# Joe Shields

Mechanical engineer with 8 years of design and manufacturing experience
Located in Portland, Oregon
Looking for either fully remote work or hybrid work in Cascadia (<40% of working hours in-office)
*Not* open to work in the war, fossil-fuels, or animal agriculture industries

Please email before calling: joedang100@gmail.com, 971-226-9393
Read more at Joedang.github.io.

## Professional Experience

### *Optomechanical Design Engineer, Earth and Space Institute and AirPhoton*

Oct. 2021 – July 2023

- Rescued a 20-million-dollar project by applying physical scaling laws
- Halved the size of three separate systems through clever architecture changes
- Performed space-claim, keep-out-zone, and tolerance analyses
- Designed cameras and optical calibration systems
- Managed system requirements, interfaces, and performance
- Designed optics by manually tracing rays in Autodesk Inventor
- Coordinated with contractors, customers, scientists, and engineers to write system specifications
- Designed orbital, airborne, and ground-based instruments
- Solved multi-disciplinary design constraints (mechanical, optical, pneumatic, thermal, etc.)

### *Mechanical Lead, Portland State Aerospace Society (PSAS)*

Sep. 2019 – Oct. 2021

- Mentored student projects and assembled project teams
- Maintained equipment and lab space
- Performed FMEA and root-cause analysis
- Managed interdisciplinary projects among students and professionals

### *Lab Manager, PSU Electronics Prototyping Lab*

Sep. 2019 – Oct. 2021

- Maintained equipment and lab space
- Trained students on prototyping equipment
- Ran the lab's parts store

### *Engineer, SpaceX*

Mar. 2019 – Sep. 2019

- Supported a wide variety of mechanisms on the human-rated Dragon 2 docking systems
- Wrote detailed and intuitive assembly instructions to meet strict quality standards
- Owned aggressive build schedules and held others accountable to them
- Solved issues including design errors, part damage, missing parts, and documentation errors

### *R&D Engineer, Pacific Diabetes Technologies*

Sep. 2018 – Feb. 2019

- Prototyped wearable micro-fluidic devices and electronic enclosures
- Created designs, models, and drawings for patent applications
- Designed miniaturized assemblies for 3D printing and injection molding

### *Mechanical Lead, Portland State Aerospace Society (PSAS)*

Dec. 2015 – Mar. 2019

- Created an open-hardware carbon fiber rocket airframe for the Portland State Aerospace Society
- Published and presented a conference paper on the project for AIAA SPACE 2016
- Documented design and manufacturing processes to foster institutional knowledge
- Designed parts using hand calculations, prototypes, computer models, CFD, and CAD

### *Design Engineer, OreSat*

Jan. 2017 – Mar. 2019

- Coordinated the design of all mechanical subsystems in Oregon's first satellite
- Maintained the top-level SolidWorks assembly of the satellite
- Incorporated constraints from NASA, NanoRacks, and OreSat electrical subsystems
- Worked across engineering disciplines to resolve highly coupled designs
- Led analysis and design reviews

### *Lab Manager, Electronics Prototyping Lab*

Jan. 2018 – Mar. 2019

- Same duties listed above

## Physical Tools

3D printers (FDM, SLA, SLS, MJP), laser cutters, mills, lathes, hand tools
PCB routers, soldering (hand, re-flow), oscilloscopes, various microscopes
Composites manufacturing (wet, dry, high/low-temperature), metal working

## Software Tools

Inventor, SolidWorks, NX, Teamcenter, Onshape, OpenSCAD, AutoCAD
R, MATLAB, C++, Python, Bash, Vim, Git, Jekyll, HTML, CSS, JavaScript
LaTeX, Microsoft Office, Libre Office, Google Docs, et cetera
Linux, Windows, Abaqus, GIMP, Inkscape

## Education

### *Portland State University, Sep. 2013 – Jun. 2016*

- B.S. **Mechanical Engineering**, Maseeh College of Engineering and Computer Science
  - Focus: heat and mass transfer
- B.S. **Physics**, College of Liberal Arts and Sciences
  - Focus: classical mechanics and electromagnetism

### *Portland Community College, Sep. 2008 – Jun. 2010, Sep. 2011 – Sep. 2013*

- Focus: general education, mathematics, music

## Small Projects

In addition to the projects below, you can check out the rest of my portfolio at github.com/Joedang.

- iTopie printer
  - Modified and built a RepRap 3D printer from parts including a custom laser-cut frame
- Restricted 3-body simulation
  - An R script for investigating the motion of satellites within planet-moon systems
- Ballistic trajectory simulation
  - Realistic scenarios of short-range ballistic motion of various projectiles on different planets, accounting for buoyancy, drag, centrifugal, and Coriolis effects written in R
- N-body simulation
  - Various scenarios involving an arbitrary number of charged massive particles written in MATLAB
- OpenFOAM analysis
  - A model of supersonic flow around a rocket nosecone, used to inform the part's design
- PSAS Asset Tracking System
  - Created a specification and front-end in R Shiny for a website to track part maintenance and ownership
- Wearable device enclosure
  - Created a 3D printed enclosure for a wearable sensor prototype for APDM using SolidWorks

## Miscellaneous

References can be provided upon request.

I'm most interested in design engineering. I work very well with scientists and other engineering disciplines (especially electrical engineers). I perform best with minimal oversight. In my ideal workflow, I spend one to two consecutive days coordinating with team members, and three to four consecutive days hyperfocusing on the tasks identified by that coordination.