

Jacob C.S. Eldred

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Academic Interests: Engineering (Mechanical, Manufacturing, Materials); History + Literature; Art + Design

Education:

Yale University, New Haven, CT

August 2019-Present

Pursuing Undergraduate Degree, Class of 2024

Collegiate School, New York, NY

September 2012-May 2019

Work + Research Experience:

Undergraduate Thesis Project, NASA and Yale Nano-Probe Lab, Yale University

2023-Present

NASA-sponsored senior thesis, team project to design and build high temperature, high heating rate furnace to simulate atmospheric reentry conditions for heat shielding. Joule heater with goal of 500C/s heat ramp.

Undergraduate Lab Assistant, Yale Nano-Probe Lab, Yale University

2019-Present

PI: Udo Schwarz; Research Mentor: Amit Datye

Work with bulk metallic glasses and polycrystalline alloys. Use of atomic force microscopy, differential scanning calorimetry. Design and machine vacuum chuck accessory for atomic force microscope, specialty tensile jaws.

Materials Science and Design Intern, Lithoz GmbH, Vienna, Austria

Summer 2023

Designed lattice structures, 2-material interfaces, and demonstration parts for ceramic 3D-printing research.

Undergraduate Visiting Researcher, Leibniz Institute IFW Dresden, Germany

Summer 2022

SLM 3D printed auxetic structures from titanium-niobium superalloys while on Tetelman Fellowship.

Studio Assistant, Matthew Barney Studio, New York City

Summer 2022

Artist casting. Sand molds for cast lead, silicon molds for PCE and silicon, plaster molds for slipcast ceramic.

Opto-Mechanical and Mechanical Eng. Intern, BroadSpot Imaging, Emeryville, CA (Remote)

2020-2021

Designed medical device parts with SolidWorks for 5-axis and Swiss-type CNC, die cutting, plasma cutting, 3D printing, diamond turning at US & overseas manufacturers. Tolerance analysis +/- 25 microns. Worked with optical engineers to design lenses/optomechanics. Designed assembly and IQA jigs. Wrote dFMEA, pFMEA, assembly instructions for FDA 510(k) and ISO audit. Used Arena PLM/BOM software; issued and approved ECOs.

IP acquired by Optos, a leader in retinal imaging and a division of Nikon.

Mechanical Engineer for COVID-19 Research, Yale Dept. of Chem. & Env. Engineering

2020-2021

PI: Jordan Peccia & Krystal Pollitt. Design and build rotating drum for Covid-19 detection device research.

Work with professional machine shop to make and assemble large components. Total budget: \$20k.

Publications:

“Development and Application of a Polydimethylsiloxane-Based Passive Air Sampler

2022

to Assess Personal Exposure to SARS-CoV-2” in *Environmental Science & Technology Letters*. Jan 11, 2022.

5th Author of 12. <https://doi.org/10.1021/acs.estlett.1c00877>, featured in *USA Today*, *Reuters*, etc.

Recognitions + Art:

Ceremonial Mace Commission, School of Engineering and Applied Science, Yale University

2022 – Present

\$50k budget sculpture which represents engineering in Yale graduation procession.

Richter Fellowship, Slifka Arts Fellowship, Jewish Studies Department Grant, Yale University

2023

Various fellowships to support art history research and a design project in Vienna for summer 2023.

Tetelman Fellowship for International Research in the Sciences, Yale summer fellowship.

2022

Neon Art Commission, Morse College, Yale University

Permanent installation in dining hall. Neon battle axe, all custom made in metal, acrylic, neon glass. 9' tall.

Brass Sculpture Commission, Grace Hopper College, Yale University

2021

Permanent installation in dining hall. CNC and manually machined brass trident. 6' tall, 80+lbs.

Cum Laude, Collegiate School Honor Society

2019

Extra-Curricular Activities + Clubs:

The Yale Record, Yale Humor Magazine, “America’s Only Magazine”

2019-Present

Merchandise Manager, Business Manager, Staff writer.

