

# PRATHAMESH KHOLE

Ph.D. student

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## Education

**University of California Santa Cruz**

*Ph.D. in Computer Science and Engineering*

**June 2029 (expected)**

*Santa Cruz, California*

**University of California Santa Cruz**

*Master of Science in Computer Science and Engineering*

**August 2024**

*Santa Cruz, California*

**Pune Institute of Computer Technology (University of Pune)**

*Bachelor of Engineering in Computer Science*

**May 2021**

*Pune, India*

## Relevant Coursework

- Advanced Machine Learning
- Artificial Intelligence
- Data Structures
- Statistical Analysis
- Machine Learning
- Analysis of Algorithms
- Operating Systems
- Deep Learning
- Data Analytics
- Robotics

## Experience

**University of California Santa Cruz**

*Graduate Student Researcher*

**January 2023 – Present**

*Santa Cruz, California*

- Working under guidance of Professor **Razvan Marinescu** as a part of his lab at UCSC.
- Worked with **python** frameworks including **PyTorch** and **Numba** to reverse diffusion Magnetic Resonance Imaging (MRI) process.
- Developed and implemented **physics based biomedical image simulators** replicating state of the art models in performance.
- Utilized medical image visualization tools like **Free Surfer**, **ITK Snap** and **Paraview** to better understand and visualize results as well as fix implementation issues.

**University of California Santa Cruz**

*Teaching Assistant*

**January 2023 – June 2024**

*Santa Cruz, California*

- **Course Instruction:** Conducted lab sessions for **CSE-12 Computer Systems and Assembly Language** ensuring comprehensive coverage of key concepts. Demonstrated the design and creating of intricate circuits using **Digital Logic** and **Boolean Algebra** principles.
- **RISC-V Assembly Instruction:** Delivered in-depth instruction on **RISC-V** Assembly Language, equipping students with the knowledge and skills to navigate and apply programming fundamentals to assembly language effectively.
- **Collaborative Problem Solving:** Engaged proactively with students, addressing academic challenges and queries, and promoting a culture of collaborative learning and critical thinking.
- **Assignment Creation:** Helping professor create and implements new labs and assignments, test and evaluation of quizzes, exams and assignments before publishing to students.

**ZS Associates**

*Business Technology Solutions Associate*

**August 2021 – June 2022**

*Pune, India*

- **Efficient Data Preprocessing:** Leveraged **Python**, **PySpark**, and **HiveQL** to revolutionize the preprocessing workflow, achieving over **90% time reduction**, ensuring data is correctly prepared for machine learning applications.
- **Enhanced Product Penetration:** Utilized advanced data analytics and refined **SQL** queries to derive insights into sales trends, enabling strategic expansion into untapped sales territories.
- **Enhanced Customer Engagement:** Through meticulous data analysis and refining **SQL** queries in workflow, crafted more targeted recommendation algorithms, resulting in an approximate **10% improvement in suggestion reach**.
- **Data Integration and Extraction:** Utilized **SQL** and **HiveQL** for efficient data extraction in production, ensuring seamless integration into the machine learning model.
- **Sales & Customer Engagement Dashboard:** Designed and integrated a dynamic dashboard to visualize sales and customer engagement metrics, providing actionable insights for client decision-making and strategy optimization.

**Schneider Electric Systems Middle East**

*Project Intern*

**June 2019 – August 2019**

*Al-Ahmadi, Kuwait*

- **Process Graphics Validation:** Conducted comprehensive testing initiatives to ensure Process Graphics functionality was in perfect alignment with project specifications and requirements.
- **Database Integrity Assurance:** Performed validations of database, ensuring the Database configuration adhered strictly to input specifications, guaranteeing data accuracy and reliability.

## Projects

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### Differentiable Diffusion Magnetic Resonance Imaging

March 2023 – Present

*University of California Santa Cruz*

- Creating a framework to make the process of acquiring diffusion MRI signals from a given shape or mesh of brain differentiable.
- The framework would also be able to reverse the diffusion MRI process, such that we can obtain the mesh or 3D brain structure given a diffusion MRI signal.
- Implemented a physics based simulator to simulate the core process of diffusion MRI signal acquisition in **Python** for any given mesh, replicating state of the art models.

### Red-Black Tree Based Oblivious Random Access Machine

January 2023 – March 2023

*University of California Santa Cruz*

- Developed an Oblivious Random Access Machine (ORAM), based Path ORAM which conceals the users access pattern.
- The ORAM works by using a Red-Black tree as the logical tree in the background for faster information access of the stored data.
- The concealing of access patterns is done by performing a series of dummy reads for every access to data (read or write), so that the overall access pattern appears uniform or same for all operations to the observer.
- The implementation is slightly faster than previous implementations for deletions as Red-Black trees are faster than AVL trees for deletions, implemented in **C++** for speed.

### Philanthropy on Blockchain (Ethereum Based DApp)

July 2020 – May 2021

*Pune Institute of Computer Technology (University of Pune)*

- Engineered a **Ethereum blockchain** based **decentralized application** for donation management, aimed at transparency and vote based approval for donations.
- Ensuring a secure platform without the involvement of any third party controlling the donations, along with all the parties being able to track the entire donation process along with pictures and receipt of donation being received.
- Additionally providing option to rollback the entire donated amount to each donor in case the trust voting (how many donors vote in favor of the charity) of the charity is below a certain percent.
- Implemented using **Ropsten Ethereum Test network**, **Solidity** for writing and implementing smart contracts, using **nextJS**, **ReactJS** and **GraphJS** for frontend.

### Document Reader & Extractor (Image Processing and OCR)

January 2020 – April 2020

*Pune Institute of Computer Technology (University of Pune)*

- Developed a tool in **Python** using **image processing** libraries like **CV2** and **PIL**.
- Integrated with **PyTesseract** for **OCR** process to **extract text from documents**, and used **PIL** and **Pandas** to save the extracted text as csv or text document.
- Developed with a goal to allow for faster processing of handwritten or printed documents.

### NGO Connect (Android Mobile Application)

July 2019 – December 2019

*Pune Institute of Computer Technology (University of Pune)*

- Designed a platform for connecting educational NGOs with professionals willing to teach and educate.
- Used using **Android Studio SDK** as the platform for App development, **Firestore** for storage, and **Java** for the core implementation.
- Focused on intuitive user experience and efficient communication.

## Technical Skills

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**Languages:** Python, C++, R, SQL, RISC-V, HiveQL, Java.

**Developer Tools:** VS Code, Google Cloud Platform, Android Studio.

**Technologies/Frameworks:** Linux, PyTorch, Transformers, Ethereum, AWS S3, GitHub, WordPress, Gradescope.

## Leadership / Extracurricular

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### Member of Student Council

Dec. 2015 – March 2017

*Director*

*FAIPS, Kuwait*

- Was member of high school student council, holding the position of Director of Environment Protection.

### Teaching

Jan. 2023 – Present

*Teaching Assistant*

*University of California Santa Cruz, California*

- Instruct and conduct lab sections for over 150 students for Assembly language and systems course.