Piyush Maiti

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Education

M.S., Biomedical Engineering — University of Southern California, Los Angeles — Dec 2018
B.E., Electrical & Electronics Engineering — Bhilai Institute of Technology, India — Aug 2014

Industry Experience

AI/ML Engineer — Voice AI, Whissle — Jul 2026 – Present
San Francisco, CA

Developing speech- and vision-based tools for automated cognitive screening using the Montreal Cognitive Assessment (MoCA).

- Built a voice-guided digital MoCA covering all cognitive domains, integrating speech recognition, spoken instructions, and automated scoring of verbal responses and drawing tasks.
- Developed rule-based scoring for speech transcripts and pen strokes, including homophone normalization, number-word parsing, sentence comparison, and trail-making geometry; integrated language models with structured outputs and rule-based checks for selected tasks.
- Developed a hybrid clock-drawing scorer combining geometric computer vision with Claude vision; made geometric checks authoritative after observing hallucinated clock hands on blank drawings, and achieved agreement with manual contour and number scores for 18 of 20 beta participants.
- Built a reviewer-assist bed-copy scorer using skeletonized drawings, graph edit distance, and a six-criterion rubric; audited it on 50 sample drawings and measured agreement with manual scores for 13 of 20 beta participants.
- Benchmarked Claude Opus, Claude Sonnet, and TypeSafe's Jev model on 140 simulated abstraction responses; Opus achieved 87.1% accuracy (Cohen's kappa = 0.78) and outperformed Jev (McNemar p = 0.007), while Jev responded approximately 28 times faster.
- Led a 20-participant beta evaluation, administered sessions, manually scored every assessment, and incorporated feedback from two clinical MoCA administrators to improve audio timing, replay limits, and protocol fidelity.

Research Experience

Neuroimaging Data Analyst, Memory and Aging Center — Apr 2023 – Jun 2026
University of California, San Francisco

Neuroimaging research analyst specializing in PET/MRI quantification and biomarker characterization to identify PET imaging signatures in Alzheimer's disease.

- Developed a 3D convolutional autoencoder toward a decision-support tool for neurologists' visual reads of [^{18}F]-flortaucipir tau PET, learning a normative model from 97 control SUVR scans to generate voxel-wise anomaly maps; a ten-configuration ablation cut held-out reconstruction error by 47%.
- Led the PET Core for the Longitudinal Early-Onset Alzheimer's Disease Study (LEADS); managed, processed, and analyzed large-scale multi-site PET/MRI datasets, developed data-extraction tools, and performed statistical analyses aligned with study requirements.
- Contributed to the investigations of discordance between amyloid PET visual reads and quantitative metrics; conducted statistical and image-based analyses in LEADS and Alzheimer's Disease Neuroimaging Initiative (ADNI) with FDA-approved [^{18}F] tracers.
- Built an anomaly-detection pipeline flagging undocumented Aβ-targeting therapy from longitudinal amyloid PET in LEADS (742 scans, 270 participants), calibrating Centiloid-decline thresholds on pre-approval data and validating on a post-approval temporal hold-out (59–78% sensitivity, 92–96% specificity); integrated into prospective PET QC to trigger record corrections.
- Developed automated quality control (QC) tools for MRI (SPM/FreeSurfer) and PET pipelines, deployed across projects.

- Processed and harmonized PET/MRI data across cohorts using FreeSurfer and SPM pipelines to quantify amyloid burden, supporting analyses of early- vs late-onset AD in LEADS and ADNI.
- Mentored research assistants and supported neurologists with participant-level PET/MRI interpretation reports.

Staff Scientist, Mallinckrodt Institute of Radiology Jul 2021 – Mar 2023
Washington University School of Medicine

Imaging scientist specializing in quantitative PET methods and multimodal radiomics integration in preclinical imaging.

