Sannara EK

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RESEARCH SUMMARY

I am an interdisciplinary researcher at the intersection of AI and Pervasive Computing. My current research as a Postdoctoral Research Associate at the University of Cambridge focuses on developing efficient Multi-modal Large Language Models (MLLMs) with Retrieval-Augmented Generation (RAG) using satellite images for the domain of Earth Observation. My work is driven by two core questions: **How can we design user-centric AI models that are efficient and robust?** and **How can we collectively run or train advanced AI models while preserving user privacy at the edge?**

My previous research has focused on developing novel neural network components to address domain shift challenges in federated learning environments. In addition, I have explored a range of self-supervised learning techniques to overcome labeled data scarcity and designed benchmarks to evaluate AI domain generalization. My open-source contributions have led to influential publications, publicly available pre-trained models, and the introduction of new AI layers.

WORK EXPERIENCES

- **Postdoctoral Research Associate**   *2025 July – Present*
  University of Cambridge   Cambridge, United Kingdom
  ◦ Investigating LLM with RAG deployed to edge satellite use cases for enhanced analysis onto the domain of earth observation.

- **Research Intern - M2**   *June 2020 – November 2020*
  Grenoble Computer Science Laboratory   Grenoble, France
  ◦ Developed and published personalized federated learning algorithms for human activity recognition

  ◦ Deployed AI models to wearable devices for on-device training/inference

  ◦ Experienced on distributed and multi-GPU development and training (Jean Zay supercomputers)

- **Research Intern - M1**   *June 2019 – September 2019*
  Grenoble Computer Science Laboratory   Grenoble, France
  ◦ Developed metrics to analyze the visual stimulus of physically impaired users utilizing eye-trackers

- **Software Engineer**   *August 2017 – September 2018*
  Udaya Technology Co., Ltd   Phnom Penh, Cambodia
  ◦ Developed mobile applications using Java and Swift for Android and iOS platforms

  ◦ Collaborated with cross-functional teams to deliver software solutions in healthcare and education sectors

- **Telecommunications Intern**   *May 2017 – July 2017*
  Huawei Technology Co., Ltd   Phnom Penh, Cambodia
  ◦ Configured and installed new Huawei core routers and switches at Smart Axiata

EDUCATIONS

- **PhD in Computer Science**   *2021 – 2024*
  Université Grenoble Alpes   Grenoble, France
  ◦ Metrics: 11+ Papers (8 first-authored), h-index: 7, citations: 350+

  ◦ Thesis: Personalized Federated Learning for Pervasive Heterogeneous Environments

  ◦ Sponsor: Naval Group France

  ◦ Supervisors: Philippe Lalanda and François Portet

  ◦ Committee: Jiannong Cao, Cecilia Mascolo, Giovanni Neglia, Keiichi Yasumoto and Vania Marangozova

- **Master of Science in Informatics**   *2018 – 2020*
  Université Grenoble Alpes - Grenoble INP   Grenoble, France
  ◦ Specialization: Artificial Intelligence for Graphics, Vision, and Robotics

- **Bachelor of Science in Software Engineering with Multimedia**   *2013 – 2017*
  Limkokwing University of Creative Technology   Phnom Penh, Cambodia
  ◦ Specialization: Mobile Computing and Systems

SELECTED PUBLICATIONS

- **FedAli: Personalized Federated Learning Alignment with Prototype Layers for Generalized Mobile Services** *2025*
  Sannara Ek, Kaile Wang, François Portet, Philippe Lalanda, and Jiannong Cao
  Submitted and under-revision (pre-print on arXiv)

- **Comparing Self-Supervised Learning Techniques for Wearable Human Activity Recognition** *2024*
  Sannara Ek, Riccardo Presotto, Gabriele Civitarese, François Portet, Philippe Lalanda, and Claudio Bettini
  CCF Transactions on Pervasive Computing and Interaction

- **Transformer-based models to deal with heterogeneous environments in Human Activity Recognition** *2022*
  Sannara Ek, François Portet, and Philippe Lalanda
  Springer Nature Journal on Personal and Ubiquitous Computing

- **A federated learning aggregation algorithm for pervasive computing: Evaluation and comparison** *2021*
  Sannara Ek, François Portet, Philippe Lalanda, and German Vega
  IEEE International Conference on Pervasive Computing and Communications (PerCom)

RESEARCH EXCHANGES

- **Visiting Research Assistant** *August 2024 - September 2024*
  The Hong Kong Polytechnic University - IMCL Lab Hong Kong, China
  ◦ Participated in a research exchange to extend federated learning findings into the vision domain

- **Visiting Student Researcher** *October 2022 - November 2022*
  University of Milan - EveryWare Lab Milan, Italy
  ◦ Engaged in research on pre-trained and self-supervised learning models for human activity recognition

- **Visiting Student Researcher** *November 2021*
  Université de Lorraine - Institut Jean Lamour Nancy, France
  ◦ Investigated deep learning solutions for arc fault detection

EXTRACURRICULARS

- **Advanced Language Processing (NLP & LLM) Winter School** *January 2022*
  Laboratoire d'informatique de Grenoble Grenoble, France

- **Cisco Certified Network Associate Training Course** *May 2015 – June 2016*
  Sunrise Institute of Technology Phnom Penh, Cambodia

ACADEMIC SERVICES AND AWARDS

- **Reviewer:** IEEE: Percom, ACM: IMWUT, Journals: Pervasive and Mobile Computing, Knowledge-Based Systems

- **Awards:** IEEE PerCom '23 Student Travel Grant, Limkokwing Award for Creativity and Innovation, Limkokwing Valedictorian of the graduation years '15-17

- **Internship Supervisions:** Domain Adaptation by Gradient Reversal (M2), Model Confidence Prediction (M2), and Benchmarking Self-Supervised Learning (M1)

SKILLS

- **Expertise Domain:** Machine Learning, Mobile and Pervasive Computing, Federated Learning, Wearable Sensing, Computer Vision

- **Technical Proficiencies:** Python [Tensorflow, PyTorch], Java [Android], Swift [iOS], JavaScript [NodeJS, React], SQL

- **Languages:** Khmer [Native], English [Fluent], French [Basic]

REFERENCES

- **Prof. Philippe Lalanda** *philippe.lalanda@univ-grenoble-alpes.fr*
  PhD Supervisor Université Grenoble Alpes

- **Prof. François Portet** *francois.portet@imag.fr*
  PhD Supervisor Université Grenoble Alpes

- **Prof. Claudio Bettini** *claudio.bettini@unimi.it*
  Research Exchange Host University of Milan

- **Prof. Jiannong Cao** *jiannong.cao@polyu.edu.hk*
  Research Exchange Host The Hong Kong Polytechnic University