

# Rohith Krishnan Pillai ❖ CV

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## PROFESSIONAL SUMMARY

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A highly motivated and results-oriented **Full Stack Machine Learning Engineer** with **over four years of experience** in fast-paced environments, demonstrating expertise in the **development, deployment, and scaling of machine learning solutions**. Proven ability to build and maintain MLOps pipelines, and leverage cloud infrastructure for real-time inference and data processing. Possessing a strong academic foundation with an **M.S. in Robotics** specializing in **computer vision and deep learning**. I am a highly adaptable, accountable and autonomous engineer who embraces tackling challenges, and I am passionate about applying advanced technologies to solve complex problems and contribute to innovative projects.

## CERTIFICATIONS, SKILLS & INTERESTS

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- **Programming Languages:** Python, C/C++, MATLAB, Java, Bash
- **Tools/Frameworks:** Unix/Linux, Git, Jira, MLOps, Scikit learn, Pytorch, Tensorflow, Keras, Hydra, Transformers, LLM, Hugging Face, AWS, NoSQL, CoreML, ONNX, Flask, REST API, Docker, ROS, OpenCV, eQMS
- **Soft Skills:** Team Leadership, Self-Directed Learning, Adaptability, Autonomy, Research and Ideation, Problem Solving, Cross-Functional Collaboration, Public Speaking

## WORK EXPERIENCE

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### Lifeware Labs, LLC

Jan. 2021 – May 2025

*Senior Machine Learning Engineer & Data Scientist | May, 2024 – May, 2025*

*Pittsburgh, PA*

*Machine Learning & Computational Biology Engineer | Jan, 2021 – May, 2024*

Led diverse initiatives in a fast-paced medical device startup (4–7 employees), taking multiple projects from 0 to 1, including ML/research, software and cybersecurity regulatory 510(k) compliance, product engineering, and cloud infrastructure

- Machine Learning & Data Science:
  - Built multiple internal tools for automated data ingestion, cleaning, and signal processing (ECG, EMG, PPG, SCG, IMU) and data visualization, allowing task to be delegated to non-technical team member and significantly improve efficiency (*Python*)
  - Designed, trained and deployed ML models for cuffless blood pressure (BP) estimation, including a patented bagging approach using demographic-aware models, as a new vital sign feature on the mobile device (*TensorFlow, XGBoost*)
  - Led hemorrhagic shock prediction ML project, overseeing feature engineering, model development, and deployment on mobile platforms (*CoreML for iOS, ONNX for Android, Java*)
  - Established MLOps pipeline using self-hosted ClearML for ML model tracking, training, and deployment for future 510(k) compliance for ML models
  - Mentored a junior Data Scientist in data engineering, ML model development and deployment
- Cloud Development:
  - Deployed real-time ML inference pipelines on AWS for BP estimation using data streamed from an iOS app (*SageMaker, Lambda, S3, Athena, TensorFlow, XGBoost*)
  - Designed cloud infrastructure for a health dashboard displaying longitudinal physiological data, such as ECG, PPG signals. (*EC2, Dash, Plotly, Flask*)
  - Developed and deployed front and backend for a real-time human performance monitoring dashboard

in 2 weeks, leading to early sales for the vital signs monitor and dashboard service to the USSOCOM MARSOC (EC2, Lambda, S3, Athena)

- **Clinical Research & Biosignal Processing:**
  - Designed and executed a clinical study (200+ subjects) for ML-based BP estimation
  - Led multiple IRB approved clinical trials, including TICU (50 subjects), TAVR (20+ subjects), and a 572-subject product validation trial for EMS and first responder use
  - Developed biosignal processing algorithms for IMU-based patient posture estimation
- **Product Engineering, Project Management & Regulatory Compliance:**
  - Contributed to UI/UX design for iOS application and alarm system logic and architecture per IEC 60601-1-8 standard for a medical device product currently under 510(k) clearance review by FDA
  - Contributed to product design for IEC 60601 compliance, including patented 'device feet' design
  - Led a small team of software engineers in software and cybersecurity compliance efforts for FDA 510(k) clearance, achieving IEC 62304 compliance and clearing cybersecurity penetration testing on first attempts (tested by external testing lab), leading to a successful submission
  - Defined security requirements, conducted threat modeling, implemented product SBOM, wrote cybersecurity labeling and secured external cybersecurity testing approval. (*OWASP, CVSS, CycloneDX*)
  - Managed software & security risks as per IEC 14971 and TIR 57, defining a SPDF for the device, writing software SOPs and compliance documentation (software development plan, security plan, V&V plan, etc.)
- **Leadership & External Representation:**
  - Wrote monthly reports and proposals for DoD grant-funded projects
  - Conducted interviews for company roles, evaluating technical and cultural fit
  - Represented the company in outreach, including presenting work to the German BW Minister of Finance, Director of DARPA Biotechnology Department, senior USAF researchers, Special Operations Forces