- Developed a Python pipeline for regional PET quantification in the mouse brain, converting atlas labels into smoothed surfaces and extracting curve skeletons using local separators. Curated each atlas skeleton once for consistent sampling across animals, and generated MOBY digital phantoms with known regional activity, added noise, and 3D point-spread-function smoothing to validate quantitative accuracy.
- Developed shape-matched skeleton inflation to sample regional interiors using overlapping spheres along each skeleton, with radii set to half the local distance to the anatomical boundary. The approach limits boundary contamination from partial-volume effects and registration errors without an explicit scanner point-spread-function model. On noise-smoothed phantoms registered in VivoQuant, reduced mean uptake bias from −22.2% to −6.1% in the cerebellum and from −13.6% to −5.8% in the hippocampus relative to standard atlas ROI means.
- Benchmarked the method against morphological erosion and geometric transfer matrix (GTM) correction across several brain regions using two commercially available preclinical segmentation and analysis platforms, PMOD and VivoQuant. Evaluated sampling coverage and sensitivity to point-spread-function assumptions and registration error, identifying region-dependent limitations in thin, elongated structures such as the striatum.
- Developed a PET/CT preprocessing pipeline for a longitudinal mouse model of obesity and Alzheimer's-related pathology, including kinetic modeling of [^{18}F]-FSPG to characterize metabolic imaging biomarkers.
- Worked on optimization and harmonization of PET scanner reconstructions for partial volume effects using Phantech's linear-filling phantom with [^{18}F]-FDG and [^{64}Cu] isotopes, comparing OSEM3D/MAP and TeraTomo 3D reconstructions across varying voxel sizes, iterations, and energy windows.
- Developed a cross-modality radiomics analysis tool to correlate features between histopathology (Nissl stain), autoradiography, and PET/MRI data in mouse brain and tumor imaging; implemented advanced image registration and computational methods to integrate radiomic features across modalities.
- Simulated compartmental-model-based time-activity curves to study sampling bias and optimize PET acquisition protocols.

Project Assistant, Imaging Genetics Center Jul 2019 – Jun 2021
USC Keck School of Medicine

Neuroimaging research assistant focused on deep learning–based MRI harmonization, preprocessing pipeline development, and automated quality-control tools for large multi-site Alzheimer's datasets.

- Co-developed a style-encoding GAN that harmonizes multi-site T1-weighted MRI to a single reference scan without site labels, curating and preprocessing training data from five cohorts (UK Biobank, ADNI, PPMI, ABCD, ICBM) and running model training and hyperparameter experiments.
- Validated harmonization with intensity-histogram divergence, structural similarity, and U-Net tissue segmentation, improving gray-matter Dice from 0.80 to 0.86 and traveling-subject SSIM from 0.752 to 0.822 on unseen scanners (MICCAI 2021).
- Optimized preprocessing pipelines for ADNI diffusion MRI, benchmarked image-processing tools, and conducted statistical analyses for validation.
- Developed tools to quantify Gibbs artifacts in MRI using the Physically Implausible Signal framework; generated simulated Gibbs distortions on QSM data for U-Net–based deep learning artifact removal.
- Built automated mask-correction tools for echo planar imaging distortion corrections in MRI and temporal/optic nerve exclusions using Sobel edge detection.
- Created interactive HTML-based platforms for quality control, data visualization, and quantification.

Research Assistant, Computational Imaging of Brain Organization Lab Oct 2018 – Jun 2019
Children's Hospital Los Angeles

Neonatal neuroimaging research assistant.

- Reduced manual QC effort by 30% by building automated diffusion MRI pipelines for neonatal brain imaging to assess white-matter injury.

Independent Projects

Interview Prep Tool: Source-Cited Question Answering and Interview Preparation Oct 2026 – Present
Personal project · GitHub

Python (Streamlit) web app and command-line tool that answers questions about my own papers, notes and code, tags every statement with where it came from, and prepares me for a specific job.

- Built a question-answering system over PDFs, notes and project code in which every statement is tagged with its source (file and page, code file and line range, web page, or the model's own knowledge) and opens the exact passage; routes questions across Claude, Gemini, OpenAI and local Ollama models, with side-by-side comparison.
- Designed a privacy-first consent gate: project code and CV or job text go to a cloud model other than my own Claude login only after a per-request approval that lists the exact files sent; code is read-only, patient-data and imaging folders are never read, LAN access needs a passcode, and model-generated images and links are removed to prevent data leaks through prompt injection.
- Implemented a deep read that builds a lasting knowledge document for a large codebase, and a sandboxed Explore mode in which a model browses a sanitized, read-only copy.
- Built per-role interview preparation (gap analysis against the job description, STAR story bank, likely questions) and a text mock interview (behavioral, technical, coding) whose feedback and rewritten answers use only facts from my documents, leave [add: …] blanks instead of inventing details, and flag numbers that are not in them.
- Wrote 340 automated tests (pytest, Streamlit AppTest) with scripted stand-in models, added a Stop button that cancels a running question, and shipped changes through branches and pull requests.

