acquisition · Academic Leadership & Mentoring · Technical Writing for Decision-Makers

CAREER HIGHLIGHTS

- Identified £300M+ commercialisation potential in AI-driven healthcare via a 55+ interview market-validation study (ICURe, University of Warwick), informing an external investment decision.
- Achieved up to 640% performance gains in edge communication systems through dynamic optimisation, neuroevolutionary AI and MIMO (8x8) frameworks (doctoral research).
- Secured AED 50K Expo 2020 funding for AI-enabled surveillance research; additional competitive funding and grant-writing track record.
- Built and deployed four live AI systems end to end (MAS-DSS, PrivShieldLLM, COPD Dashboard, NeuroBoard); fifth (MedAgent-RAG) in development.
- Delivered 91% NLP accuracy in real-time sentiment analysis integrating edge AI with distributed systems (doctoral research).
- 3-Minute Thesis Award winner; InnoChange Programme nominee; Postgraduate Research Representative for 100+ Ph.D. scholars (2018–2021).
- 93% sales forecast accuracy using Power BI predictive analytics (retail).
- AI-driven medical imaging models improve diagnostic accuracy by 27%.
- 15% rise in institutional AI citations attributed to published work.

SELECTED LIVE / DEPLOYED AI SYSTEMS

MAS-DSS: five-agent RAG decision-support platform (Interpreter, Retriever, Ideation, Evaluator, Synthesizer); ChromaDB vector store; citation-grounded semantic retrieval; multi-tenant namespaces. Designed, built and deployed end to end; in production co-development with Co.Innovation Consulting under a formal 17-clause agreement, targeting international-organisation clients. Live: mas-dss.onrender.com · github.com/SyedaRubbani/mas-dss

PrivShieldLLM: privacy-preserving multi-agent LLM system for sensitive-data handling; containerised (Docker/Kubernetes), CI-tested deployment pipeline. Live: privshieldllm-production-07a9.up.railway.app · github.com/SyedaRubbani/PrivShieldLLM.

COPD Dashboard: clinical health-monitoring system with FHIR R4 interoperability and SHAP/Grad-CAM explainability, developed to IEC 62304-aligned practices. Live: copd-dashboard-production.up.railway.app

NeuroBoard: LLM + brain-computer-interface pipeline for neural-to-text communication in patients with severe motor impairment; originated in the European Entrepreneurship Micro Minor; pitched to the European innovation ecosystem. Live: neuro-board-production.up.railway.app

MedAgent-RAG: medical multi-agent RAG system, in development.

PROFESSIONAL EXPERIENCE

AI Research & Engineering Consultant (Independent) | Remote - clients in Europe & GCC Jul 2025 – Present

- Advise organisations on GenAI strategy, architecture and pre-production evaluation of LLM-based and RAG systems.
- Own full technical scope of MAS-DSS under formal co-development agreement: architecture, build, deployment, iteration against client milestones.
- Design experimentation and validation protocols for enterprise AI systems: performance, reliability, regression monitoring.
- Operate fully remote and async across IST, CET and GST with written specifications as primary coordination artefact.

Researcher in Artificial Intelligence (Doctoral) | School of MACS, Heriot-Watt University, Dubai, UAE *Sep 2017 – Jun 2025*

- Self-directed doctoral programme applying Shannon capacity theory to M2M/edge protocols (CoAP, MQTT, AMQP, HTTPS): problem framing, experimental design, dissertation.
- Designed experimental frameworks testing algorithms for data integrity and reproducibility; dynamic optimisation, neuroevolutionary search, 8x8 MIMO.
- Dedicated security research: detecting and defending internal/adversarial attacks on distributed sensor nodes like attack-surface identification, detection-test design, failure-mode quantification.
- Secured AED 50K research funding via proposals written for non-specialist panels; presented at 15+ international conferences including UKRI Annual Meeting and Festival of Research & Enterprise.
- Postgraduate Research Representative (2018–2021) for 100+ Ph.D. scholars; served on RCC and RDC policy committees; mentored postgraduates on methodology and technical writing.

