

# JACOB WILLIAM CROUCH

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## EDUCATION

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**University of Michigan (Senior)**  
Major: Computer Science (3.32 GPA)

*September 2015 - Present*

## SKILLS

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<b>Skills</b>	c/c++, Python, javascript, SQL, AJAX, Jinja, React, Flask, Rest API
<b>Languages</b>	Spanish: Limited Working Proficiency

## COURSEWORK

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| • System Design of a Search Engine in c++      | • Database Management Systems              |
| • Web Systems and Design                       | • Introduction to Computer Security        |
| • Data Structures and Algorithms               | • Cryptography                             |
| • Foundations of Computer Science              | • Programming Introductory Data Structures |
| • Introduction to Statistics and Data Analysis | • Computer Organization                    |

## Projects

- **Search Engine:** Currently building a search engine in c/c++ linux with a small team of students using our own libraries. As of now, I've built a query compiler and HTML parser. This project emphasizes project planning, system design, multi-threading, sockets, system calls, data storage, and atomicity.
- **Web App:** Built a mock instagram web app with client-side dynamic pages using Flask, React/JS, python, sqlite, and REST API. Included infinite scrolling and sessions.
- **Creative AI:** Used natural language processing to create new Beatles songs from their lyric catalog and new Nintendo music. This project taught me how to work with python and its different libraries. I also learned basic NLP techniques. I enjoyed this project because it combined coding with music.
- **Virtual Stock Exchange:** Created a virtual market of buyers and sellers with priority queues. I also added features such as a time traveler mode to go back and make maximal profit, a trader-info mode where the activity of each trader was recorded, and a median mode where I maintained a running median of daily stock prices. This project really tested my debugging skills.
- **Machine Learning:** Trained models based on user data to recognize types of posts on a Piazza forum. In this project I learned how to use classifiers and train data.
- **Image Processing:** Implemented a seam carving algorithm to resize images while keeping the most important pixels. For this project I had to read a paper on the seam-carving algorithm and then implement it. Not only was the project very cool, but I learned how to read technical papers.
- **Approximating TSP:** Implemented an MST and nearest neighbor heuristic and used branch-and-bound technique to 2-approximate TSP for up to 40,000 vertices and exactly for up to 40. This project really challenged me due to its overall size and the need to research and apply heuristics. I struggled with run time until I changed heuristics, learning that sometimes you have to change your approach.

## INTERESTS

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|-------------------|-------------|------------------------|
| • Backend         | • Databases | • Software Development |
| • Web Development | • Security  | • Soccer               |