## **Robotics Institute, Carnegie Mellon University**

**Aug. 2018 - Dec. 2020**

### ***Graduate Research Assistant***

***Pittsburgh, PA***

- Created a novel meta-3D face reconstruction from video method using single image reconstructions to fuse multi-view features
- Researched methods for physiological data monitoring from video, i.e. Heart rate estimation from facial video
- Designed models for synthetic dataset creation with embedded bio-signals heart rate, rPPG using GANs on a \$1M Bill and Melinda Gates Foundation (BMGF) funded project
- Developed the pyZFace (3D face tracker) library, and the ZFace C++ static library, for metric 3D face reconstruction from video for mask sizing for a Department of Defence (DoD) funded SBIR phase-II project
- Organized and was a Data Chair for the 2nd 3DFAW-Video challenge and workshop held at ICCV 2019, in Seoul, Korea & created the 3DFAW-Video dataset and the associated ARMSE metric for evaluation

## **Robotics Institute, Carnegie Mellon University**

**May. 2017 - Aug. 2017**

### ***Summer Scholar Research Intern***

***Pittsburgh, PA***

- Introduced new video based functionalities for the \$1M XPRIZE finalist RoboTutor team
- Created mapping of Facial action units to pedagogically relevant affective states
- Analyzed automatically detected student facial emotions data and found correlations to in-app behavior, for behavior prediction
- Initiated development of an Android service to predict student behavior in real-time on the app
- Published and presented results at AAAI 2018

## **Carnegie Mellon University in Qatar**

**May. 2016 - Aug. 2016**

### ***Undergraduate Student Researcher***

***Doha, Qatar***

- Developed a program that identifies phrases that create sounds, such as the literary technique of auditory images
- Extensively trained the model on wikipedia articles using Word2Vec and the Stanford Parsing Library

- Achieved ~70% accuracy using a machine learning technique using SVMs to contribute towards a NELL like system for audio

**Qatar Computing Research Institute**  
*Undergraduate Student Researcher*

**May. 2015 - May. 2016**  
*Doha, Qatar*

- Created a method to identify the perception of nations on social media platform
- Implemented programs to create visual forms of data analysis using large scale data collected and processed from Twitter
- Built a web page to display results. Published results in ACM WebSci'17

**EDUCATION**

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**Carnegie Mellon University**  
*Master of Science - M.S. in Robotics*

**Aug, 2018 - Dec, 2020**  
*Pittsburgh, PA*

- **Specialization:** Computer Vision and Deep Learning
- **Thesis:** 3D Face Reconstruction from Monocular Video and its Applications In the Wild
- GSA Campus Affairs Committee member (2018-19); Co-lead the Science and Localization, tele-operation's sub-teams over a semester, for the NASA funded [Iris Lunar Rover](#) (formerly CubeRover) mobile robot that made it to space in orbit around the Earth.

**Carnegie Mellon University**  
*Bachelor of Science - B.S. in Computer Science, Minor in Computational Biology*

**Aug, 2014 - May, 2018**  
*Pittsburgh, PA*

- **Thesis:** Mixed Initiative Survivable Path Planning using Imprecise Information
- GPA: 3.74/4.00, College Honors, University Honors, Student Leadership Award, Dean's List x 6 semesters
- Student Academic Committee Member, Vice-president of The Planetary Society CMUQ, Executive member/Communications officer for Computing Club, Course Assistant for Introductory Programming and Computer Science Course and Introductory Robotics Course

**CERTIFICATIONS**

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- Design Controls in Greenlight Guru (Issued May 2023) - Credential ID [6zwk69b97e3m](#)
- Document and Change Management in Greenlight Guru (Issued May 2023) - Credential ID [n9vwmeatz2gx](#)

**AWARDS & HONORS**

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- **University Honors - BS in Computer Science (May 2018)** for high GPA in graduating class
- **College Honors - BS in Computer Science (May 2018)** for completion of undergraduate thesis
- **Student Leadership Award (May 2018)** - for contributions to undergraduate student community at CMUQ
- **Qatar National Research Fund (QNRF) Best Project in Information & Communications Technology (ICT) (April 2018)** at Meeting of the Minds for my undergraduate thesis on Mixed Initiative Survivable Path Planning with Imprecise Information
- **Best Designed App - Carnegie Apps Hackathon (Feb 2018)**- Won the prize for best design in the hackathon. The application created, Arosa, was a portal to simplify graduate school applications mainly in searching and matching with advisors,colleges, funding etc. by using machine learning techniques.
- **Winner - Algorithmic Trading Hackathon (Feb 2018)** - Won the algorithmic trading hackathon organized in CMUQ, by making the most cumulative profit at the end of the competition while "trading" in NYSE using CMU's FTS platform.
- **QUIRP Grants Recipient** - project proposals awarded funding in 2016 and 2017 respectively.
- **Dean's List** - for 6 semesters (Fall 2014; Spring 2015; Fall 2015; Fall 2016; Spring 2017; Fall 2017)

## PATENTS

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### **Chest-Worn Device And Related System For Compact And Portable Physiological Monitoring** **Charalambides, A., Lickert, E., & Pillai, R. K. (2024). U.S. Patent Application No. 18/417,851.**

A body-worn patch to be worn by a patient, wherein the body-worn patch comprises a plurality of sensors and a controller. The plurality of sensors comprises a biopotential sensor capable of measuring an electrocardiogram (ECG) signal, an inertial measurement unit capable of measuring a seismocardiogram (SCG) signal, and an optical sensor capable of measuring a photoplethysmography (PPG) signal. The controller is in signal communication with the plurality of sensors and the controller is capable of receiving the ECG signal, the SCG signal, and the PPG signal. The controller is capable of determining a physiological property of the patient based on the ECG signal, the SCG signal, and the PPG signal.