Safe Trip Trace & Track Oct 2026
Personal project

A private family safety dashboard for group travel.

- Built a serverless trip-monitoring web app on Cloudflare (Pages Functions, KV, Durable Objects, Queues). It lets families follow travellers through one-tap phone check-ins, with no app install and no accounts.
- Designed a privacy-first access model: personal link codes per person, an HttpOnly cookie after first use, and private-by-default pages. The phone page is the only public route.
- Added AI status analysis (Claude) that reads check-ins, family calls and the itinerary to flag differences from the plan. It uses structured output, a daily call cap and validated results, so only well-formed analyses reach the dashboard.
- Built road-aware live mapping (Leaflet, OSRM routing): a position estimate snapped to the real road, a fading trail between check-ins, alternative routes, and rules that scale trust with how old a position is. Stops, off-road positions and no-movement cases are detected, and storm and flood alerts near the route are shown. The rules are pure, unit-tested functions.
- Added multimodal check-ins: GPS with accuracy and timestamps, photos, voice notes with Gemini transcription and captions, and an urgent "call me" path.
- Shipped to production for a real 5-day, two-traveller trip with the family watching: 20 deployments, with a rollback copy before each release and a health check after each. About 3,100 lines of front-end and 1,500 lines of server and library code.
- Tested the project with 163 automated tests plus a headless-Chrome scenario harness covering 10 road situations. Contributed the road-map feature to the shared main repository as a reviewed branch with a handoff note.
- Fixed provisioning bugs on the Cloudflare free plan (SQLite-backed Durable Objects, RPC wrappers). The same fixes went into the main repo's provision command, which also checks that links don't collide.

Technical Skills

Programming: Python, MATLAB, TypeScript, C++, HTML/CSS | Scripting: Bash, Batch
Web Development: React, Node.js, Hono, Vite, TanStack, Streamlit | Voice AI: ASR, TTS, Deepgram, Whissle
AI/LLM: Claude API (tool use, vision), LLM evaluation, RAG, multi-provider LLM routing, prompt-injection defenses | DevOps: Git, GitHub pull requests, Vercel, GCP, pytest
Libraries/Tools: Nilearn, NumPy, OpenCV, scikit-image, networkx, Numba, Dask, MySQL, PostgreSQL
Imaging Tools: SPM, FSL, FreeSurfer, DIPY, MRtrix, PMOD, ITK-Snap, BrainSuite, VivoQuant

