ABHAY SHUKLA

abhayshuklavtr@gmail.com | https://www.linkedin.com/in/shuklabhay/ | https://github.com/shuklabhay | https://shuklabhay.github.io

EXPERIENCE

FRC 604: Quixilver Robotics   2022 - Present
Controls/Software Lead (10-11)   *California*

· Enhanced robot capabilities with computer vision and sensor integration, contributed to SOTA team software (particle filter localizer, time-optimal trajectory optimizer, annual robot control architecture). Developed team's competition data collection application Quickscout.
· Developed a progressive web app for TheBlueAlliance, modernizing the univerally used platform and providing comprehensive, real-time access to all competition and team data over 30+ years.
· Led subteams in design, manufacturing, and programming of FRC team robot while teaching new members about robot development.

UCLA COSMOS (CA Summer School for Mathematics & Science)   2024
Brain-Inspired Computing Cohort Member   *California*

· Conducted deep analyses of the computational principles and neurological correlations of 20+ key machine learning mechanisms (attention, visual processing, recurrent systems, reinforcement, etc), gaining a comprehensive understanding of their capabilities and limitations.
· Developed StereoSampleGAN with UCLA funding to generate high quality stereo audio samples with a 99.77% reduction in training epoch count compared to monophonic audio generation model SpecGAN.

Bay Area STEM Academy   2023 - Present
Cofounder   *California*

· Taught 700+ elementary to high school students diverse STEM topics via numerous in-person and online workshops covering Robotics, Engineering, Machine Learning, and Programming Fundamentals.
· Raised $6000+ to support local STEM outreach initiatives for underrepresented communities and children health foundations, recruited 15+ academy mentors.

PROJECTS

StereoSampleGAN
GitHub Repo: https://github.com/shuklabhay/stereo-sample-gan

· WGAN-based computationally effiicent approach for generating high-fidelity stereo audio samples. Leverages attention mechanisms, optimized loss functions, and effective signal processing while achieving a 99.77% reduction in training epoch count compared to SpecGAN.
· Overcame existing low-quality and monophonic limitations of audio generation methods by evaluating numerous approaches to generating stereo, high-fidelity audio. Research partially funded by UCLA and pending publication.

Quickscout
GitHub Organization: https://github.com/frc604

· Developed scalable and flexible robot performance analysis application for multimodal FRC event data collection and visualization. New captured metrics empower informed strategic decisions at high-stakes competitions, contributing to the team's international success.
· Supports 130+ users on FRC604, data collected for 700+ team robots over 1 year. Trained 10+ team members in webdev to build app and expand application capabilities to fit annual challenges.

Domotron
Robot Website: https://604robotics.com/2023-2024-crescendo/

· Developed computer vision and physics-based shot calculations, driver control automation, and competitive autonomous routines for world championship division winning robot.
· Designed climber winch mechanism and robot vertical elevator, maximizing robot's competitive capabilities and earning the robot the Industrial Design, Innovation in Control, and Autonomous Awards.

EDUCATION

Leland High School   *4.00 UW A-G*
Junior   *San Jose, CA*

SKILLS

Technical Fields	AI/ML, Robotics, Signal Processing, CAD, 3D Printing, Webdev/Appdev
Other	Digital Audio Production, Graphic Design, Video Editing

HONORS & AWARDS

· FRC604: World Championship Milstein Division Winner (12/3500 Internationally + 4/300 in CA)   2024
· NextFlex FlexFactor: Entrepreneurship Competition Winner (1/260 in CA)   2024
· OneHacks III Hackathon: Third Place (3/120 Internationally)   2023
· SCU/SVUDL Invitational: PF Debate Finalist (2/140 Internationally)   2022