

# Elijah Cobb

## Full Stack Engineer

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### EDUCATION

**Bachelor's of Science, Computer Science** 08.2018 – 12.2021  
*Michigan Technological University* [🔗](#) USA

### PROFESSIONAL EXPERIENCE

**Full Stack Software Engineer** 04.2022 – present  
*Vercel* [🔗](#)

Full-stack software engineer working as a Solutions Architect on Vercel products.

**Graduate Researcher** 01.2022 – 04.2022  
*Planetary Surface Technology Development Lab* [🔗](#) USA

**NASA - LuSTR** [🔗](#)

Development of a mobility platform and implementation of test procedures for adapting a percussive cone penetrometer, ground-penetrating radar, and an active Z-stage provided by HoneyBee robotics for NASA. LuSTR aims to develop a thermal model to characterize the lunar subsurface in search of water ice.

*Skills:* C++, ROS, Concurrent Programming, OpenCV, Python, NodeJS, WebSockets, ReactJS, TypeScript, SCSS, Academic Writing, Testing

**PSTD L - HOPLITE Rover** [🔗](#)

Development of control, communication, power, mobility, sensors, vision, and autonomy software for the Heavy Onboard Platform for Lunar ISRU and Terrain Excavation (HOPLITE). Developed with C++ and ROS. Its mission control software uses the ASTRA (see below) mission control software library. Presented HOPLITE at LSIC 21.

*Skills:* C++, ROS, Concurrent Programming, OpenCV, Python, NodeJS, WebSockets, ReactJS, TypeScript, SCSS, Testing

**NASA - Watts on the Moon - W<sup>5</sup>** [🔗](#)

Developing concepts of operations for delivering and storing energy for beneficiation and electrolysis facilities on the lunar surface. Received the grand prize for Phase I and currently designing Phase II submissions.

**ASTRA** [🔗](#)

Development of a software framework providing all necessary functionality for mission ground control software actively used by NASA T-REX, PSTDL IRGO, and PSTDL HOPLITE for the NASA LuSTR project.

*Skills:* TypeScript, ReactJS, Design

**Ph.D. Student and Researcher** 11.2020 – 04.2022  
*Michigan Technological University* [🔗](#) USA

**Universal Sensor Definition Schema (USDS)** [🔗](#)

Development and validation of a language providing an interface between sensor data streams using Racket for research supported by the U.S. Navy through an SBIR (N20A-T010) with Applied Research in Acoustics Inc (ARiA). Work classified and no further information can be shared.

*Skills:* TypeScript, NodeJS, Deno, ReactJS.

## Undergraduate Research Fellow

Michigan Technological University [↗](#)

11.2020 – 12.2021

USA

### Shakudo [↗](#)

Developed an IDE for undergraduate students to learn the Alloy programming language. The IDE (named shakudo), allows users to drag and drop discrete mathematics structures together using Google's Blockly and dynamically edits the Alloy source code to allow for responsive model simulation.

Skills: TypeScript, ReactJS, ElectronJS, Java, Blockly, Alloy

### FEWConscious (FEWCON) Project [↗](#)

Maintain a Web-App for a research project funded by the National Science Foundation analyzing the environmental impact. Design and implementation of a MySQL database linking all project data together. Design of a Web-App for researchers to access the database in a visual form.

Skills: ReactJS, TypeScript, MySQL, Groovy, NodeJS

## Undergraduate Research Assistant

Planetary Surface Technology Development Lab [↗](#)

05.2020 – 12.2021

USA

### NASA - T-REX Rover [↗](#)

Design and development of communication, vision, and control software as well as designing and following test procedures for the NASA award-winning rover, the Tethered permanently shadowed Region EXplorer (T-REX). Presented and won the NASA BIG Idea 2020 Competition.

Skills: C++, NodeJS, TypeScript, ReactJS, UNIX Sockets, ElectronJS, SCSS, Testing, Academic Writing

### PSTDL - IRGO [↗](#)

Design and development of all software for a 3-axis autonomous gravity offloading system housed in a lunar simulant chamber. IRGO uses OpenCV with an infrared LED and camera to continuously provide an upwards force on a subject to accurately simulate mobility on the lunar surface using the PSTDL's LHT-01A lunar simulant sandbox.

Skills: C++, OpenCV, Concurrent Programming, Microcontroller Programming

## Software Engineer

Ampel Feedback [↗](#)

08.2018 – 02.2020

USA

Designed and implemented open-source packages that were used in the backend infrastructure. Consisted of ORM database connectors, REST API generation, authentication, etc. Used packages to develop the entire backend.

Skills: TypeScript, NodeJS, MariaDB, REST API, Database ORM

## Frontend Software Engineer

Ampel Feedback [↗](#)

12.2017 – 08.2018

USA

Developed iPad application using a serverless backend that operated as a kiosk collecting in-the-moment feedback from customers at a wide variety of businesses.