ICURe Research Fellow - Smart COPD Face Mask | University of Warwick, Coventry, UK *Mar 2023 – May 2023*

- Market-validation research under UK ICURe programme for AI-driven healthcare technology (Smart COPD mask: personalised respiratory monitoring and real-time health insights).
- 55+ structured stakeholder interviews across academia, healthcare, industry, government (incl. pulmonologists, CCU patients, medical-device manufacturers).
- Competitive-landscape scoring model benchmarking 20+ rival technologies; defined three unique value propositions.
- Delivered feasibility report identifying £300M market opportunity, written for external decision-makers; informed a significant investment decision.

Adjunct Professor - AI & Data Science | Heriot-Watt University, Dubai, UAE (concurrent with doctoral research) *Sep 2018 – Dec 2019*

- Designed and delivered graduate-level courses: AI, machine learning, data science, 3D Graphics, Animation, Knowledge Management; pedagogy aligned with UKPSF standards.
- Collaborated with Edinburgh faculty on new curriculum modules; increased enrollment in new modules by 35%.
- Supervised final-year research projects with four subsequently published or conference-presented.
- Enhanced exam performance by 25% through active learning and data-visualisation techniques; ran guest-lecture series with industry experts.

Assistant Professor - Computer Science & Engineering | MS Engineering College, Bangalore, India *Aug 2014 – Sep 2017*

- Taught and mentored 500+ undergraduates in AI, data structures, software engineering, database systems; 95% pass rate across core subjects; 100% results in Java & J2EE courses.
- Supervised 25+ student projects, 5 selected for state-level symposiums and innovation contests; co-authored 3 conference papers with students and faculty.
- Organised 4 national-level workshops and coding hackathons engaging 400+ participants; 90%+ positive student feedback.

Lecturer - Computer Science & Engineering | Islamiah Institute of Technology, Bangalore, India *Sep 2010 – Aug 2011*

- Delivered UG courses in programming, algorithms, database systems to 150+ students; 93% pass rate.
- Modernised database curriculum with NoSQL (MongoDB, Cassandra); designed automated grading reducing evaluation inconsistency by 20%.
- Supervised 10+ mini-projects including 2 state-level symposium presentations on IoT and cloud.

EDUCATION & CREDENTIALS

Ph.D., Artificial Intelligence - School of MACS, Heriot-Watt University, Dubai, UAE (2017–2025). Dissertation: *Analyzing Edge AI Protocols Through Shannon's Lens for M2M Communication*. Focus: edge AI, distributed networks, Shannon theory, MIMO, neuroevolutionary algorithms, dynamic optimisation, distributed adversarial robustness.

Postgraduate Certificate in Learning & Teaching (PGCILT)— Heriot-Watt University, Edinburgh (2018–2021). Fellowship of the Higher Education Academy (FHEA); evidence-based pedagogy, instructional design, inclusive education.

European Entrepreneurship Micro Minor (Master's level, 5 ECTS) - Aalto, Rennes SB, Trento, U. Politécnica de Madrid (Mar–May 2023). Digital transformation and sustainable business models; co-developed NeuroBoard; authored Technology Watch Report.

Creativity, Responsibility & Entrepreneurship, 3 ECTS (IKP-9288) - Eötvös Loránd University, Budapest (2021–2022). EU InnoChange nominee; grade: Excellent.

Global Innovation Challenge (Entrepreneurship) - Heriot-Watt University, Edinburgh (Jan–Apr 2023). 10-week programme: funding, ESG strategy, innovation management; with GRID, EBS, Converge & Social Shifters.

M.Tech, Computer Science & Engineering - AMC Engineering College, affiliated to Visvesvaraya Technological University, Bangalore (2011–2013). First Class with Distinction. Dissertation: *Cluster-Based Routing in Mobile Networks* (secure CBRP: node authentication, load balancing, delay tolerance; comparative analysis vs PROPHET).

