



**University of Arkansas – CSCE Department
Capstone I – Final Report – Spring 2020**

Sider

Tyler Tracy, Luke Brandon, Adam Goertz, Samuel Le, Marshall Richards

Abstract

With the advent of the gig economy and a record 36%^[1] of Americans now being involved in it, the time is now to bring college students into the fold and provide companies and small businesses with highly-specialized, low cost labor for short term tasks and projects. For students, the most important motivation for working while in school is getting experience in their field that they can market to future employers when seeking full-time employment after graduation. This is advantageous for companies because they can offer in-field work to students without having to pay for normal consultancy prices. We want to provide a platform to connect these two groups together to provide value for both students and companies. Our platform will act as the mediator between the two parties, hosting jobs available from companies and student profiles, and handle all payment and work submission processes as well as messaging. We plan to use modern web development tooling to help us make this platform as engaging and interactive as possible.

1.0 Problem

Many first or second year students have a hard time finding professional experience pertaining to their major. In the beginning of many students' academic career, it can be daunting to find an internship because of a lack of experience. As a result, many do not end up with an internship until their junior or senior year.

Additionally, it can be hard for companies to find people to do specialized work for a short period of time. Say a small company wants to build a website, but no one at the company

knows about web development. At this point, the company would either use some mediocre template or pay a professional to make it at a high cost.

These two parties have a problem of their own, but each party is able to solve the other's problem with the use of Sider. By being able to connect companies to the students, both sides will be able to develop a symbiotic relationship where the company gets a service and the student(s) gets experience.

2.0 Objective

The objective of this project is to create a platform to connect university students and companies, allowing companies to hire students to perform one-off or short duration jobs. In exchange, students will receive monetary compensation as well as relevant experience in their industry or field of study. Companies will be able to post their work opportunities and target users with specific skill sets, such as programming or graphic design. Meanwhile, students can upload their skills or credentials in order to be recommended relevant jobs, or they can search for open job postings on the website.

3.0 Background

3.1 Key Concepts

One concept that this product relies heavily on is a way two market. This is a market like User or Airbnb where there are two users. The users who provide and the users who consume. This market is normally hard to market and create for because you have to balance time between both users.

Another concept that we will rely on heavily is suggestive AI. This is the concept of using previous data to inform a machine learning model of a user and predict what would be a good fit for the model. We use this to suggest jobs for users and vice versa.

3.2 Related Work

Similar platforms to this project include Fiverr, Upwork, and Freelancer. All of these platforms allow for the creation of short-term contractual work agreements wherein the site acts as the mediator if any disputes arise about the completion of the work. They allow people to freelance specialized labor for different tasks to be done by a person or company, however this does not support students or unprofessional individuals. The biggest value-add of these platforms comes from their large catalogues of gigs and users. The other value-add is their ability to mediate disputes from workers and those who requested the work. They have very

intelligent systems in place to monitor for fraud and prevent malicious actors from abusing their systems. This is something our application would have to replicate to be successful.

4.0 Design

4.1 Design Goals

Job Posting

A company should be able to post a job and outline the criteria that is needed to make that job successful and the amount of money they are willing to pay to get this job done.

Job Look Up / Suggestion

A user should be able to look up jobs on the job page. These jobs should be local to the user who is looking for them. There should also be suggested jobs that are based on the users past work and their proclaimed skills

User Suggestion

When a company makes a job they should get suggested users that would be most likely to complete the job.

Applying For Job

Users will be able to apply for jobs by detailing their qualifications, skills, etc and the company will decide on the person/group of people if they need more than one person to do that job.

Chat

After a company has accepted a user for a job they should be able to chat about the job and send files and other important information through the platform.

