

David Gusmao

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RESEARCH INTERESTS

Applied AI systems and the evaluation methods that validate them: LLM agent design, retrieval grounding and citation enforcement, guardrail and refusal behavior, and the measurement problem of separating genuine capability from fit to a chosen benchmark. Secondary interests in empirical software engineering, particularly build-system reliability and reproducibility, and in human-computer interaction at the level of accessible, well-structured interfaces.

EDUCATION

University of Central Florida

B.S. in Computer Science

Expected December 2026

Orlando, FL

GPA: 3.38

Milestones: Passed the Computer Science Foundation Exam

Funding: Bright Futures Academic Scholarship

RESEARCH EXPERIENCE

Undergraduate Research Assistant: Hardening Build Systems

University of Central Florida

Oct 2025 – May 2026

Orlando, FL

Faulty Advisor: Brent Pappas

- Contributed to empirical research on the security and reliability of open-source software build systems.
- Diagnosed build failures by hand across six build systems (Autotools, Make, CMake, Maven, Gradle, Ant), including undeclared JDK version requirements and compiler-flag incompatibilities that appear nowhere in the source tree.
- Built the tooling that converts raw experimental output into LaTeX-ready tables and pgfplots figures used in project reporting.
- Supported reproducible workflows by organizing datasets, validating results, and documenting analysis steps so runs could be repeated by others.

Research Assistant: Human Factors Group Study

University of Central Florida

Feb 2025 – May 2026

Orlando, FL

Faulty Advisor: Brent Pappas

- Ran experimental sessions for a study of how programmers debug code collaboratively in groups, contributing to data collection workflow and study setup.
- Instrumented participants with biometric equipment measuring heart rate, respiration, skin conductance, gaze, and prefrontal cortex blood oxygenation, improving measurement quality across sessions.
- Worked under human-subjects research protocol; completed the associated ethics training listed under Certifications.

TECHNICAL LEADERSHIP

Project Manager & Technical Lead: Knights Counsel

UCF Senior Design, Sponsored Capstone

Jun 2026 – Present

Orlando, FL

Two-semester sponsored capstone delivering a permission-aware AI document-retrieval assistant for a university legal office. The system answers questions against a live document corpus inside the client's enterprise Microsoft 365 tenant, returns citations with its answers, and declines to answer when retrieval does not supply sufficient grounding. Reached MVP status in August 2026.

LEADERSHIP

- Lead a five-person team in the dual role of project manager and technical lead: scope definition, work sequencing, task assignment, and client-facing communication.

- Reversed an earlier six-agent architecture to a two-agent topology on latency and per-message cost evidence, and recorded the reversal as an architecture decision record rather than deleting the superseded design.
- Redirected the team's critical path to metadata schema implementation after evaluation evidence contradicted the prevailing assumption that the failure was a prompting problem.
- Established a taxonomy and naming standard for the document corpus and agent configuration.

SYSTEMS ENGINEERING

- Designed and built the retrieval agent end to end: two-agent orchestration topology, thirteen specified behavioral requirements, grounding and citation enforcement, and a version-controlled configuration baseline.
- Specified refusal behavior so the agent declines rather than speculates when retrieval returns insufficient grounding, and made that behavior a graded requirement rather than an incidental property.
- Implemented on Microsoft Copilot Studio with SharePoint Online document storage, Microsoft Entra ID permission inheritance, and Power Automate.
- Prototyped a SharePoint Framework (SPFx) front end in React, TypeScript, and Fluent UI; descope'd from the MVP critical path.

EVALUATION

- Built an eighteen-case evaluation suite and a custom seven-label grading rubric after determining that the platform's built-in grader scored answer rate rather than designed behavior, marking every intended refusal as a failure.
- Established a multi-run testing methodology after single-run results proved non-reproducible across consecutive executions of the same case set.
- Demonstrated through controlled multi-run testing that semantic retrieval was presenting unfiltered results as filtered answers, and traced the cause to an absent query predicate rather than to prompt phrasing.

Stack: Microsoft Copilot Studio, SharePoint Online, Microsoft Entra ID, Power Automate, React, TypeScript, Fluent UI, SPFx

TECHNICAL WRITING

Knights Counsel: Technical White Paper, v1.0

August 2026

Co-author

Sole author, system design and behavior specification sections

- Full technical account of the system's architecture, behavior specification, evaluation methodology, and results.

