ISAAC SMITH

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Near-surface geophysics and computational physics researcher with experience in MASW, seismic processing, ERT, GPR, magnetometry, GIS, and subsurface characterization. My work also includes Python/C++ software development and machine-learning research for seismic data analysis. I'm especially interested in building better tools for seismic interpretation and exploring how computational and quantum methods can be applied to geophysics.

EDUCATION

Missouri State University Expected May 2027

B.S. Comprehensive Geology; B.S. Physics: Quantum Computing | Overall GPA: 3.80/4.00

Certificates: Applied Geophysics; Computational Science; Paleontology; Geologic Foundations

Completed Courses: Seismic Data Processing; Advanced Computational Physics; Differential Equations; Multivariate Calculus; Structural Geology; Principles of Stratigraphy

Fall 2026 Courses: Applied Geophysics; Mathematics for Science and Engineering; Thermal Physics; Modern Physics; Undergraduate Research; Quantum Mechanics

Winter 2026 Field Course: Appalachian State University: Winter Field Geology in Death Valley

Spring 2027 Courses: Experiments in Modern Physics; Intermediate Mechanics; Electricity & Magnetism; Quantum Computing; Field Geology of the Midcontinent Region

RESEARCH

Computational Surface-Wave Analysis & Inversion | Undergraduate Research Ongoing

- Developing end-to-end multichannel analysis of surface waves (MASW) software using Python and C++ so students and schools can process seismic data without the cost of industry packages.
- Developing the signal-processing, dispersion-analysis, shear-wave-velocity inversion, and visualization steps that connect seismic measurements to subsurface models. First beta targeted for December 2026.
- Prepared a feasibility study for the computational workflow; adviser: Dr. Sarah Morrison; advisory committee: Dr. Mike Reed and Dr. Kevin Mickus.

CNN-based Fundamental Mode Picking | Undergraduate Research Ongoing

- Working with a computer science graduate student to apply a convolutional neural network (CNN) to identifying fundamental modes in surface-wave dispersion data.

2D Acoustic Wave Modeling | Course project 2025

- Developed a MATLAB finite-difference model of acoustic P-wave propagation in layered shale and sandstone using a Gaussian source and second-order spatial and time differences.
- Used wavefield snapshots and lithology overlays to examine propagation through layered media and relate changes in the simulated response to velocity, density, and impedance contrasts.

Dispersion Data Parsing & Visualization | Course project 2025

- Built a Python/NumPy workflow to batch-parse Multimodes-style .LST files and export frequency, phase velocity, pick weight, and mode number to individual and combined CSV files.
- Produced mode-separated curves and pick-weight diagnostics with original picks retained alongside spline-interpolated plots. Scope was data preparation and visualization, not inversion.

2D Ising Spin-system Simulation | Course project 2025

- Implemented a MATLAB square-lattice Ising model with Metropolis updates to calculate energy and magnetization across a range of temperatures.
- Compared ordered and randomized initial spin states and visualized changes near the model's critical temperature.

PROFESSIONAL & FIELD EXPERIENCE

Geophysical Engineering Intern | Terracon May 2026-present
St. Louis, Missouri

- Independently completed field assignments across 15+ projects using Wenner-array electrical resistivity, MASW, magnetometry, GPR, private utility locating, Emlid positioning, and electromagnetic locating equipment.
- Calibrated an L&R MiniRes resistivity meter; troubleshot MASW, resistivity, and magnetometry systems; maintained positioning, field notes, and pre-task quality and safety checks.
- Processed MASW data in SurfSeis6 and prepared Excel-based reports for approximately 20 electrical-resistivity lines, organizing processed data and field summaries for review.
- Led two-person crews, reviewed project scopes, assigned tasks, coordinated with project managers and onsite contractors, and revised ineffective survey layouts approximately 25 times.
- Collected 100+ Wenner resistivity lines, four MASW lines, GPR data, approximately 15 acres of Magnetometry coverage, one private utility-clearance site, and 50+ positioning points.
- Located and marked utilities and subsurface anomalies, including an unmarked gas tank that prompted relocation of a planned drilling location.

Materials Engineering Intern | Terracon May-August 2025
St. Louis, Missouri

- Performed construction materials testing across approximately 30 sites: 50 fresh-concrete tests, 20 compressive-strength tests, 15 Atterberg limits, 10 nuclear-density tests, and two Proctor tests.
- Identified and escalated approximately four out-of-specification results while maintaining ASTM procedures, field documentation, and quality standards.
- Supported electrical-resistivity and seismic data collection through survey setup, equipment checks, calibration records, and site documentation.

Nonprofit Office Manager | Midwest Hemophilia Association Nov. 2025-May 2026
Ozark, Missouri

- Coordinated two events and supported five others serving 100+ attendees and approximately 20 volunteers; increased participation to 15+ sponsors.
- Contributed to event revenue growth from $12,000 to $21,548 through sponsor outreach, registration, donor coordination, and logistics.

LEADERSHIP & PROFESSIONAL INVOLVEMENT

President | AAPG, Missouri State Chapter February 2025-present
American Association of Petroleum Geologists

- Reestablished and grew the chapter to 28 members; lead meetings, field trips, guest speakers, professional development, and outreach with faculty and industry professionals.

Peer Mentor | Society of Exploration Geophysicists October 2022-present

- Receive industry mentorship and support prospective geophysics students through academic and career guidance.

TECHNICAL SKILLS

Methods: MASW, Wenner electrical resistivity/ERT, magnetometry, GPR, and private utility locating.

Programming & libraries: Python, MATLAB, C++; NumPy, Matplotlib, pandas, scikit-learn, PyTorch, Jupyter, Codex.

Instrumentation: Geophones, Geodes, L&R MiniRes resistivity meter, MagEx magnetometer, GPR roll-along system, Emlid, and electromagnetic utility locator.

Geoscience Software: SurfSeis6, Surfer, ArcGIS Pro, and Excel-based technical reporting.

TRAINING & CREDENTIALS

OSHA 10-Hour Construction; ATI Nuclear Moisture Density Gauge; SurfSeis6 Workshop; Radiation Safety; SSI Open Water Diver; Defensive Driving.

Planned Credentials: Geologist-in-Training, Engineer-in-Training, and Certified Associate in Project Management.

Field Readiness: Frequent travel and outdoor work; valid driver's license and accident-free driving history.