Ratings

After a transaction has been completed both the student will have the option to rate the company and the company to rate the user, this will allow companies and users to build profiles and a reputation that either mark them as a good student/company or an

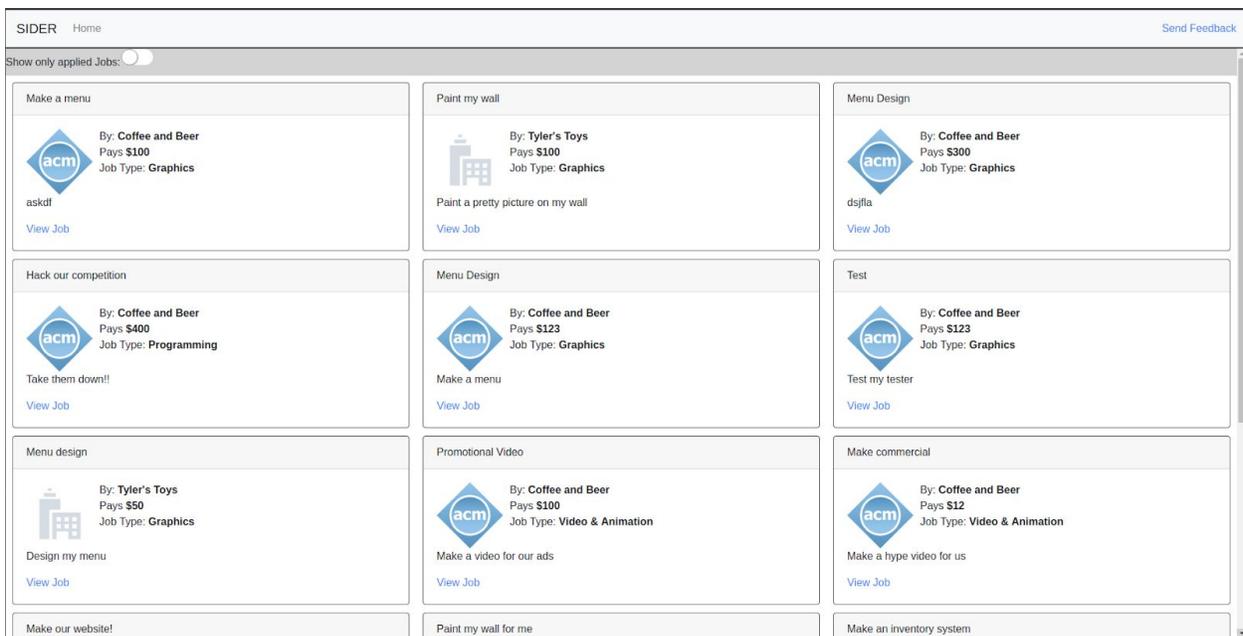
untrustworthy student/company. This allows companies and students to make better decisions when choosing to hire a student or take a job with a company.

4.2 High Level Architecture

There will be two main parts of this product. The first part is a functional KoaJS API that would be hosted on Google Cloud. There will be persistent WebSockets running for notifications and chat within the application. If we decide to use microservices then we will split up the backend into different services all running on different cloud machines. This way if one service is used more than the others than you could spin up more instances of just that service via the Google Kubernetes Engine. There will be a mongoDB database that the server(s) access in order to keep track of everyone's data and paths to their files in a Google Cloud Bucket.

The second main part will be an online web application created with NextJS which does server-side rendering that is hosted on a heroku web server. This allows for easy, clean, and fast front-end development and performance while abstracting away networking concerns into services that are much simpler to develop, change, and debug. We will use open source front-end rendering frameworks to aide in the composition of different types of media.

User access and authentication will happen through the employment of standards like OAuth in order to reduce the amount of network operations and security protections our team has to develop in-house.



