HARIHAR RENGAN

Machine-learning researcher · explainable AI for healthcare

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PATENT

US Patent 12,737,201 · Sole inventor — Granted Sep 2026

"System and Method of Navigating a Digital Platform with a Customized Virtual Assistant." Application No. 19/270,080, filed Jul 2025. Underpins the EpicxAI navigation engine.

RESEARCH EXPERIENCE

Explainable AI Lab, Dept. of EECS, American University in Dubai — 2025 – Present

Student Research Lead

- Lead student research on interpretable machine learning for cardiology, nephrology, EEG and neuroimaging, producing four conference papers (IEEE Healthcom ×2, ACM ICMHI, IEEE CAISAIS) and two journal submissions.
- Derived a closed-form chronic kidney disease screen from serum creatinine alone using symbolic regression (cross-validated AUC 0.82; 0.95 on a held-out clinical cohort).
- Achieved AUROC 0.936 for EEG mind-wandering detection on video (previous best 0.876) and showed, under leakage-controlled evaluation, that performance falls to chance on reading.
- Presented two papers in person at IEEE Healthcom 2026, New York.

Department of Computing, The Hong Kong Polytechnic University — Mar 2026 – Present

Student Researcher

- Developed a prior-informed normative EEG scoring framework for Alzheimer's screening that requires no Alzheimer's-labelled training data (IEEE COMPSAC 2026); preparing a journal extension.

Athinoula A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital — Jun 2026 – Present

Research Intern

- Train deep-learning models for MRI segmentation; developing an Alzheimer's neuroimaging project, pending grant approval.

Independent Research — Jun 2024 – Present

- Developed certified orthogonal-polynomial surrogates for interpreting machine-learning models; sole-author manuscript under review at *TMLR*.

Science Internship Program, University of California, Santa Cruz — Jun – Aug 2024

Research Intern, Electrical Engineering

- Simulated porous metallic nanostructures for plasmonic biosensing using Lumerical FDTD.

PUBLICATIONS (* equal contribution)

[1] **H. Rengan***, A.-M. Valiyev*, R. B. Zhu*, C. Do, E. Y. Fu. "Prior-Informed Normative EEG Scoring for Alzheimer's Detection: Framework and Cross-Paradigm Boundary Analysis." *IEEE COMPSAC 2026* (IEEE flagship conference), MediComp Workshop, pp. 3044–3051. **[Co-first author]**

[2] **H. Rengan**, V. Pangracious. "Explainable Single-Biomarker AI for CKD Screening Using Symbolic Regression." *IEEE Healthcom 2026*. **[First author]**

[3] **H. Rengan**, V. Pangracious, T. AlAkl, M. AbouRehab, S. Makin, L. Noman. "NeuroAssist: ML-Driven MRI Vision for Brain Tumor Analysis." *IEEE CAISAIS 2026*. **[First author]**

[4] E. Tomar*, **H. Rengan***, V. Pangracious*. "Understanding the Generalization Limits of EEG-Based Mind-Wandering Detection: A Trustworthy Cross-Paradigm Study Across Reading and Video-Watching." *IEEE Healthcom 2026*. **[Co-first author]**

[5] A.-M. Valiyev*, **H. Rengan***. "Empirical and Behavioral-Simulation Based Evidence for Portfolio-Style Allocation in Student Study Time." *IEEE TALE 2026* (IEEE flagship conference); working paper at *SBP-BRiMS 2026*, Carnegie Mellon University. **[Co-first author]**

[6] **H. Rengan***, A.-M. Valiyev*. "An Empirical Analysis of Student Disengagement." *IEEE MIT URTC 2026*. **[Co-first author]**

[7] V. Pangracious, **H. Rengan**, G. Abdallah, H. Park. "Augmenting Cardiovascular Care with Artificial Intelligence: A Clinical Approach." *ACM ICMHI 2026*. **[Second author]**

[8] **H. Rengan***, V. Pangracious*, E. Tomar*. "An Investigation of the Limits of EEG-Based Mind-Wandering Detection Across Cognitive Paradigms." *Array*, under review. **[Co-first author]**

[9] V. Pangracious, **H. Rengan**, G. Abdallah, H. Park. "Augmenting Heart Failure Detection with AI: A Clinical Approach." *Scientific Reports*, in revision. **[Second author]**

[10] **H. Rengan**. Certified orthogonal-polynomial surrogates for machine-learning interpretability (title withheld for review). *TMLR*, under review. **[Sole author]**

VENTURES

EpicxAI · *Founder & CEO* — 2025 – Present

- Built a patented LLM navigation engine that takes users directly to the page or action they request; 20,000+ users, including Royal Sundaram Insurance agents.
- Reduced average search time on partner platforms from 8 minutes to 3 seconds.

Lock In (Lock In Enterprises, Inc.) · *Co-founder* — Mar 2025 – Present

- Study-planning platform for schools, funded by a $10k Emergent Ventures grant; 120,000+ views and 550+ learners served.

