

# Sarvesh Sadana

<http://sadanaresearch.com>

## EDUCATION

### UC BERKELEY

PHYSICS & MATH DOUBLE MAJOR  
August 2018 – Present

### OHLONE COLLEGE

CERTIFICATE OF ACCOMPLISHMENT  
IN PURE MATH (MAY 2018)  
August 2017 – May 2018 (Coursework  
completed while in high school)

## COURSEWORK

### COMPLETED (OHLONE)

- Differential Equations
- Introduction to Linear Algebra
- Calculus with Analytic Geometry

### COMPLETED (BERKELEY)

- Computational Techniques in Physics
- Mechanics and Relativity
- Linear Algebra (Proof-based)
- Independent Study (Mechanical Engineering, ongoing)

### IN PROGRESS

- Fourier Analysis, Wavelets, and Signal Processing
- Introduction to Abstract Algebra
- Electromagnetism, Waves, and Optics
- Experimental Physics I

## TECHNICAL SKILLS

### PROGRAMMING

**Experienced:** Python 2.7/3.x •  $\LaTeX$

**Proficient:** MATLAB

**Familiar:** G-code • Mathematica • Bash

### SOFTWARE

**Experienced:** Fusion360 • Microsoft Office Suite • Cura

**Proficient:** PicoScope • Slic3r

**Familiar:** LabVIEW Pro

### LABORATORY SKILLS

**Experienced:** High Vacuum Technology  
• High Voltage Technology • 3D Printers  
• Radiation Detection • Lab Safety

**Proficient:** Machining • Electrolysis  
• GLP • Polymer Chemistry • Extruders

**Familiar:** Soldering • Welding

## EXPERIENCE

### NUCLEAR FUSION REACTOR | SOLE BUILDER AND OPERATOR

December 2015 – October 2017 (ongoing research) | Fremont, CA

- Built a fully functioning research-grade inertial electrostatic confinement fusion reactor (a "fusor") from scratch in my garage.
- **Technical details:** *It uses an extremely powerful electric field to create a 30 keV deuterium-rich plasma in a high vacuum. The deuterium nuclei accelerate radially inward toward a charged hollow tungsten cage. A fraction of these collide with one another, undergo nuclear fusion, and release a 2.5 MeV fast neutron, which is then detected by a Helium-3 proportional counter.*
- Measured peak isotropic neutron flux of  $4.7 \times 10^6$  neutrons per second. 95% CI: ( $3.3 \times 10^6$ ,  $6.1 \times 10^6$ )
- Member of the "Neutron Club", a listing of all 70-odd amateurs who have provably accomplished nuclear fusion
- Contributor to the Open Source Fusor Research Consortium v3

### LIQUID HELIUM GENERATOR | SOLE BUILDER AND OPERATOR

June 2017 – Present (under construction) | Fremont, CA

- Currently constructing an apparatus at home which can liquefy helium.
- **Technical details:** *It works by repeatedly compressing the gas to 3000 PSI then expanding it in a reservoir, where it cools down (and eventually liquefies when it reaches 4K) via the Joule Thomson effect. However, nitrogen and neon are required to precool the helium down to its inversion temperature, requiring a multistage device.*

## RESEARCH

### COMPUTATIONAL MANUFACTURING AND MATERIALS

#### RESEARCH LAB (CMMRL) | SOLE UNDERGRADUATE RESEARCHER

June 2017 – Present (Appointment ends May 2022) | Berkeley, CA

- Currently conducting experimental research (9 hours/week during the academic year) into the development of novel polymer matrix composites (PMCs) and additive manufacturing techniques under Professor Tarek Zohdi.
- My goal is to create 3D printing filaments which are stronger, more wear-resistant, chemically inert, generally have superior mechanical properties compared to existing industrial filaments.
- Developed multiple composites already (mainly combining carbon fiber with a variety of polymers) and the results are promising
- Wrote software to numerically calculate the bulk thermal expansion of a carbon fiber reinforced polymer in Python 3.
- In the process of writing and publishing two (first-author!) papers detailing my research.

### SIEMENS FUTURE MAKERS CHALLENGE | PARTICIPANT

April 2018 | Berkeley CA

- Competed in the Siemens Future Makers Challenge on a team with 2 PhD students against 7 other teams for a \$150,000 research investment.
- In 24 hours we wrote a genetic algorithm that optimized the location and amounts of functionalized graded material to minimize industrial turbine blade deformations

## REFERENCES

References available upon request. More technical information on my projects can be found on my website, <http://sadanaresearch.com>.