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Work Experience

2020 – 2023	**PhD Fellow**, *Extended Reality & Robotics Lab*, Aarhus University. I work at the intersection of immersive virtual reality, haptics, biosignals and learning analytics to investigate effective ways of designing immersive and user adaptive skill training systems.
2022	**Visiting Researcher**, *Rainbow Robotics group*, INRIA Rennes.
2010 – 2020	**Research Software Engineer**, *AMMACHI Labs*, Amrita University. I worked as a software engineer leading the Virtual Reality & Serious Games group at AMMACHI (Amrita Multi-Modal Applications & Computer Human Interaction) labs. Focused on building virtual and augmented learning environments to teach vocational, computational thinking & social problem solving skills.
2009 – 2010	**Intern**, *Sakshat Amrita Vocational Education Project*, Amrita University.

Education & Qualifications

2013	**UGC-NET Lectureship**, *University Grants Commission*, Qualified for lectureship in Computer Science through National Eligibility Test ☑.
2007–2010	**Master in Computer Applications**, *Amrita School of Engineering*.
2004–2007	**BSc in Computer Science**, *Amrita School of Arts and Sciences*, (3rd Rank).

Recognitions

2021	**Invited Speaker**, Pulse 2021 conference for learning scientists, University of Twente, 2021 ☑.
2019	**Best Social Robot**, Won 1st prize in the social robotics competition 'Socialis Impremiere' at the 2019 IEEE Ro-Man conference, New Delhi..
2019	**Invited Speaker**, Workshop on Social Robots and Artificial Agents For Developing Countries: Challenges and Opportunities at the 2019 IEEE Ro-Man conference, New Delhi ☑.

Technical Skills

Languages	C#, Python, C++, C, Java, Javascript	**Haptics**	Chai3D, Openhaptics, H3DAPI.
Data Science	SQL, Pandas, Scipy, Pingouin, SPSS, Scikit-Learn, Keras.	**Prototyping**	Arduino, Fritzing.
Graphics	Unity3D, OpenGL, IRRLicht, Processing.	**Web**	Electron.js, Flask.

Networking Normcore, Photon	**Vision** OpenCV, Kinect/Leap SDKs, AForge.NET.

Selected Projects

2020-   **VR, Haptics and Biosensors for improving industrial skills training**.
- Ongoing controlled experiments with hundreds of subjects on improving performance on a fine motor skill training task using VR. Research questions were inspired by case studies and interviews with Danish companies developing and using VR training.
- Links between arousal measured through biosensors (skin conductance and heart rate) and training performance measures were established. An adaptive training system is being built based on these findings.
- Created the VR prototype using Unity3D, and the electronics and communication side of the physical prototype using Arduino. Performance and physiological data processing pipeline for the experiment was created using iMotions and Jupyter notebooks using Pandas for data cleaning/processing, Seaborn for visualization, hrv-analysis and neurokit libraries for processing physiological data, Scipy and Pingouin for statistical analysis.

2020-   **Multi-user VR system for engineering project management training**.
- An immersive training experience for enabling remotely located trainees to be trained in the essential concepts of SCRUM methodology through a collaborative activity.
- Over 100 students at the Bachelor's and Master's level at Aarhus University, Herning campus were introduced to SCRUM through the system.
- Developed using Unity3D, Normcore multiplayer library and Oculus SDK.

2019   **Social Robot for Behavioral Change**.
- Led a team of software and mechanical engineers in collaboration with Glasgow University to develop a social robot to encourage children in rural areas to engage in proper handwashing behavior, in order to reduce diseases caused by poor hand hygiene which was tested in a "Wizard of Oz" study.
- Developed communication stack for robot control, a custom Bluetooth Android library, robot mouth animations in Unity as well as the initial physical prototypes of the robot.

2010 − 2020   **Simulators for Skill Training**.
- Led a team of four software engineers and worked with mechatronics engineers to build the reinforced bar bending simulator, currently deployed at five Larsen & Toubro's (L&T) Construction Skill Training Institutes. After getting requirements from L&T expert trainers, developed the virtual learning scenarios, guided visual cues and real time mesh (bending) deformation graphics in Unity3D.
- Developed simulation software using OpenGL/CHAI3D/Qt for different tools and machinery (drillpress, tablesaw, file, handplane & ratchet) and the APIs for interfacing the simulations with the "APTAH" (linear movement) and "CHAKRA" (rotary movement) haptic feedback devices.
- Developed a prototype vision based system for simulating a Jigsaw machine with passive haptics (OpenGL + OpenCV).

Selected Publications

- **R. Unnikrishnan**, Francesco Chinello, and Konstantinos Koumaditis. "Investigating the effectiveness of immersive VR skill training and its link to physiological arousal", Virtual Reality (2022)
- **R. Unnikrishnan**, Konstantinos Koumaditis, and Francesco Chinello. "A Systematic Review of Immersive Virtual Reality for Industrial Skills Training." Behaviour & Information Technology (2021): 1-30

- **R. Unnikrishnan**, Francesco Chinello, and Konstantinos Koumaditis. "Immersive Virtual Reality Training: Three Cases from the Danish Industry." In 2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), pp. 1-5. IEEE, 2021.

- **R. Unnikrishnan**, Konstantinos Koumaditis. "Teaching Scrum with a Virtual Sprint Simulation: Initial Design and Considerations." In 26th ACM Symposium on Virtual Reality Software and Technology, pp. 1-2. 2020.

- **R. Unnikrishnan**, Amol Deshmukh, Shanker Ramesh, Sooraj K. Babu, A. Parameswari, Rao R. Bhavani. "Design and Perception of a Social Robot to Promote Hand Washing among Children in a Rural Indian School". In the 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN). IEEE, October, 2019.

- Sooraj Babu, Sooraj Krishna, **R. Unnikrishnan** and Rao R. Bhavani, "Virtual reality learning environments for vocational education : A comparison study with conventional instructional media on knowledge retention." 18th International Conference on Advanced Learning Technologies, IEEE, 2018.

- N. Amritha, Menon M. Mahima, K. Namitha, **R. Unnikrishnan**, Mohan T. Harish, MD Sankaran Ravi, and Rao R. Bhavani, "Design and development of balance training platform and games for people with balance impairments." In Advances in Computing, Communications and Informatics (ICACCI), 2016 International Conference on, pp. 960-966. IEEE, 2016.

- **R. Unnikrishnan**, N. Amritha, Alexander Muir, and Bhavani Rao, "Of Elephants and Nested Loops: How to Introduce Computing to Youth in Rural India." In Proceedings of the The 15th International Conference on Interaction Design and Children, pp. 137-146. ACM, 2016.

- N. Akshay, S. Deepu, E. S. Rahul, R. Ranjith, J. Jose, **R. Unnikrishnan**, Rao R. Bhavani, "Design and Evaluation of a Haptic Simulator for Vocational Skill Training and Assessment", 39th Annual Conference of the IEEE Industrial Electronics Society, Vienna, 2013.

- **R. Unnikrishnan**, K. Moawad, and Rao R. Bhavani, "A physiotherapy toolkit using video games and motion tracking technologies", Global Humanitarian Technology Conference: South Asia Satellite (GHTC-SAS). IEEE, 2013.