AlziDetect · *Co-founder & Technical Research Lead* 2025 – Present

- Low-cost early Alzheimer's screening from EEG, eye movements and facial tracking, built with PolyU and EdUHK researchers.
- Partnered with Alpha Clinic to reach 530+ seniors, 165 of whom were referred to their GPs.

LEADERSHIP

Dubai Computer Science Society · *Co-head* Sep 2025 – Present

- Grew Dubai College's computer science society from 50 to 450+ members and expanded it into the Dubai CS Society, opening a first international chapter in Bahrain; now lead the wider society after handing over the school chapter.
- Mentored 370+ underserved students through two free summer cohorts; helped raise 4,500+ AED for student startups.
- Launched App a Year (student-built apps incl. DC CarShare) and a Manim-animated CS Knowledge Library with CityU Hong Kong.
- Director and Technical Lead of MUGA League (Mar 2026 – Present), a charity basketball league that has raised 50,000+ AED.

Mathematics Society & Applied Maths Club, Dubai College · *Co-president* Oct 2025 – Oct 2026

- Led societies of 90+ and 80+ members; ran weekly competition practice, helped run a 200+ entrant national competition, and founded the DC Integration Bee.

Physics Society, Dubai College · *Founder & President* Jan 2025 – Sep 2026

- Grew the society to 30+ members studying calculus-based physics; established the school's first recurring Physics Olympiad.

Sustainability Club, Dubai College · *Head of DC CarShare* Sep 2025 – Sep 2026

- Led 30+ students building a carpooling app for ~2,000 school families; surveyed 400 parents; app being prepared for launch.

SELECTED PROJECTS

Reloop: ResNet50 waste classifier across 7 materials; 3rd nationally, InnovAIte AI Hackathon (3,000 AED). 2026

Mammath & py3dsa: open-source Python libraries for mathematics (51,000+ downloads) and algorithms (4,000+). 2021 – 24

harlang: an interpreted programming language, with its interpreter written in Python. 2024

HONOURS & AWARDS

ENTREPRENEURSHIP & INNOVATION

Blue Ocean Student Entrepreneur Competition: Global Top 100 (top 0.1%); 3rd, Middle East 2026
AlziDetect; 23,000+ entries from 175+ countries

Conrad Challenge: Conrad Innovator; Conrad China Silver 2026
AlziDetect; the Conrad Foundation's highest distinction in its international STEM innovation challenge

Emergent Ventures: $10,000 grant, 55th cohort 2026
Lock In; Mercatus Center, George Mason University

Diamond Challenge: Semi-finalist 2026
AlziDetect; University of Delaware's global high-school entrepreneurship competition

MATHEMATICS

UK Mathematics Trust: Hamilton Olympiad Bronze (top 100 worldwide); IMC perfect score (135/135) 2022 – 25
Maclaurin Distinction; BMO Round 1 qualifier; 9 Golds and 3 Distinctions

MAA American Mathematics Competitions: AIME qualifier via AMC 12; AMC 10, 2nd in the UAE 2024 – 25

ISMTF Senior Mathematics Competition: 4th individually, Vienna; 1st, 4th (×2) and 6th across rounds 2026

Challenge ME Maths Championship: 3rd of 41,000+ students from 11 Middle Eastern countries 2025

Dubai Math Super League: 1st in the UAE (twice) 2025 – 26

Mathematician of the Year, Dubai College 2025
1 of 360 students; selected for the school Maths A-Team (top 3 of 160 students)

COMPUTER SCIENCE

American Computer Science League: 1st in the UAE (2025); 2nd in the UAE and finalist (2026) 2025 – 26

iCodeJr CodeBattle: UAE National Champion 2025

InnovAIte AI Hackathon: 3rd nationally (2026); 4th nationally (2025) 2025 – 26

Dubai Science and Engineering Fair: Finalist, explainable AI for cardiorenal diagnosis 2026

HUMANITIES

John Locke Institute Essay Competition: Very High Commendation, Theology (top 1%); Commendation, Int'l Relations 2026

SKILLS & INTERESTS

Technical: Python (scikit-learn, LightGBM, PySR), JavaScript, Flask, SQL, Java, C#, LaTeX, Lumerical FDTD.

Interests: Badminton (UAE-ranked 14th, U19 singles); Trinity Grade 8 keyboard (Merit); essayist, Dubai Keynes Society.

EDUCATION

Dubai College Dubai, UAE · Aug 2020 – Jul 2027 (expected)

- **A-Levels:** Mathematics, Further Mathematics, Physics, Computer Science.
- **Standardised tests:** SAT 1560 (800 Math, 760 Reading & Writing); AP Calculus AB 5.
- **GCSEs:** 10 subjects, all Grade 9; Pearson High Achiever Award. **HPQ:** A*, on AI in software development.
- **EPQ:** "Do Parkinson's spiral/wave-drawing CNN classifiers pass explainability checks?"