4.3 Risks

Risk	Risk Reduction
Data Privacy	We are currently using encrypted JWTs to securely store users' session information. Eventually we plan to update the current authentication and authorization system to use Auth0. While we will collect information about our users and their interactions with the site, we do not plan to store any financial information, such as credit card details. We will instead use a third-party service, such as Stripe, to handle all transactions.
Companies and students are not able to find each other effectively.	We plan to initially use a basic matching scheme to pair users with recommended jobs based on their professed skill set. Eventually, we hope to transition to a machine-learning system to identify jobs that are particularly well-suited to each user.
Disputes between students and companies over the completion of or payment for a job.	When a user and company enter into an agreement to do a specific job, we will initially hold half of the agreed upon fee in escrow. In the event a student does not complete a job to the company's satisfaction, we will hold the money until the dispute has been resolved or successfully mediated..

4.4 Tasks

Research Tasks

1. Research Payment APIs to use and the pros and cons of each
2. Research different ways of handling forms and libraries out there that are better than Formik

DevOps Tasks

1. Add testing for Front-end
2. Add testing for back-end
3. Add Auto-Deploying on Gitlab

Application Task

1. Add "My jobs" page for companies
2. Add search for jobs
3. Google Login
4. Move to Auth0
5. Add payment system
6. Add job / user recommendations
7. Add more user media and data options
8. Add rating system

Testing Task

1. Write front end tests
2. Write backend tests
3. Add integration tests

4.5 Schedule

Tasks	Dates
DevOps Task 1 Application Task 1-2 Testing Task 1 -2	Week 1 - Week 2 January 14 - Jan 24
DevOps Task 2 Application Task 3 Research Task 1	Week 3 - Week 4 Jan 27 - Feb 7
DevOps Task 3 Application Task 4 Research Task 2	Week 5- Week 6 Feb 10 - Feb 21
Application Task 5 - 6	Week 7 - Week 8 Feb 24 - Mar 6

Application Task 7	Week 9 - Week 10 Mar 9 - Mar 20
Application Task 8	Week 11 - Week 12 Mar 23 - Apr 3

4.6 Deliverables

- Project Architecture: This will contain detailed documentation of each function of the backend / web app. It will also include a diagram describing the flow of the architecture (Micro-service architecture potentially)
- Source Code: This will contain the source code for the front-end (NextJS) and the back-end (KoaJS)
- Final Report: Will describe what works, what needs to be worked on if picked up in the future, and describe the reasoning behind the decisions made.

5.0 Key Personnel

Adam Goertz — Goertz is a senior Computer Engineering major at the University of Arkansas. He has worked as a software intern at Cerner Corporation during the summer of 2019 and works in the AESIR lab at the university researching capacitive sensing applications.

Luke Brandon - Luke Brandon is a junior Computer Science major at the University of Arkansas. He has completed or is enrolled in nearly all of the computer science courses required for graduation. He has worked as a Software Development Engineer at Amazon Web Services, IoT Core in Seattle, WA over the summer of 2019. Brandon will be responsible for full stack development of the front and back-end of the service.

Tyler Tracy - Tracy is a junior Computer Science at the University of Arkansas. He has had an internship with SupplyPike during his sophomore year and an internship at Google Cloud the summer before his junior year. Track will be the project lead for this semester and will be responsible for assigning and creating task as well as full stack development.

Samuel Le - Le is a senior Computer Science major in Computer Science and Computer Engineering Department at the University of Arkansas. He has had an internship with J.B. Hunt during his junior year, a research position with the Department of Education Reform at the

University of Arkansas during his junior year, and with Walmart during the summer after his junior year. He will be responsible for full stack development.

Marshall Richards - Marshall is a junior Computer Science major at the University of Arkansas. Before starting university, he worked as a software engineer intern for Microsoft in the summer of 2017. Since the summer of 2019 he has interned for Segway Inc. as a robotics engineer intern.

6.0 References

[1] <https://www.gallup.com/workplace/240929/workplace-leaders-learn-real-gig-economy.aspx>

[2] <https://koajs.com/>

[3] <https://www.freelancer.com/>

[4] <https://www.upwork.com/>

[5] <https://www.fiverr.com/>

[6] <https://nextjs.org/>