

# NICHOLAS TAPP - HUGHES

🔗 nicholastapphughes.com | 📧 nicholas.tapphughes@gmail.com | 💬 Nick Tapp-Hughes | 🌐 tapphughesn

**Full-Stack Engineer** focused on building web, AI/ML, and data applications that meet stakeholder needs.

## EXPERIENCE

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### Software Developer

*Epic Systems Corp., July 2023–July 2025*

- Developed system that enabled hospital admins to configure clinical follow-ups from medical imaging insights.
- Drove 20% performance gain (according to internal experimentation) and UX improvements in 2 application components by migrating them from Visual Basic to .NET/C# and React.
- Wrote 2 technical designs, presented to customers, and collected user feedback for an LLM-extracted insights project which resulted in earlier diagnosis for 70% of lung cancer cases at The Christ Hospital.
- Shipped bug fixes across the client, server, and databases at a weekly cadence to 500+ healthcare systems.

### Graduate Student Researcher

*UNC Computer Science, Aug 2021–May 2023*

- Achieved 22% improvement in autism classification accuracy on a 3D mesh hippocampus dataset by developing new methods for extracting interpretable statistical features of 3D objects.
- Boosted research lab productivity by maintaining our Python repo, developing scripts for orchestrating experimentation, cleaning datasets, and introducing visualization tools.
- Published scientific paper in the Journal of Mathematical Vision and Imaging.

### Graduate Research Assistant

*UNC Gillings School of Public Health, Aug 2021–June 2025*

- Improved policymakers' understanding of smoking behavior in the US adult population by building a microsimulation model that predicts year-over-year smoking behavior at the individual level.
- Accelerated the project team's productivity and synchronization by maintaining the codebase, building sensible data pipelines, sharing regular results, recommending technologies, and onboarding new people.
- Published in PLoS One; submitted to Nicotine and Tobacco and Society for Research on Nicotine and Tobacco.

### Software Engineering R&D Intern

*Sila Nanotechnologies Inc., June 2022–Aug 2022*

- Improved physical measurement accuracy in chemical R&D processes by developing improvements to a proprietary computer vision pipeline, writing documentation, and advising future development strategy.

## PROJECTS & SYSTEMS BUILT

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### Evolutionary Skeletal Representations Algorithm

An algorithm for determining salient statistical features of 3D objects using skeletal representations. Subroutines include differential geometric processing, computation of diffeomorphic LDDMM registrations, geometric landmark (vertices, crest curves) localization, coordinate system transformation, ellipsoid approximation, and direct s-rep parameter optimization. Python and C++ components were composed in a single scripted pipeline.

### Smoking Behavior Microsimulation Model

A 2<sup>nd</sup> order Markov chain multinomial logistic regression model simulating the smoking behavior of individuals over the course of their lifetimes, scaled up to the entire US adult population. Tobacco smoking behavior, mortality, and incidence of lung cancer and cardiovascular disease are predicted based on individual age, sex, race/ethnicity, and smoking status plus societal factors. Accompanied by large scale experimentation and data analysis.

### Nick Tapp-Hughes's Blog

A personal website and blog built using React/Vite and hosted on AWS (Amplify, S3, Lambda, SES) with Cloudflare DNS services. Supports verified subscribers and automatically converts Google Docs into HTML blog posts.

## PUBLICATIONS

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- Stephen M. Pizer, Zhiyuan Liu, Junjie Zhao, Nicholas Tapp-Hughes, James Damon, Miaomiao Zhang, JS Marron, Mohsen Taheri, Jared Vicory, "Interior Object Geometry via Fitted Frames," Available: Springer, <https://rdcu.be/eFX0G>.
- Nicholas Tapp-Hughes, "A 3d U-net for Segmentation of Subcortical Structures In MR Images of 12 and 24 Month-old Infants," Available: Carolina Digital Repository, <https://cdr.lib.unc.edu/concern/theses/4f16c8286>.

## SKILLS

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**Technologies:** Python, git, Linux, Docker, AWS, C, C++, C#, Rust, SQL, MongoDB, TypeScript, React, L<sup>A</sup>T<sub>E</sub>X

**Areas of expertise:** Machine Learning and AI, Data Analysis and Processing, Full-Stack Web Development

## EDUCATION

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### University of North Carolina at Chapel Hill

*B.S. Applied Mathematics, B.S. Computer Science*

- Cumulative GPA: 3.92/4, Math GPA: 3.87/4, CS GPA: 3.97/4

*August 2017–May 2021*

*M.S. Computer Science*

*August 2021–May 2023*