Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Aerospace Engineering

Jean-Baptiste Jeannin, assistant professor of aerospace engineering, Department of Aerospace Engineering, and assistant professor of electrical engineering and computer science, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to associate professor of aerospace engineering, with tenure, Department of Aerospace Engineering, and associate professor of electrical engineering and computer science, without tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

Ph.D.	2013	Cornell University, Computer Science, Ithaca, NY
M.S.	2012	Cornell University, Computer Science, Ithaca, NY
M.Eng.	2008	Cornell University, Computer Science, Ithaca, NY
B.S.E	2007	Ecole Polytechnique, Mathematics & Computer Science, Palaiseau, FR

Professional Record:

2018 – present	Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan
2017 – present	Assistant Professor, Department of Aerospace Engineering, University of Michigan
2015 – 2017	Senior Researcher, Programming Languages Group, Samsung Research America, Mountain View, CA
2013 – 2015	Post-Doctoral Fellow, Computer Science Department, Cornell University, Ithaca, NY

Summary of Evaluation:

Teaching: Professor Jeannin has developed an undergraduate course on aerospace computing which is now a required course for all AERO majors. He has also taught graduate courses in aerospace information systems and programming languages. He has graduated one Ph.D. student and is currently mentoring another six Ph.D. students (as chair or co-chair). Professor Jeannin has earned a reputation as an outstanding instructor, and both undergraduate and graduate students view him as caring and empathetic, and particularly thoughtful towards students in need. He has also regularly advised undergraduate and graduate students and produced conference and journal papers with them.

Research: Professor Jeannin has made theoretical contributions in formal methods with applications to and impact in several disciplines including computer security, distributed systems, flight software, hardware systems, cyber-physical systems, and numerical methods. One example of his significant contribution is in the formal verification of distributed systems. His work introduced an innovative automated approach - instead of exhaustively searching for configurations in systems, the method focuses on discovering invariants by model-checking smaller system instances and then generalizing. He has also set an ambitious vision of providing end-to-end formal verification of numerical methods, beginning from a mathematical equation written on a piece of paper to guaranteeing an error threshold on the output of the code, which is also mechanically checked. Professor Jeannin's research is of a high standard, and the depth and breadth of his research is outstanding. He has also demonstrated the ability to develop collaborations with faculty members in widely different

disciplines, and steer those collaborations towards impactful outcomes. His research has been supported by both government and industry grants and contracts. He has been involved in securing a total of $2M ($1.25M his share) in grant funding and has $2.6M ($1.6M his share) in pending proposals, a strong indication of a growth trajectory. External reviewers agree on the outstanding quality of Professor Jeannin's work and the high regard his research community holds him in.

Recent and Significant Publications:

Nishant Kheterpal, Elanor Tang and Jean-Baptiste Jeannin, "Automating Geometric Proofs of Collision Avoidance with Active Corners," *Formal Methods in Computer-Aided Design* (FMCAD), 2022.

Liren Yang, Hang Zhang, Jean-Baptiste Jeannin and Necmiye Ozay, "Efficient Backward Reachability Using the Minkowski Difference of Constrained Zonotopes," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (EMSOFT), 2022.

Hammad Ahmad and Jean-Baptiste Jeannin, "A Program Logic to Verify Signal Temporal Logic Specifications of Hybrid Systems," *Hybrid Systems: Computation and Control* (HSCC), 2021.

Aakash Abhishek, Harry Sood and Jean-Baptiste Jeannin, "Formal Verification of Braking while Swerving in Automobiles," *Hybrid Systems: Computation and Control* (HSCC), 2020.

Haojun Ma, Aman Goel, Jean-Baptiste Jeannin, Manos Kapritsos, Baris Kasikci and Karem A. Sakallah, "I4: Incremental Inference of Inductive Invariants for Verification of Distributed Protocols," *Symposium on Operating Systems Principles* (SOSP), 2019.

Service: Professor Jeannin supports the department in the graduate committee, the aerospace computing curriculum committee, and its DEI committee. He has served in the CoE's Computing Curriculum Committee and served as a CoE representative for faculty recruitment interviews in CSE. He has been very active in conference organization and technical societies, serving on program committees in many leading conferences in his field. He is also an associate editor for the *Journal of Aerospace Information Systems*, the flagship journal for software from the American Institute of Aeronautics and Astronautics (AIAA), the main international professional organization for the aerospace community.

Professor Jeannin's engagement with DEI is also very strong. Besides being an active member of the AERO DEI Committee, he has been engaged in DEI activities both within and outside UM. He has twice served as the co-chair of the Verification Mentoring Workshop at CAV conference, one of the most prominent DEI initiatives in the field of formal methods. This year he was the co-chair and host of the NSF-funded Midwest Programming Languages Workshop at the University of Michigan, bringing a diverse group of graduate students from peer Midwestern universities. In addition, he has been deeply engaged with the African Undergraduate Research Adventure (AURA), hosting five undergraduate students from Ethiopia for summer research experiences under his supervision.

External Reviewers:

Reviewer A: "His work in any two or three of these areas would form a strong case for tenure: Why work in all five [areas]? There's a theme here: these are the fundamentals to ensure the safety of aerospace vehicles, or cars, or interacting collections of planes or cars, as they become semi-autonomous or autonomous."

Reviewer B: "JB has cracked difficult problems using his equally deep grasp of ideas from programming languages and formal methods."

Reviewer C: “one of handful of leaders in automated and interactive theorem proving to formally verify several classes of systems, specifically in CPS and distributed/network systems, and likely will be the leader in the numerical approximation interactive theorem proving as arisen in scientific computing.”

Reviewer D: “is emerging as a leader in the general area of verifying cyber-physical systems.”

Reviewer E: “[Prof. Jeannin] is among the few experts in the world with the necessary knowledge of continuous mathematics and interactive theorem proving to successfully carry out this research.”

Reviewer F: “Jean-Baptiste’s body of work is wide, deep, and, overall characterized by impec[c]able mathematical rigor.”

Reviewer G: “He has buil[t] an international reputation for research excellence in our field. Jean-Baptiste has routinely demonstrated exceptionalism in both the creativity and quality of his body of research; he shows tremendous future promise.”

Summary of Recommendation: Professor Jeannin is highly regarded in his community as an emerging leader in formal verification, with applications in a diverse range of areas. He has earned a reputation as an outstanding instructor, and has successfully developed and taught undergraduate and graduate courses, and earned a reputation as a caring and supportive instructor and mentor. It is with the support of the College of Engineering Executive Committee that I recommend Jean-Baptiste Jeannin for promotion to associate professor of aerospace engineering, with tenure, Department of Aerospace Engineering, and associate professor of electrical engineering and computer science, without tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Steven L. Ceccio, Ph.D.
Interim Dean of Engineering
Vincent T. and Gloria M. Gorguze Professor of Engineering
College of Engineering

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