Publications & Abstracts

Papers and Publications

- La Joie R., Blazhenets G., **Maiti P.**, Chiotis K., Eloyan A., Kirby K., Hammers D., Koeppe R.A., Ackley S.F., Robison J., Soleimani-Meigooni D.N., Carrillo M.C., Dickerson B.C., Apostolova L.G., Rabinovici G.D., LEADS Consortium. *Identification of patients receiving amyloid-targeting therapies in observational studies using amyloid PET trajectories: insights from LEADS. Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring*, 2026, 18(2), e70408.
- Lagarde J., **Maiti P.**, Schonhaut D. R., Blazhenets G., Zhang J., Eloyan A., Thangarajah M., et al. *Amyloid PET in Sporadic Early-Versus Late-Onset Alzheimer's Disease: Comparison of the LEADS and ADNI Cohorts. Annals of Neurology*, 2025, 98(2), 236–248.
- Zhang J., Soleimani-Meigooni D. N., Koeppe R., Ackley S., Schonhaut D. R., Lin Z. E., **Maiti P.**, et al. *Exploring Centiloid Robustness: Impact of Sample Size and Image Resolution on Centiloid Conversion Accuracy. Journal of Nuclear Medicine*, 2025, 66(12), 1976–1984.
- Njamnshi W. Y., Chiotis K., Tsoy E., Blazhenets G., **Maiti P.**, Zhang J., et al., LEADS Consortium. *Tablet-based Cognitive Assessment Tool (TabCAT) in a multisite study of early-onset Alzheimer's disease. Alzheimer's & Dementia*, 2025, 21(12), e71012.
- Lin M., Chiotis K., **Maiti P.**, Zhang J., Blazhenets G., et al. *Tau topography subtypes account for clinical heterogeneity and longitudinal trajectories in early-onset Alzheimer's disease. Brain Communications*, 2026, 8(3), fcag176.
- Guo Z., Luo J., Mashl R. J., Hoog J., **Maiti P.**, Fettig N., Davies S. R., et al. *Evaluation of Copanlisib in Combination with Eribulin in Triple-Negative Breast Cancer Patient-Derived Xenograft Models. Cancer Research Communications*, 4(6), 2024: 1430–1440.
- Liu M., Zhu A. H., **Maiti P.**, Thomopoulos S. I., Gadewar S., Chai Y., Kim H., Jahanshad N. *Style transfer generative adversarial networks to harmonize multisite MRI to a single reference image to avoid overcorrection. Human Brain Mapping*, 2023, 44(14), 4875–4892.
- Liu M., **Maiti P.**, Thomopoulos S., Zhu A., Chai Y., Kim H., Jahanshad N. *Style Transfer Using Generative Adversarial Networks for Multi-Site MRI Harmonization. International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, pp. 313–322. Cham: Springer International Publishing, 2021.
- Thomopoulos S., Nir T. M., Villalon-Reina J. E., Zavaliangos-Petropulu A., **Maiti P.**, Zheng H., Nourollahimoghadam E., et al. *Diffusion MRI Metrics and Their Relation to Dementia Severity: Effects of Harmonization Approaches. International Symposium on Medical Information Processing and Analysis (SIPAIM)*, Vol. 12088, pp. 166–179, Brazil, 2021.
- Gadewar S., Zhu A. H., Thomopoulos S. I., Li Z., Ba Gari I., **Maiti P.**, Thompson P. M., Jahanshad N. *Region-Specific Automatic Quality Assurance for MRI-Derived Cortical Segmentations. IEEE International Symposium on Biomedical Imaging (ISBI)*, France, 2021.
- Chiotis K., Blazhenets G., Soleimani-Meigooni D. N., …, **Maiti P.**, …, La Joie R., Rabinovici G. D. *Distinct Tau PET Dynamics in Early vs. Late Age-of-Onset Alzheimer's Disease. medRxiv*, 2026 (preprint).
- **Maiti P.** and Bhusnur S. *Application of Ultrasonic Sensors for the Development of Anti-Collision Device. International Journal of Electrical and Electronic Engineering & Telecommunications*, Vol. 5, No. 1, 2016, pp. 24–26.

