

# 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 team software (particle filter localizer, time-optimal trajectory optimizer).
- Developed progressive web app for TheBlueAlliance, modernizing the widely-used platform providing real-time access to 30 years of competition and team data.
- 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*

- Gained proficiency in 20+ key machine learning mechanisms under mentorship of Dr. Hugh Tad Blair. Explored intersection of biological mechanisms and computing.
- Developed ML problem-solving and data analysis skills by applying theoretical learnings to practical assignments.

## PROJECTS

### StereoSampleGAN

*GitHub Repo:* <https://github.com/shuklabhay/stereo-sample-gan>

- WGAN-based approach for generating high-fidelity stereo audio samples by leveraging attention mechanisms, optimized loss functions, and effective signal processing. Research partially funded by UCLA and pending publication.
- Overcame low-quality monophonic limitations of existing audio generation methods with a 99.77% reduction in training epoch count and 9.56x reduction in parameter count.

### Quickscout

*GitHub Organization:* <https://github.com/frc604>

- Developed scalable 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, collected data 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 |