# NICHOLAS TAPP-HUGHES

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**Full-Stack Machine Learning Engineer** focused on building high-quality, accurate, and reliable systems that meet stakeholder needs. Experienced integrating machine learning technologies into real-world solutions.

## EXPERIENCE

**Software Developer** *Epic Systems Corp., July 2023–July 2025*
- Improved screening follow-up workflows for 80+ hospital systems (driven by customer feature requests) by architecting a configurable system that enables automatic follow-up care suggestions based on screening insights.
- Drove 20% performance gain (measured by realistic experimentation) and UX improvements (measured by user feedback) 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 62 bug fixes to 500+ healthcare systems by tracing logs and diagnosing issues across the full stack.
- Collected feedback/pain points, built trust, and facilitated installs during 20 days spent on-site with end users.
- Ensured reliability and maintainability by using test suites, analyzing performance, and favoring simple design.

**Graduate Student Researcher** *UNC Computer Science, Aug 2021–May 2023*
- Published a 22% improvement in autism classification accuracy on a 3D mesh hippocampus dataset by developing new methods for extracting interpretable statistical features of 3D objects (Journal of Math. Imaging and Vision).
- Boosted research lab productivity by maintaining our open-source Python/C++ repo, developing scripts for orchestrating experimentation, cleaning datasets, and introducing visualization tools.

**Graduate Research Assistant** *UNC Gillings School of Global Public Health, Aug 2021–Jun 2025*
- Improved policymakers' understanding of smoking behavior in the US adult population by building a microsimulation model (in Python) that predicts year-over-year smoking behavior at the individual level.
- Accelerated the project team's productivity and synchronization by maintaining the codebase, building robust data pipelines, sharing regular results, recommending technologies, and onboarding new people.

**Software Engineering R&D Intern** *Sila Nanotechnologies Inc., Jun 2022–Aug 2022*
- Improved physical measurement accuracy in chemical R&D processes by enhancing a proprietary computer vision pipeline (Python), writing documentation, and advising future development strategy.

**Medical Computing R&D Intern** *Kitware Inc., May 2021–Aug 2021*
- Contributed to itkArgus, an open-source on-device medical video analysis application, by integrating ITK and MONAI deep learning libraries for ultrasound processing and building with CMake across platforms.

## PROJECTS & SYSTEMS BUILT

**Evolutionary Skeletal Representations Algorithm**
An algorithmic pipeline for determining salient statistical features of 3D mesh objects using skeletal representations and differential geometric processing. Implemented with Python, C++, and shell scripts; released as open-source.

**Smoking Behavior Microsimulation Model**
A simulation of individual lifetime smoking behavior, for the entire US adult population, built with Python. Based on a $2^{nd}$-order Markov chain multinomial logistic regression model. Predicts smoking behavior, mortality, and incidence of disease based on individual and societal factors. Accompanied by large-scale data analysis.

**Nick Tapp-Hughes's Blog**
A personal website and blog built using React and hosted on AWS/Cloudflare. Uses an Amplify/DynamoDB/ Lambda/SES cloud stack + Python/Bash scripting to support verified subscribers, automatically convert Google Docs to HTML blog posts, and mitigate security risks such as email enumeration or DoS.

## SELECTED PUBLICATIONS

- Pizer, S. M., Liu, Z., Zhao, J., **Tapp-Hughes, N.**, Damon, J., Zhang, M., Marron, J. S., Taheri, M., Vicory, J., *Interior Object Geometry via Fitted Frames*, Journal of Mathematical Imaging and Vision. Available: https://rdcu.be/eFX0G.
- Mills, S. D., **Tapp-Hughes, N.**, Zhang, Y., Ribisl, K. M., Wiesen, C. A., Fan, J., & Hassmiller Lich, K., *Development and Validation of the Tobacco Use Individual-level Simulation and Tracking (TwIST) Model*, PLoS One. (in press)

## SKILLS

**Languages:** Python, C++, TypeScript, C#, Java, SQL, Rust
**Frameworks & Tooling:** PyTorch, TensorFlow, Hugging Face, AWS, Containerization, Linux, Git, LLM-Assisted Dev
**Other:** Machine Learning Research, System Design, Agile, Remote Team, Open Source, LLM APIs

## EDUCATION

**University of North Carolina at Chapel Hill**
*B.S. Applied Mathematics, B.S. Computer Science* *Aug 2017–May 2021*
- Cumulative GPA: 3.92/4,   Math GPA: 3.87/4,   CS GPA: 3.97/4
*M.S. Computer Science* *Aug 2021–May 2023*