Conference Abstracts

- Heston M. B., **Maiti P.**, Blazhenets G., Soleimani-Meigooni D. N., Lin Z., et al. *Discordance Between Amyloid PET Visual Read and Quantitation: False Positives or Early Pathology Detection? Human Amyloid Imaging (HAI)*, 2026.
- Rocha S., Pasternak S., Lesman-Segev O., Schwartz D., Blazhenets G., **Maiti P.**, et al. *Amyloid-PET and White Matter Hyperintensities but Not Military Service Duration nor Combat Exposure Are Associated with Neurodegeneration and Cognitive Impairment in Older Veterans. Human Amyloid Imaging (HAI)*, 2026.
- Ziontz J., **Maiti P.**, Zhang J., Chiotis K., Blazhenets G., Rocha S., Shankar R., et al. *Clinical and Cognitive Manifestations of Hemispheric Asymmetry in Neuroimaging Biomarkers in Early-Onset Alzheimer's Disease. Alzheimer's Association International Conference (AAIC)*, Toronto, Canada, 2025.
- Chiotis K., Blazhenets G., Schonhaut D. R., Lagarde J., **Maiti P.**, Zhang J., Shankar R., et al. *Tau PET Load in Early- and Late-Onset Alzheimer's Disease: A Cross-Sectional and Longitudinal Comparison of the LEADS and ADNI Cohorts. Alzheimer's Association International Conference (AAIC)*, 2025.
- Lin M., **Maiti P.**, Chiotis K., Zhang J., Blazhenets G., et al. *Tau Topography Subtypes in Early-Onset Alzheimer's Disease: Explaining Clinical Heterogeneity and Propagation Patterns. Alzheimer's & Dementia*, 2026, e105737.
- Njamnshi W. Y., Chiotis K., Tsoy E., Possin K. L., Hammers D. B., Eloyan A., Kirby K., **Maiti P.**, et al. *Tablet-Based Cognitive Assessment in a Multisite Study of Early-Onset Alzheimer's Disease: Association with Pen-and-Paper Tests and PET Measures of Amyloid and Tau. Alzheimer's Association International Conference (AAIC)*, 2025.
- Lagarde J., Schonhaut D. R., **Maiti P.**, Zhang J., Soleimani-Meigooni D. N., et al. *Characterization of the heterogeneity of amyloid-PET-negative patients with a clinical diagnosis of sporadic early-onset AD: an FDG-PET study in the LEADS cohort. Alzheimer's & Dementia*, 2024, 20(S9), e094087. DOI: 10.1002/alz.094087.
- Lagarde J., **Maiti P.**, Schonhaut D. R., Zhang J., Soleimani-Meigooni D. N., et al. *Amyloid-PET in patients with a clinical diagnosis of sporadic early- versus late-onset AD: comparison of the LEADS and ADNI cohorts. Alzheimer's & Dementia*, 2024, 20(S9), e094101. DOI: 10.1002/alz.094101.
- Schonhaut D. R., Insel P. S., Soleimani-Meigooni D. N., Zeltzer E., Windon C., **Maiti P.**, Yballa C., et al. *A Clock Model of Regional Tau-PET Accumulation and Cognitive Decline in Sporadic Early-Onset Alzheimer's Disease. Alzheimer's & Dementia*, 20 (2024): e093935.
- **Maiti P.**, Li S., Dutta K., Whitehead T., Shoghi K. *Assessing the Performance of Software Platforms to Segment Mouse Brains Using a Digital Phantom.* SNMMI 2023, Chicago, IL.
- Shyam C., Whitehead T., Zhou D., Qiu L., **Maiti P.**, Tu Z., Kravitz A., Hershey T., Shoghi K. *Imaging Neuroinflammation in an Animal Model of Diet-Induced Obesity.* SNMMI 2023, Chicago, IL.
- Thomopoulos S. I., Nir T. M., Villalon-Reina J. E., Zavaliangos-Petropulu A., **Maiti P.**, Nourollahimoghadam E., Zheng H., Jahanshad N., Thompson P. M. *Effects of Dementia and MCI on Diffusion Tensor Metrics Using the Updated ADNI3 DTI Preprocessing Pipeline. Alzheimer's & Dementia*, 2022, 18(S6), e066333. DOI: 10.1002/alz.066333.
- Nir T. M., Villalon-Reina J. E., Haddad E., Zheng H., Thomopoulos S. I., **Maiti P.**, Zhu A. H., Thompson P. M., Jahanshad N. *Cortical microstructural associations with CSF amyloid and tau. Alzheimer's & Dementia*, 2021, 17(S4), e055820. DOI: 10.1002/alz.055820.
- Liu M., **Maiti P.**, Thomopoulos S., Kadakova N., Kim H., Jahanshad N. *Multi-Site MRI Harmonization Using Unified Generative Adversarial Networks.* OHBM 2021, Seoul, Korea.
- Ba Gari I., Gadewar S. P., Wei X., **Maiti P.**, Boyd J., Jahanshad N. *A 3D U-Net for Gibbs Artifact Removal from Quantitative Susceptibility Maps.* ISMRM 2021, Chicago, IL.
- Nir T. M., Salminen L., Villalon-Reina J. E., Tubi M. A., Thomopoulos S. I., **Maiti P.**, Braskie M. N., Thompson P. M., Jahanshad N. *Hippocampal Subfield Microstructure Abnormalities Mediate Associations Between Tau Burden and Memory Performance: Neuroimaging/Multi-Modal Comparisons. Alzheimer's & Dementia*, 16 (2020): e039622.
- Nir T. M., Villalon-Reina J. E., Thomopoulos S. I., **Maiti P.**, Reid R., Bernstein M., Jack C. R., Thompson P. M., Jahanshad N. *Improved Neurite Density Estimation in Alzheimer's Disease With Multi-Tissue Multicompartment Diffusion MRI Modeling.* IEEE EMBC 2020, Montreal, Canada.

- Nir T. M., Villalon-Reina J. E., Zhu A., Salminen L. E., Thomopoulos S. I., Tubi M. A., **Maiti P.**, Thompson P. M., Jahanshad N. *Hippocampal Microstructural Abnormalities in Cognitively Impaired and Amyloid-Positive Individuals.* OHBM 2020, Montreal, Canada.

Journal Review

Reviewer — IEEE International Symposium on Biomedical Imaging (ISBI)