Priyam Sahoo

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Education

University of Illinois at Urbana-Champaign Aug 2024 - present
Master of Science in Computer Science ***(fully-funded research track)*** *CGPA: 4.00/4.00*

- **Research Assistant** advised by Dr. Talia Ringer at PL/FM/SE group at UIUC.

Vellore Institute of Technology, Andhra Pradesh, India Jul 2017 - Apr 2021
Bachelor of Technology (B.Tech), Computer Science and Engineering *CGPA: 9.37/10.00*

- Recipient of **Chancellor's Gold Medal** for securing the highest CGPA in the batch.

Publications

1. **Ansible Lightspeed: A Code Generation Service for IT Automation** | *link: conference_paper*
   Priyam Sahoo*, Saurabh Pujar*, Ganesh Nalawade, Richard Gebhardt, Louis Mandel, Luca Buratti
   39th IEEE/ACM International Conference on Automated Software Engineering (ASE 2024)
2. **Vision enabled Smart Prosthetic Arm for Amputees** | *link: conference_paper*
   Anitha Subramanian*, Sibi Chakkaravarthy Sethuraman*, Ritwik Badola*, Priyam Sahoo*, Nandeesh Kumar Kumaravelu
   2021 IEEE International Symposium on Smart Electronic Systems (iSES)

Research Experience

PL/FM/SE Group, University of Illinois Urbana Champaign Aug 2024 - present
Research Assistant (advised by Dr. Talia Ringer)

- Developing **neural techniques to generate formal specifications from informal natural language descriptions** by capturing user intent to specify the functional correctness of programs.
- Fine-tuning a pre-trained language model to generate accurate formal specifications from informal descriptions, programs, and tests specifically tailored for **Interactive Theorem Provers**.
- Designing a benchmark framework for systematically evaluating the quality of generated formal specifications by incorporating a scoring system that considers syntactic validity, semantic correctness, and logical consistency.
- Building and preparing to release a dataset that includes **Coq** and **Isabelle** programs, their formal specifications, natural language descriptions of the specifications, and test cases to support future research in this field.

Team wisdom, Red Hat Inc. Jul 2023 - Apr 2024
Software Engineer (research)

- Worked on developing **Ansible Lightspeed** Service with IBM WatsonX Code Assistance, a highly domain-specific LLM-based solution for natural language to ansible-YAML code generation.
- Deployed the service ensuring optimal scalability, handling simultaneous requests without compromising response time. Maintained memory for sub-2-second responses post-three-stage processing.
- Developed an analytical framework to scrutinize performance data by leveraging user edit insights and feedback. Utilized this data to fine-tune the model iteratively.
- Achieved a **suggestion acceptance rate of 49.1%** from a pool of 3,910 community users (62,099 real-time requests), surpassing GitHub Co-Pilot (31.4%), Amazon's CodeCompose (22.5%) and Google MLECC (34%).

Artificial Intelligence and Robotics (AIR) Lab, VIT and NVIDIA Aug 2020 - Dec 2020
Undergraduate researcher

- Developed an Arduino-driven prosthetic arm with 2 degrees-of-freedom wrist and independent finger movements, equipped with a palm-mounted camera for detecting objects and executing autonomous gripping maneuvers.
- Implemented YOLOv3 and GR-ConvNet algorithms for real-time object identification within the prosthetic arm's field of view. Utilized computer vision techniques and pattern recognition to identify graspable areas.
- Utilized IR sensors and Johnny-Five NodeJS framework to enable gesture-based control and record various gripping actions. Utilized the recorded actions to train the model for gripping techniques on detected objects.
- Achieved an **accuracy of 94.6%** in gripping and manipulating daily-used objects by implementing 5 gripping strategies with precise force and position control in the prosthetic arm.

Reconfigurable Intelligent Systems Engineering (RISE) Lab, IIT Madras May 2019 - Jun 2019

Research Intern

- Contributed to **Open Malware Research** by developing a real-world dataset for malware behavioral analysis considering network, OS, and hardware trails for detecting malware.
- Designed an automated infrastructure to collect 2.7 terabytes of data, including 7 million network packets, 11.3 million OS system call traces, and 3.3 million hardware events from 10,434 malware samples.
- Evaluated malware detection capabilities with standard multi-class ML models considering their F1-scores, and open-sourced the labeled dataset as **Labelled-Data-As-A-Service** for future research.

Work Experience

Red Hat Inc. Jul 2021 - Jul 2024

Software Engineer

- Developed **Ansible Language Server (ALS)** that offers decentralized language support for Ansible language with features such as syntax highlighting, diagnostics, auto-completion and hovering, functionalities in code editors.
- Integrated **Ansible Lightspeed** into the ALS to generate syntactically accurate and ready-to-deploy Ansible-YAML code from plain english inputs, resulting in a 60% increase in ansible-YAML code writing efficiency.
- Designed **VS Code extension for Ansible**, utilizing Ansible Lightspeed and ALS to enhance ansible developers accessibility. It has garnered 600,000+ downloads within 3 years of release in the VS Code marketplace.

Projects

Finger Sense: Low Vision Assistance | *link: github* | *Raspberry Pi, Python, OpenCV, Tesseract* Sept 2021

- Designed a wearable hand glove with real-time Point-to-Speak capability using Raspberry Pi, Pi-Cam, and a speaker, incorporating computer vision and machine learning techniques.
- Utilized OpenCV, contour analysis, and centroid calculation for precise finger tracking and ResNet-18-based YOLOv2 and Tesseract OCR for object and symbol/text detection from the live camera feed.
- Implemented an intersection algorithm between the finger and the detected symbol/text using geometric calculations to discern the specific indication by the user's finger within the camera feed. Integrated pyttsx3 for text-to-speech to convert pointed text and symbols into audible speech.
- Real-life testing was done where a senior citizen with low vision was able to listen to the text they were pointing to, hence improving their daily navigation experience.

Friendly Neighbor | *link: github* | *Java, Kotlin, NodeJS, Google FCM, Firebase Auth, MongoDB* May 2020

- Developed an Android app to tackle the problem of sharing essentials during the COVID-19 pandemic lockdown.
- Leveraged Java and Kotlin for front-end framework and integrated Java Service Discovery into the back-end architecture, incorporating a Node API Gateway.
- Utilized geospatial queries with 2dsphere index and Google Maps API to implement a system that efficiently identifies and locates individuals within a specific geographic area.
- Successful field trial of the app was conducted during the 2nd wave of COVID (during lockdown) in the Air Force Camp, where I was a resident for 3 months.

Achievements and Honors

1. **IBM Tech, 2024:** Recipient of IBM Tech 2024 for being among the top 200 (0.02%) Red Hat individuals in terms of research innovation and impact.
2. **Chancellor's Gold Medal, B.Tech CSE (2021):** Achieved 1st rank (out of 238 students) in academics in the 2021 batch of B.Tech in Computer Science and Engineering.
3. **Grant from Government of India, Department of Science & Technology (DST), under Cognitive Science Research Initiative (CSRI) scheme, 2023:** Among only 200 projects nationwide to receive the CSRI grant for the EmoStress-Vital project for its significant societal importance.

Technical Skills

Languages: Python, C++, TypeScript, Java, Kotlin
Frameworks: PyTorch, TensorFlow, OpenCV, React.js, Django, Flask, Node.js, Android SDK, Johnny-Five
Relevant Coursework: Data Structures and Algorithms, Design & Analysis of Algorithms, Object Oriented Programming, Probability & Statistics, Linear Algebra, Applied Machine Learning, Formal Methods

* Equal contribution as first authors