Skills: Objective-C, Swift, UIKit, ParsePlatform, NodeJS, JavaScript

## Software Engineer

Solution Studio [↗](#)

06.2017 – 12.2017

USA

Developed interactive Facebook Messenger bots for businesses to use in marketing campaigns.

Skills: NodeJS, JavaScript, ManyChat

## SKILLS

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### Languages

TypeScript, C/C++, Python, Objective-C, Swift, Rust, Racket, Java, C#

### TX

UDP, TCP, HTTP/S, WS/S, I2C

### Databases

MySQL, MariaDB, MongoDB, PostgreSQL, ParsePlatform, Firebase

### Misc

Linux, Ubuntu, NGINX, Firewall, SSH

### Robotics

ROS, OpenCV, Control Systems, Networking, Systems Programming, Embedded Programming, Systems Engineering

### Web Libraries

ElectronJS, Svelte, ReactJS, React Native, NextJS, Expo

### API

REST, WS, GraphQL, Auth

### Professional

Git, Academic Writing, Documentation, SCRUM, Agile, Microsoft Office, Google GSuite, Github

## PROJECTS

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### dotmd [↗](#)

Web-based markdown application that allows users to create and preview Markdown documents on the web. Full markdown/latex support with image uploading, drawing/sketching, virtual file system, etc.  
*Skills:* NextJS, ReactJS, TypeScript, MongoDB, NextAuth

### astra [↗](#)

Set of React components for building robotic control software for ground control stations.  
*Skills:* ReactJS, TypeScript, SASS/SCSS

### silicon [↗](#)

MongoDB ORM written in TypeScript using all advanced features from the TypeScript type system in order to provide safe creation and manipulation of a Mongo database. Used in many of the projects listed here.  
*Skills:* MongoDB, TypeScript, NodeJS

### hydrogen [↗](#)

High-level abstracted type-safe REST API framework. Type-checking and parsing of queries along with functional endpoint building and advanced error handling. This was used in many of the projects listed here.  
*Skills:* NodeJS, TypeScript

### oxygen [↗](#)

Runtime type-checking system enabling type mapping and conditional types in TypeScript. Allows a simple type definition to be passed and recursively verifies any variable against it.  
*Skills:* TypeScript

### keybase-bot-builder [↗](#)

Package aiding in the development of bots for the Keybase platform.  
*Skills:* Keybase, NodeJS, TypeScript.

### virtual-choir [↗](#)

Full-stack Web-App that allows members of a musical group to record video and audio in line with the music. Displays music to users in order for them to sing in time with the group. Created to enable musicians to collaborate during the Covid-19 pandemic.  
*Skills:* TypeScript, NodeJS, MongoDB

### pstdl.com [↗](#)

*Skills:* NextJS, ReactJS, MongoDB, Markdown, TypeScript, SCSS

### vacationvillageelkrapids.com [↗](#)

*Skills:* HTML, CSS, SCSS

[lessonsofthelark.com](http://lessonsofthelark.com) 

Skills: HTML, CSS, SCSS

## AWARDS

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**NASA BIG Idea 2020 Challenge Finalist & NASA Artemis Award**  01.2021  
NASA

**Undergraduate Fellowship** 05.2020  
Michigan Technological University

## PUBLICATIONS

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**Design and implementation of the Heavy Onboard Platform for Lunar ISRU and Terrain Excavation (HOPLITE) to enable payload development and field testing for lunar and mars applications.** 08.2021  
*Lunar Surface Innovation Consortium*

**Testing and Development of the Tethered-permanently shadowed Region EXplorer (T-REX): a rover designed to lay superconducting tether into Lunar PSRs** 06.2021  
*New Space, Mary Ann Liebert Publishing*


**Designing Scaffolded Interactive Instruction in Discrete Mathematics** 02.2020


**The Tethered permanently shadowed Region EXplorer (T-REX)** 01.2020  
*NASA BIG Idea*

## PROFESSIONAL SOCIETIES

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**Lunar Surface Innovation Consortium**   
Member of the LSIC mobility subteam. Active with other LSIC events/presentations.

**MTU Aerospace Enterprise**   
Integration of subsystem software drivers for the "Auris" CubeSat. Auris monitors radio frequencies of satellites while in orbit and is funded by the United States Air Force. The Auris team recently won the AFRL competition and is maturing Auris into a flight-ready model for a launch within the coming years.

**First Robotics**   
Member of a First Robotics team in high school. Developed software for competition.

## REFERENCES

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**Dr. Paul van Susante**, *Principal Investigator*, Planetary Surface Technology Development Lab  
[pjvansus@mtu.edu](mailto:pjvansus@mtu.edu)

**Dr. Charles Wallace**, *Associate Professor*, Michigan Technological University  
[wallace@mtu.edu](mailto:wallace@mtu.edu)

**Craig Einstein**, *R&D Scientist and Engineer*, ARiA Acoustics  
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