The Cucumber, Yale standup comedy club – co-president

2022-2023

Science Olympiad, Collegiate School – Build Captain

2015-2019

Collegiate Journal, Collegiate School Newspaper - Editor-in-Chief

2015-2019

Academic Credentials:

ACT Score: 36

Skills (Software):

SolidWorks – 3D CAD Modeling parts and assemblies, SolidWorks PDM file management

Autodesk HSMWorks – CAM software embedded in SolidWorks.

Arena (PLM Software) – BOM Management and official file tracking software. Experienced using and administering software.

Adobe InDesign – Two years experience laying out school newspaper, experience designing templates/graphic standards from scratch, including interest in and experience with typography.

Adobe Illustrator – Experience in logo/vector design, three years making files for laser cutter, water jet, die cutter.

Adobe Photoshop, Adobe Bridge – Photo organization, editing, mass processing, time-lapse, panorama/composite.

Microsoft Word, Excel, PowerPoint.

G-Suite.

Basic Programming – Experience coding in Matlab, C, and Python.

Practical Experiences:

Woodworking – Fine furniture making incl. joinery and marquetry; stage-building for school plays, chainsaw.

Manual Machining – Intermediate experience using manual mill and lathe, 2.5D CNC.

3D Printing – Research experience designing for and working with Lithoz ceramic LCM printers, including experimental 2-component printers using alumina, zirconia, hydroxyapatite, and other materials. Research experience designing for and working with SLM (Selective Laser Melting) printers using TiNb superalloys. Experience designing for Carbon, DLP, SLA, Incus LMM (Lithography-based Metal Manufacturing) printers.

Neon/Glassmaking – Intermediate neon tube bender and sign maker (soda-lime glass). Created a number of signs up to nine feet tall and mounted on custom made laser cut acrylic boxes. Experience with flameworking hollow borosilicate glass.

Photography – Experience in many types of photography including journalistic, portrait, environmental portrait, landscape, panorama/composite. Own a professional-quality DSLR that I could use for any project.

Balsa Woodworking and Engineering – Experience building almost anything out of balsa with a razor blade and superglue. Have built laminated arches, trusses, oil-derrick style towers, and cantilevers that have held up to 1900x their own weight, using intuitive force diagrams, long hand calculations, Finite Element Analysis, and laser cut plans drawn in Illustrator.

Laser Cutting, Waterjet Cutting – Researched and organized purchase of laser cutter for school. Maintained cutter and taught students and faculty members how to use it. Made parts on Waterjet cutter for final processing in machine shop.

Printing and Finishing (Processes) – Experience working with and for various types of printing presses. Spent one summer working at Endeavor Printing, a digital print shop, printing and finishing perfect bound, saddle-stitched, and casebound books as well as menus, programs, tickets, comic books, road signs, construction signs, stickers, and posters. Also: experience with different printing techniques: t-shirt (screenprinting, direct-to-garment), letterpress, newspaper (four-color offset), fine photography/commercial inkjet. I know these processes intimately and can see any printing project from idea through proofing and production to completion, including finding and working with the printer.

Printing and Finishing (Machines) – Duplo Saddle-Stitcher, Duplo DPB-500 Perfect Binder, 27” Guillotine Paper Cutter, VanderCook SP-20 Letterpress Proofing Presses, Xerox Versant Digital Press and Fiery prepress and imposition interface.

Writing/Copywriting/Editing – Experience writing critically and creatively for classes and for school publications. I also have experience editing and copy-editing news, editorial, and criticism, as well as managing publications for print.

Driving – Introductory experience driving a forklift though I am not formally certified.

Publications Read:

Beyond newspapers, I read the following trade publications and newswires because I am interested in learning more about these fields than the thin coverage they get in normal newspapers:

Supply Chain/Shipping – Supply Chain Dive, Transport Topics, American Shipper (FreightWaves), Splash 24/7, Maritime Executive, *Trains News Wire*, *Progressive Railroading*; also: *Wall Street Journal* Logistics Report.

Media – Niemann Lab, Poynter, *Columbia Journalism Review*.

Miscellaneous – CityLab (Urbanism), Construction Dive, Utility Dive.