

RAGHAVA VINAYKANTH MUSHUNURI

Dept. of Computer Science (IDI), NTNU, 7034, Trondheim | Tel: + 47 40 28 37 03 |
Email: raghavavinay106283@gmail.com | [Linkedin](#) | [Github](#) | [Google Scholar](#)



PROFILE

I am a PhD candidate in the Department of Computer Science at the Norwegian University of Science and Technology, with strong expertise in Python, C++, MATLAB, and Computer Vision, as well as hands-on experience in embedded C, hardware-software integration, digital signal processing for ultrasound and ECG, 3D visualisation, and medical imaging technologies. With a passion for AI applications in healthcare, I have worked on deep learning and computer vision projects across multiple medical imaging modalities, while also developing a strong interest and industry experience in embedded systems, cross-platform development, Edge AI, and software engineering in medical domains. My background in startup environments has enabled me to work both independently and collaboratively within cross-functional teams, making me adaptable and self-driven. Google scholar link is provided above for list of publications.

IT – competence & skills

Programming Skills: C++ development, Python, MATLAB, Bash scripting, CMake, Embedded C, Docker, Java (basics), Vulkan SDK & OpenGL programming, TensorRT, SQL, Yocto (basics), C#(basics).

Frameworks: Pytorch, OpenCV, Visual Studios, QT, Linux & Windows, Android Studios, Keil, OpenCL, DICOM, GCP, SQL, YOCTO, QEMU.

Skills: Deep Learning, Machine learning, Computer Vision, Software design and development, LLMs, Quantisation aware training and Edge device modelling, Git, CI/CD, GPU clusters, hardware-software integration, Embedded Systems development, Image/signal processing, GUIs using MATLAB and QT (C++, python), Boost and Async IO, STM32 Microcontrollers, Real-time computing, Multithreading, multiprocessing, GPU acceleration, hardware communication protocols(SPI, UART, USB), DevOps.

Education

October 2019 – August 2022	Master of Science (MSc) Field of study: Computer Science , GPA:1.8/5 (German)	Otto-Von-Guericke University Magdeburg
August 2014 – April 2018	Bachelor of Technology (B.Tech) Field of study: Electrical and Electronics Engineering , GPA:7.99/10	Andhra University, India (AU)

Work Experience

PhD Candidate – AI & Ultrasound Doppler/ECG

NTNU / St.Olav's Hospital / Cimon Medical, Trondheim, *Nov 2023 – Present*

- I am working on detecting pulse during CPR by analysing blood-flow velocity patterns from carotid Doppler ultrasound and estimating key clinical metrics from average velocity envelopes.
- Developed deep learning models for predicting Return of Spontaneous Circulation (ROSC) using Doppler ultrasound during CPR. Classification models to detect ROSC vs Other signals (completed), segmentation model to predict the average velocity envelope (in progress), and peak detection model.
- Implemented **CUDA convolution kernel** from scratch for training CNN models with C++ and developed models with **C++ Pytorch** layers and implemented **TensorRT/ONNX** inference pipeline for Edge devices. Developed MATLAB GUI for data annotation and signal preprocessing. Working on **multimodal AI systems** combining ultrasound and ECG signals for ROSC detection and implemented signal processing and noise reduction algorithms.
- Published research in *Resuscitation Plus*([here](#)) and **MIDL conference**(accepted and not published yet). Supervised 3 master's students in AI-based medical imaging projects.
- Also learning kernel development using QEMU and Yocto, OpenGL and Vulkan SDK voluntarily.

Key competence: C++ and Python, MATLAB, Ultrasound signal & image processing, Ultrasound Physics and modelling, Digital signal processing algorithms, Bash, TensorRT/ONNX, CMake, PyTorch with C++ and Python, Vision Transformer models, Explainable AI, CUDA kernel development.

Data Scientist & Software Engineer (AI + Embedded Systems)

Aindra Systems, Bangalore, *Sep 2022 – Nov 2023, March 2026-present(voluntary)*

- Improved weakly supervised deep learning model for cervical cancer detection on whole-slide images (**sensitivity: 65% → 80%**). Integrated artifact removal pipeline for preprocessing.
- Reduced slide-scanning time by **two minutes** by improving the existing parallel processing pipeline and existing hardware-software interaction pipeline with STM32 MCU, and migrated the existing CPU-based

image processing workflow to GPU using CUDA and OpenCV C++ libraries. Implemented a better and faster gamma correction pipeline for WSI images using OpenCV C++ on a GPU.

