

Julian Fletcher

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EDUCATION

University of Missouri

Columbia, MO

M.S. Computer Science (GPA: 3.8)

Expected May 2027

– Advised by Dr. Jeffrey Uhlmann

B.S. Computer Science (GPA: 3.68)

May 2026

– Minor in Mathematics, Geography, Information Technology

RESEARCH INTERESTS

Graph algorithms; constrained shortest paths; geographic information systems; vehicle kinematics; spatial network analysis

RESEARCH EXPERIENCE

Shortest Path Planning Under Turn Radius Constraints

April 2024 — Present

Undergraduate Researcher, McNair Scholar

University of Missouri

Advised by Dr. Jeffrey Uhlmann

- Developed graph-based framework to enforce turn-radius constraints in shortest-path planning by combining angular restrictions with minimum edge-length requirements.
- Proved equivalence between static preprocessing and query-time filtering paradigms, verifying that both produce identical feasible paths under the same constraints.
- Demonstrated length-awareness eliminates infeasible maneuvers admitted by angle-only baselines in high-resolution graphs.
- Implemented a C++ testing framework to empirically evaluate constrained search behavior across graph resolutions and obstacle configurations.
- Observed more than 10% reduction in graph edge counts through static preprocessing of minimum edge length requirements.
- Manuscript in preparation.

Turn-Radius Constrained Isochrones

January 2026–Present

Graduate Researcher

University of Missouri

- Developed modified routing algorithm to integrate physical vehicle turn restrictions into standard reachability models.
- Processed projected OSMnx road network data to compute and visualize time-constrained reachable areas in urban environments.
- Quantifying reductions in reachable network area caused by limited access to side-streets in turn-constrained routing when compared to traditional unrestricted baselines.
- Investigating extensions of turn-constrained reachability models to off-road and obstacle-constrained environments where standard road network assumptions do not apply.

TEACHING EXPERIENCE

- **Guest Lecturer**, *CMP SCI 3050: Advanced Algorithm Design*, University of Missouri, April 2026
Lecture: “Constrained Shortest Path Planning.”
- **Graduate Student Lecturer**, *GEOG 4750: Spatial Analysis*, University of Missouri, April 2026
Lecture: “Modeling Reachability with Isochrones.”

PRESENTATIONS

Oral Presentations

- “True Turn-Radius Constrained Paths.” *MAC Academy Scholars Discover Undergraduate Research*, University of Missouri, July 2025.
- “True Turn-Radius Constrained Paths.” *McNair Scholars Conference*, University of Missouri, May 2025.

Poster Presentations

- “Shortest Path Planning Under Turn Radius Constraints.” *Undergraduate Research Day*, University of Missouri, May 2026.
- “Shortest Path Planning Under Turn Radius Constraints.” *Show Me Research Week*, University of Missouri, April 2026.
- “Shortest Path Planning Under Turn Radius Constraints.” *College of Engineering Research Day*, University of Missouri, April 2026.
- “True Turn-Radius Constrained Paths.” *McNair Scholars Conference*, University of Missouri, May 2025.

HONORS AND AWARDS

Outstanding Senior — College of Engineering, University of Missouri 2026

- One of two EECS recipients selected based on evaluation of academic standing, undergraduate research, and leadership within the College and broader campus community.

Undergraduate Research Fellowship 2026

- Awarded competitive fellowship by the University of Missouri College of Engineering to support undergraduate research.

McNair Scholars Program 2024 — 2025

- Selected for undergraduate research preparation program for undergraduate students.

APPLIED GEOSPATIAL RESEARCH

SAR Flood Extent Mapping | *Sentinel-1*, *SNAP*, *ArcGIS Pro* Oct 2024 – Dec 2024

- Mapped 2024 Minnesota River flood extents by executing a multi-stage SAR processing workflow, bypassing cloud-cover limitations inherent in optical sensors.
- Performed pre-processing in SNAP including thermal noise removal, backscatter normalization (σ^0), Gamma Map speckle filtering, and Range-Doppler Terrain Correction using Copernicus DEM.
- Conducted change detection and thresholding analysis (backscatter ≤ -17 dB) to isolate floodwater, identifying significant inundation along the river corridor despite post-crest acquisition.

PROFESSIONAL EXPERIENCE

Enterprise Mobility St. Louis, MO

Software Engineering Intern May 2025 – July 2025

- Engineered a billing transparency feature for international brands (Enterprise, National, Alamo) by updating React UI components and integrating RESTful APIs to handle dynamic refueling charges.
- Implemented French Canadian localization (i18n) for billing modules to support international compliance.
- Executed a large-scale repository refactoring of Material UI (MUI) imports to resolve a dependency conflict causing file descriptor exhaustion on Windows development environments.

TECHNICAL SKILLS

Programming: C++, C, Python, JavaScript (React.js), TypeScript, Java, HTML, CSS, SQL

Research: Algorithm Design, Complexity Analysis, Data Analysis, Performance Benchmarking

Geospatial: Sentinel-1 SAR Imagery, ArcGIS Pro, ArcPy, SNAP (Sentinel Application Toolbox), Change Detection, OSMnx

Tools: Git, CMake, Jupyter, L^AT_EX, MATLAB