

# Jacob C.S. Eldred

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

## Education:

<b>Stanford University</b> , Palo Alto, CA	September 2024 – Present
Candidate for masters of science in mechanical engineering	
<b>Yale University</b> , New Haven, CT	August 2019-May 2024
Bachelors of science in mechanical engineering with distinction, class of 2024	
<b>Collegiate School</b> , New York, NY	September 2012-May 2019

## Work + Research Experience:

<b>Undergraduate Thesis Project</b> , NASA and Yale Nano-Probe Lab, Yale University	2023-2024
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.	
<b>Undergraduate Lab Assistant</b> , Yale Nano-Probe Lab, Yale University	2019-2024
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.	
<b>Materials Science and Design Intern</b> , Lithoz GmbH, Vienna, Austria	Summer 2023
Designed lattice structures, 2-material interfaces, and demonstration parts for ceramic 3D-printing research.	
<b>Undergraduate Visiting Researcher</b> , Leibniz Institute IFW Dresden, Germany	Summer 2022
SLM 3D printed auxetic structures from titanium-niobium superalloys while on Tetelman Fellowship.	
<b>Studio Assistant</b> , 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.	
<b>Opto-Mechanical and Mechanical Eng. Intern</b> , 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.	
<b>Mechanical Engineer for COVID-19 Research</b> , 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.	
<b>Endeavor Printing</b> , Long Island City, NY	2019
Printing and Finishing Associate at Digital Printing Press/Sign Shop. Designed jigs for repetitive tasks.	

## Publications:

<b>“Development and Application of a Polydimethylsiloxane-Based Passive Air Sampler to Assess Personal Exposure to SARS-CoV-2”</b> in <i>Environmental Science &amp; Technology Letters</i> . Jan 11, 2022.	2022
5 <sup>th</sup> Author of 12. <a href="https://doi.org/10.1021/acs.estlett.1c00877">https://doi.org/10.1021/acs.estlett.1c00877</a> , featured in <i>USA Today</i> , <i>Reuters</i> , etc.	

## Select Press Coverage:

“‘We can make it ourselves’: Building a new Yale Engineering mace,” <i>YaleNews</i>	Jul. 23, 2024
“Incus GmbH’s additively manufactured mace for Yale University,” <i>MetalAM</i>	Aug. 27, 2024
“A ceremonial mace manufactured using CNC & LMM technology,” <i>3D Adept Media</i>	Aug. 26, 2024
“Incus GmbH partners w. Yale University’s NanoProbe Group to explore auxetic structures,” <i>MetalAM</i>	Feb. 2, 2024
“Morse dining hall adorned with 9-foot neon axe,” <i>Yale Daily News</i> .	Nov. 9, 2022
“At elaborate ceremony, Grace Hopper College unveils student-made trident,” <i>Yale Daily News</i> .	Oct. 11, 2021

## Select Lectures:

“On the creation of the Yale Engineering Mace” (60 mins), Yale School of Engineering and Applied Science	June 2024
“Toward a miniature, high-heating rate, high-temperature furnace” (15 mins), Mellon Forum, Morse College, Yale	May 2024
“Compression behavior of SLM superalloy auxetic structures” (10 mins), BIOREMIA mini conference, Yale	Feb 2024
“Proposal for a novel building-scale sundial at Kline Tower” (30 mins), Lunchtime Talk, CCAM, Yale	Oct 2023

### Recognitions + Art:

- Ceremonial Mace Commission**, School of Engineering and Applied Science, Yale University 2022-2024  
\$50k budget sculpture representing engineering in Yale graduation procession every year. Installed in Dean's office.  
1500+ man-hours total project, 15+ suppliers/artisans. Wood and metal, traditional and advanced manufacturing.  
Carried mace at graduation procession, an honor usually reserved for distinguished faculty.
- Stanton Wheeler & Marcia Chambers Award**, Morse College, Yale University 2024  
"Awarded to the senior who has made outstanding artistic contributions to [Morse] college."
- Adrian Van Sinderen Book Collecting Prize**, Yale University 2022 & 2024  
Honorable mention in sophomore and senior prizes for collections on trains and general library, respectively.
- Richter Fellowship**, Yale University 2023
- Slifka Arts Fellowship**, Slifka Center for Jewish Life at Yale
- Jewish Studies Department Grant**, Yale University  
Various fellowships to support art history research and a design project in Vienna for summer 2023.
- 'Beer Window', Permanent Art Installation**, Morse College, Yale University  
Rose window made from collage of cardboard boxes, installed in Morse College butterfly.
- Tetelman Fellowship for International Research in the Sciences**, Yale summer fellowship. 2022  
Fully funded summer research abroad in the sciences. Used at IFW Dresden for 3D printing TiNb alloys research.
- 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.  
Working drawings donated to Yale Library Archives.
- Brass Sculpture Commission**, Grace Hopper College, Yale University 2021  
Permanent installation in dining hall. CNC and manually machined brass trident. 6' tall, 80+lbs.  
Mechanical drawings donated to Yale Library Archives.
- Cum Laude**, Collegiate School Honor Society 2019
- Neon Art Commissions**, Collegiate School  
Permanent installation in Drama Department office. 7-foot tall, marquee-style neon sign of word 'DRAMA.'  
Permanent installation in common area, small sculpture for Science Department portraying benzene ring.
- Rhode Island School of Design**, Pre-College Program, Providence, RI 2018  
Program Major: Furniture Design. Coursework: Drawing, Design, Art History
- National Geographic**, Student Photo Contest  
Finalist – Top 28 of 5000+; Photo: *La Iglesia San Pedro*.
- Scholastic Art and Writing Awards**  
Photography – 1 national Silver Medal. Photograph exhibited at Metropolitan Museum of Art
- Harvard Summer School**, Cambridge, MA 2017  
Coursework: Letterpress/Book Arts; "Scrutinizing the American Environment" (Prof. John Stilgoe)
- Herzig Grant**, Collegiate School.  
Awarded \$2200. Created archival photographs of Collegiate's stairwell murals prior to building demolition.  
Combined tilt-shift- and strip-panorama techniques to make ultra-high-res composite images from 50+ photos.

### Extra-Curricular Activities + Clubs:

- The Yale Record**, Yale humor magazine, "America's Only Magazine" 2019-2024  
Merchandise Manager, Business Manager, Staff writer.
- The Cucumber**, Yale standup comedy club – co-president 2022-2023
- Alpha Epsilon Pi Fraternity**, brother. 2020-2024
- 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** – Templates/graphic standards from scratch, including interest in and experience with typography.

**Adobe Illustrator** – Experience in logo/vector design, 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, 4-axis manual, 2.5-axis 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.

**Casting** – Sand casting lead with silicon patterns, casting silicon and PCE plastic in silicon molds, slipcast ceramic and make ceramic molds.

**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.