Knights Counsel: Final Design Document, v2

2026

Contributing author

Co Author, system design section

- Requirements, architecture, and design rationale for the sponsored capstone, including the behavior test set and the architecture decision record covering the six-agent to two-agent reversal.

SOFTWARE PROJECTS

Build-Recipe Inference Agent | *Python, Docker, Anthropic API, Linux*

May 2026 – Present

Independent research and engineering project on automated build inference.

- Building a containerized LLM agent that infers and executes build recipes for unfamiliar source archives: selecting the build system, installing system and toolchain dependencies, and running each build phase in a fresh isolated container.
- Designing a cross-tool comparison running three build-inference systems over three program corpora, evaluated against a hand-verified corpus of approximately 370 build recipes across multiple languages and build systems.
- Research motivation: Build reproducibility is an integral part of good software engineering but it is often difficult to achieve. Work has already been done to automate this process however, they only end up preserving the completed build, or only working for specific ecosystems. These outputs don't produce the documentation one would need to reproduce and understand the build.
- Status: environment and harness in progress; comparison design complete, results pending.

- PocketProfessors** | *React, TypeScript, Node.js, Express, MongoDB, JWT* Jul 2025
- Led frontend UX for pack-opening and collection views: responsive grid, focus states, and ARIA labeling.
 - Designed all art for website and cards.
 - Collaborated on API shape and the JWT refresh lifecycle across a team build.
 - Deployed at pocketprofessors.com.
- FitnessFunctions** | *PHP, MySQL, HTML/CSS, JavaScript* Nov 2025
- Solo-built role-based class enrollment system with separate admin and member dashboards, instructor and class CRUD, and capacity-aware enrollment backed by MySQL.
- Personal Portfolio and Resume Site** | *HTML, CSS, JavaScript* 2025 – Present
- Hand-written with no framework; implements skip links, section-level ARIA labeling, reduced-motion support, visible focus outlines, and a per-project accent theme system.
 - Live at d4davidg.github.io.
- CS Majors vs Gorilla (Contact Manager)** | *JavaScript, PHP, AJAX/XHR, HTML/CSS* Jun 2025
- Served as project manager for a small team build: contact CRUD with search and form validation over PHP endpoints via XMLHttpRequest.

TECHNICAL SKILLS

Languages: Python, JavaScript, TypeScript, Java, PHP, C++, HTML, CSS, Bash, LaTeX

Front-End and Web: React, Node.js, Express, Fluent UI, SharePoint Framework (SPFx), semantic HTML, responsive CSS (Flexbox/Grid), WCAG accessibility patterns

AI and Agent Engineering: LLM agent design, retrieval-augmented generation, grounding and citation enforcement, guardrail and refusal design, tool-use and function-calling interfaces, structured JSON output contracts, Anthropic API, OpenAI API, Microsoft Copilot Studio, Microsoft Power Platform

Evaluation and Research Methods: evaluation suite and rubric design, regression testing for non-deterministic systems, run-to-run variance analysis, pass@k, precision and recall, ground-truth construction, failure taxonomy, experimental design, literature synthesis, human-subjects study support

Systems and Infrastructure: Docker, Linux/WSL2, MongoDB, MySQL, Apache (LAMP), MERN, build systems (Autotools, Make, CMake, Maven, Gradle, Ant), SharePoint Online, Microsoft Entra ID, Power Automate

Tools and Practice: Git/GitHub, Jira, Confluence, Postman, VS Code, Overleaf, architecture decision records, technical documentation

AWARDS AND HONORS

2024: 3rd Place, UCF Horse Plinko Cyber Defense Competition

Ongoing: Bright Futures Academic Scholarship

CERTIFICATIONS AND TRAINING

- Human Subjects Research: Social/Behavioral (Group 2)
- Responsible Conduct of Research (Engineers)
- Certified Internet Business Associate
- Microsoft Technology Associate: Windows Operating System Fundamentals
- Microsoft Technology Associate: Introduction to Programming Using Python
- American Red Cross Water Safety Instructor

PROFESSIONAL EXPERIENCE

Swim Instructor and Lifeguard Jul 2023 – Present
Rosen Aquatic and Fitness Center Orlando, FL

- Teach small-group lessons across all ages and ability levels, from water survival through competitive swimming.
- Own class scheduling and documentation, large event setup, and pool surveillance.
- Communicate across age groups and language barriers in a safety-critical setting.