- Developed and maintained **Qt-based cross-platform GUIs** for medical imaging systems. Collaborated across software, hardware, and data teams in a startup environment.
- **Now helping develop a multi-layered approach with MedGemma, Phikon(histo) and models for cervical cancer (UniCas, CellPose) WSIs.**

Key competence: C++, Python, Docker, Embedded C, Bash, CMake, Computer-Vision, hardware-software integration, Linux, QT5, STM32 MCU, OpenCV – C++, GPU, MONAI, Image Processing – CUDA, Explainable AI, hardware-in-the-loop.

Junior Computer Vision Engineer (AI / Graphics / Edge Systems/ 3D visualisation)

Arspetra, Luxembourg, **Mar 2022 – Jul 2022**

- Developed a **C++-based 3D visualization system** using Vulkan SDK and OpenGL on Linux as well as android devices.
- Integrated **gesture recognition models** for real-time interaction on Android-based AR headsets. Worked on **edge AI deployment**, real-time rendering, and human-computer interaction systems

Key competence: C++, Vulkan SDK, Edge Computing, Python, 3D, Rendering, Computer Vision, Android, ONNX, TensorRT, Tflite.

Research Intern / Master's Thesis – Medical AI

Fraunhofer MEOS, Germany, **April 2021 – March 2022**

- Worked as an intern to detect volatile organic compounds in breath gas spectrums using ML models. Developed GUI with Qt5 for visualization of the predictions and XAI biomarkers for VOCs.
- Worked with Detection, segmentation of cancerous regions and counting cancerous cells in Vulvar cancer Tissue Micro Arrays(Master's thesis). Published a paper ([here](#)) at the SPIE Conference.

Key competence: Pytorch, XAI, Vision Transformer models, GPU clusters, Bash, QuPath, Microscopic Imaging

Student Research Assistant (HiWi)

Otto-von-Guericke University, Germany, **March 2021, February 2022**

- Worked on CT image reconstruction and denoising using deep learning and signal processing
- Implemented Filtered back projection algorithm using python and developed UNet based noise removal model.

Key competence: PyTorch, Signal processing and reconstruction algorithms, Python, DICOM, CT Imaging.

Projects

- **Immune System Response in Polytrauma (12 CP):** Used deep learning and machine learning to predict complications in polytrauma patients and identify key biomarkers. Individual project. Published a paper in the Frontiers in Immunology Journal. (paper [here](#))
- **Super-Resolution of 3D DWI MRI:** Led the development of a UNet-based model for super-resolving diffusion-weighted MRI volumes (DICOM), Published at the EUSIPCO conference. (paper [here](#))
- **Derived Data Prediction for DWI:** Developed deep learning models to generate diffusion tensors and brain tracts from MRI data, along with a Qt5-based GUI for visualisation.
- **Hand Movement Classification:** Built an LSTM model in MATLAB for classifying hand movements from sensor glove data, incorporating signal processing methods; published in MDPI Sensors. (paper [here](#))
- **Personal Projects (OpenGL/Vulkan/VR):** **Building 3D visualisation tools using Vulkan, OpenGL, C++ and Android NDKs out of personal interest, along with online courses (hobby coding). With avid interest in low-level programming, developing basic CUDA and Linux kernels with Yocto, C++, QEMU.**

Languages

English : Fluent (C2) | **Norwegian** : Basic (A2, learning B1)

Relevant courses

- **OpenGL, Vulkan SDK, Embedded Linux with Yocto** – ongoing
- **Embedded C, PLC & SCADA** – finished

References

Gabriel Kiss: Associate Professor, NTNU, +47 91897045, gabriel.kiss@ntnu.no, Charlotte Ingul – charlotte.b.ingul@ntnu.no, Hans Torp (Retired Prof) – hans.torp@ntnu.no, Frank Lindseth – frank.lindseth@ntnu.no