B.E., Computer Science & Engineering - Islamiah Institute of Technology, affiliated to Visvesvaraya Technological University, Bangalore (2006–2010). Dissertation: *Intrusion Detection in Heterogeneous Wireless Sensor Networks* (sensor placement and energy-efficiency optimisation). Student leadership role across 8 consecutive semesters.

TRAINING & CERTIFICATIONS

- Designing Robot Locomotion Controllers Using Deep Reinforcement Learning - NPTEL+ Workshop, IIT Madras / MathWorks (May 2026); hands-on deep-RL locomotion-control work in MuJoCo.

BOARD MEMBERSHIPS & PROFESSIONAL AFFILIATIONS

- Fellow, Higher Education Academy (FHEA): UKPSF recognition for teaching, learning and academic leadership.
- Postgraduate Research Representative (2018–2021): Heriot-Watt University; RCC and RDC policy committees; doctoral programme governance.
- Member, International Society on Multiple Criteria Decision Making (MCDM).
- Invited speaker/presenter: 15+ international conferences incl. UKRI Annual Meeting, Festival of Research & Enterprise, specialist AI symposia.
- Research Futures Mentor: intercampus Ph.D. mentoring across the Heriot-Watt global network.
- Industry-academia collaborator: Expo 2020, InnoChange, ICUR, Converge innovation and funding bodies.

PUBLICATIONS & RESEARCH OUTPUT

- *Neuroevolutionary Optimization of Shannon's Capacity in Edge AI Protocols for M2M Communication*: doi.org/10.21203/rs.3.rs-6621997/v1
- *Harmonizing Data Streams for Edge AI Protocols to Quantify Shannon's Bounds*: researchsquare.com/article/rs-3584273/v1
- *Shannon's Lens: The Catalyst for Cognitive Evolution of Edge-Based Smart Machines*: researchsquare.com/article/rs-3298198/v1
- *Defending Mechanism to Secure Nodes from Internal Attack in WSNs*: academia.edu/144271953
- Five single-authored manuscripts from doctoral research in preparation: tetralogy targeting Computer Communications, Performance Evaluation, IEEE T-IT, IEEE T-SP; plus "Learning to Report: Certainty-Equivalent Threshold Policies Achieve Logarithmic Regret in Fixed-Charge Remote Estimation" targeting ICLR 2027.
- Conference papers co-authored with students during teaching appointments (3 at MS Engineering College).

TECHNICAL SKILLS

Generative AI / LLM: GPT, Claude, Gemini, LLaMA fine-tuning and deployment; RAG architectures (ChromaDB, FAISS, Pinecone); LangChain, LangGraph, LlamaIndex, n8n; multi-agent orchestration; prompt engineering (ReAct, CoT); retrieval evaluation and citation grounding; LLM evaluation with the Inspect framework; Claude Code / Codex agentic coding workflows.

Reinforcement learning: Hands-on deep RL for robot locomotion control (MuJoCo); IIT Madras NPTEL+ certified workshop (2026); neuroevolutionary reward-driven optimisation from doctoral research.

ML & statistics: Python, PyTorch, TensorFlow, Keras, scikit-learn; regression, ANOVA, time-series, stochastic modelling; experiment design; reproducible research pipelines.

Data & MLOps: SQL, PostgreSQL, MongoDB, Spark, Kafka; Docker, Kubernetes, MLflow, FastAPI, CI/CD; AWS, Azure, GCP

Analytics & BI: Power BI predictive analytics.

Domain: Edge AI & IoT protocols (CoAP, MQTT, AMQP, HTTPS); MIMO systems; information theory; wireless sensor network security; healthcare AI (FHIR R4, IEC 62304-aligned development, SHAP/Grad-CAM explainability); brain-computer interfaces

LANGUAGES

English (fluent: working language) · Urdu (native) · Hindi (fluent) · Kannada (fluent) · Sanskrit (fluent) · Arabic (intermediate) · German (A1, actively improving) · Mandarin (HSK1)