ABHAY SHUKLA

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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 universally used platform and enabling effective, real-time access for FRC competition data and insights globally.
- Led subteams in design, manufacturing, and programming of team robot while training new members to contribute to 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 99.5

Bay Area STEM Academy 2023 - Present
Cofounder *California*

- Impacted 700+ students with free STEM education, raised $6000+ to support local STEM outreach initiatives for underrepresented communities and children health foundations.
- Developed engaging curriculum for elementary to high school students, recruited mentors, planned and effectively delivered numerous in-person and online camps covering Robotics, Engineering, Machine Learning, and Programming Fundamentals.

PROJECTS

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

- Introduces a novel, computationally efficient WGAN-based approach for generating high-fidelity stereo audio samples. Leverages attention mechanisms, optimized loss functions, and effective signal processing while achieving a 99.5
- Overcame existing low-quality and monophonic limitations of audio generation methods by evaluating numerous approaches to stereo, high-fidelity audio generation. Research partially funded by UCLA and pending publication.

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

- Led development of large scale, flexible robot performance analysis application for multimodal FRC event data collection and real-time visualization. Facilitates informed partnership decisions at high stakes competition and drives team's international success.
- 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.

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