## PUBLICATIONS

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- Dun, S., Rachdi, H., Memon, S. A., **Pillai, R. K.**, Mejova, Y., & Weber, I. (2022). Perceptions of FIFA men's world cup 2022 host nation Qatar in the twittersphere. *International Journal of Sport Communication*, 15(3), 197-206.
- Charalambides, A., **Pillai, R. K.**, Beri, M., Carpenter, J., Stancil, B., Majidi, C., ... & Sultan, I. (2021). Clinical Results of a Novel Chest-Based Wearable During Transcatheter Aortic Valve Replacement Surgery for Real-Time Remote Monitoring. *Circulation*, 144(Suppl\_1), A12465-A12465.
- **Pillai, R. K.** (2020). *3D Face Reconstruction from Monocular Video and its Applications In the Wild* (Research Masters dissertation, Carnegie Mellon University).
- **Pillai, R. K.**, Jeni, L. A., Yang, H., Zhang, Z., Yin, L., & Cohn, J. F. (2019, October). The 2nd 3D Face Alignment in the Wild Challenge (3DFAW-Video): Dense Reconstruction From Video. In *ICCV Workshops* (Vol. 2, No. 6, p. 7).
- Saxena, M., **Pillai, R.**, & Mostow, J. (2018, April). Relating children's automatically detected facial expressions to their behavior in robotutor. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 32, No. 1).

For more publication visit <https://rohithpillai.com/experience/research/>

## PROJECTS

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### **pyZFace & ZFace C++ Libraries**

2020

Developed the pyZFace python library, and the ZFace C++ static library. These are language specific ports of the original ZFace tool developed, created, and released by Dr. Laszlo Jeni, Dr. Jeffrey Cohn (both my advisors), and Dr. Takeo Kanade. The method was detailed in their paper: Jeni, L. A., Cohn, J. F., & Kanade, T. (2015, May). Dense 3D face alignment from 2D videos in real-time. In *2015 11th IEEE international conference and workshops on automatic face and gesture recognition (FG)* (Vol. 1, pp. 1-8). IEEE.

### **3D Global Registration Using ICP & Branch-and-Bound Search**

2020

The project addresses global point cloud registration by utilizing a Branch and Bound (BnB) search over the Euclidean transformation space combined with ICP sub-routines, aiming to overcome the local minima issue that ICP typically faces. By comparing multiple methods within this framework, the approach demonstrates an effective solution for point cloud alignment without requiring prior knowledge of initial alignment.

### **Beyond DeepJazz**

2020

The project builds on DeepJazz by Ji-Sung Kim, enhancing it with additional pre-processing to prevent overfitting and experimenting with various architectures like VAE-LSTM and Bi-LSTM to improve creativity and quality in Jazz music generation. Through these innovations, the team found that their Bi-LSTM model produced the most human-like results and provided recommendations for generating different Jazz styles based on user preferences.

### **True Neural Regression Trees (TNRTS)**

**2019**

Introduces the True Neural Regression Tree (TNRT), an enhancement of Neural Regression Trees (NRTs) that minimizes regression error at each node, rather than relying on classification-based loss functions like cross-entropy or hinge loss. By addressing the limitations of the original NRT, which treats intra-class errors as equal, TNRT improves regression performance by focusing on the true regression loss, as demonstrated through comparisons with standard regression datasets.

### **Gesture Recognizing Glove**

**2018**

Created a glove that could recognize gestures using flex sensors and a TM4C micro-controller. The glove provides serial data to the computer. Created a Rock Paper Scissors game to illustrate real-time gesture recognition.

### **A Comparison of K-means Clustering using Hadoop MapReduce vs OpenMPI Implementations**

**2017**

Compared two K-means clustering implementations: a parallel version using Message Passing Interface (MPI) in C and a Hadoop MapReduce implementation in Java. It explores the efficiency and scalability of both methods for large-scale clustering tasks, aiming to improve K-means performance by leveraging parallelism and distributed computing to handle larger datasets more effectively.

### **Protein Back-translation using Hidden Markov Model (HMMs)**

**2016**

Created a program to back-translate yeast protein sequences to DNA sequences, constructed using hidden Markov models (HMMs) on open-reading frame data. Achieved accuracy of up to 70%.

For more projects visit <https://rohithpillai.com/experience/projects/>

## **REFERENCES**

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References available upon request