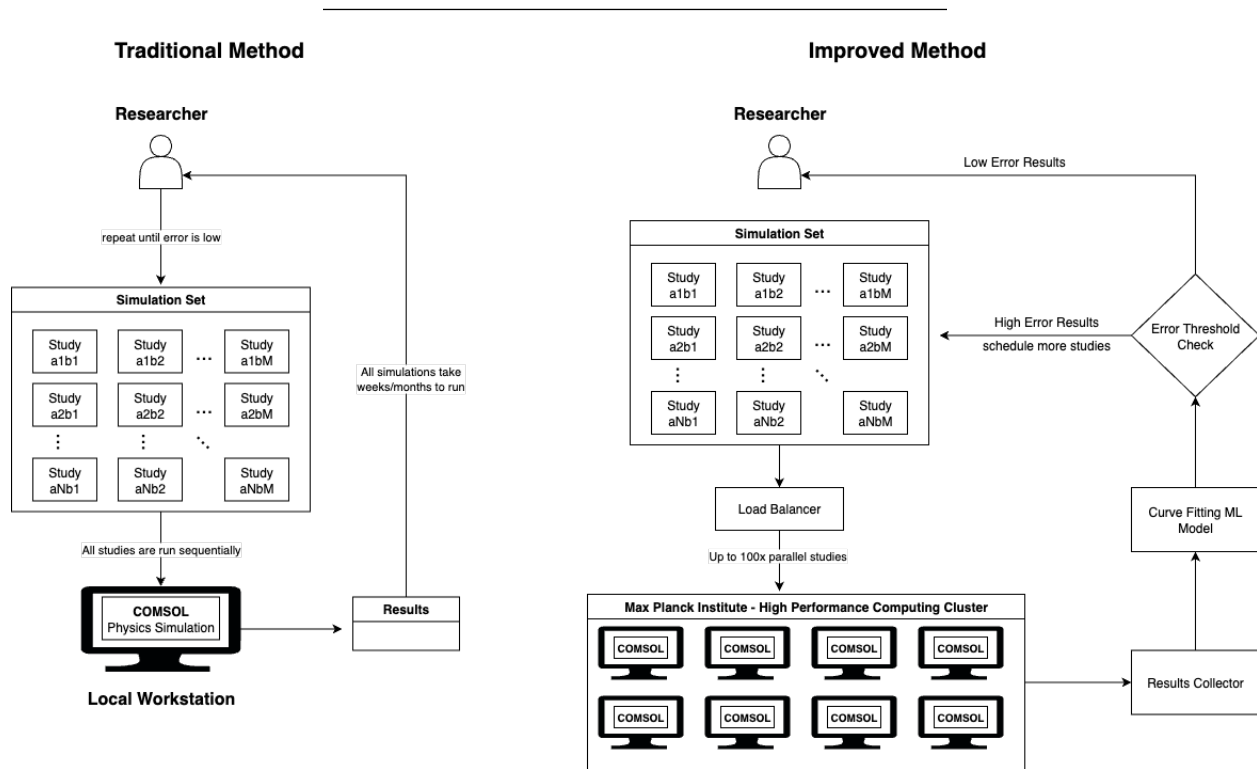


Optional Criteria 4.1 - Computational Physics Research at Max Planck Institute

During my research fellowship at Max Planck Institute for Intelligent Systems (2022), I was bound by the time it took to run CFD simulations on COMSOL, a physics simulation software. Running these simulations on local workstations took weeks or months, which severely limited our research velocity. I decided to move the entire testing suite to the Max Planck high-performance computing platform. This required extensive coordination. I had multiple meetings with the IT team to set up COMSOL on Linux and integrate it with the institute's job scheduling system. I then developed an ML-based job scheduling system that helps conduct CFD studies in a smarter way, achieving 200x faster data population. This breakthrough enabled 3 high-impact journal publications and 1 conference paper where I was co-first author on 2 of them. All my publications are open access, meaning thousands of people have viewed my work. Two of my papers alone have each received over 3,000 accesses. The papers have received over 25 citations and the number is increasing every day. Through open access publishing, I have contributed to making scientific research freely available to the global research community. After seeing my results, other PhD candidates at the lab across Germany also adopted my methodology and used the wiki page I created to replicate the setup.



High-level architecture of the HPC framework I developed - integrated COMSOL with Max Planck's job scheduling system

[nature](#) > [scientific reports](#) > [articles](#) > [article](#)

Article | [Open access](#) | Published: 23 June 2023

The mismatch between experimental and computational fluid dynamics analyses for magnetic surface microrollers

[Ugur Bozuyuk](#), [Hakan Ozturk](#) & [Metin Sitti](#) 

[Scientific Reports](#) **13**, Article number: 10196 (2023) | [Cite this article](#)

3336 Accesses | **9** Citations | **4** Altmetric | [Metrics](#)

Nature Scientific Reports publication - co-first author, 3,000+ accesses (Impact Factor: 3.9, h-index: 347)



Research Article | [Open Access](#) | 

Microrobotic Locomotion in Blood Vessels: A Computational Study on the Performance of Surface Microrollers in the Cardiovascular System

[Ugur Bozuyuk](#), [Hakan Ozturk](#), [Metin Sitti](#) 

First published: 04 June 2023 | <https://doi.org/10.1002/aisy.202300099> | Citations: 12

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Volume 5, Issue 9
September 2023
2300099

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Metrics

Citations: 12
Full text views: 3,128 



Advanced Intelligent Systems publication - co-first author, 3,000+ accesses (Impact Factor: 6.8, h-index: 21)

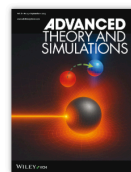
ADVANCED THEORY AND SIMULATIONS

Research Article | [Open Access](#) | 

Anisotropic Surface Microrollers for Endovascular Navigation: A Computational Analysis with a Case Study in Hepatic Perfusion

[Burak Arslan](#), [Ugur Bozuyuk](#), [Kıvanç Görgülü](#), [Erdost Yıldız](#), [Hakan Ozturk](#), [Lucia Liotta](#), [Volker Heinemann](#), [Hana Algül](#)  [Metin Sitti](#) 

First published: 06 May 2025 | <https://doi.org/10.1002/adts.202400387>



Volume 8, Issue 9
September 2025
2400387

 Figures  References  Related  Information

Metrics

Full text views: 670 

Advanced Theory and Simulations publication - co-author, 600+ accesses (Impact Factor: 2.9, h-index: 47)

MASS Conference MASS Conference paper - 4th publication from Max Planck research

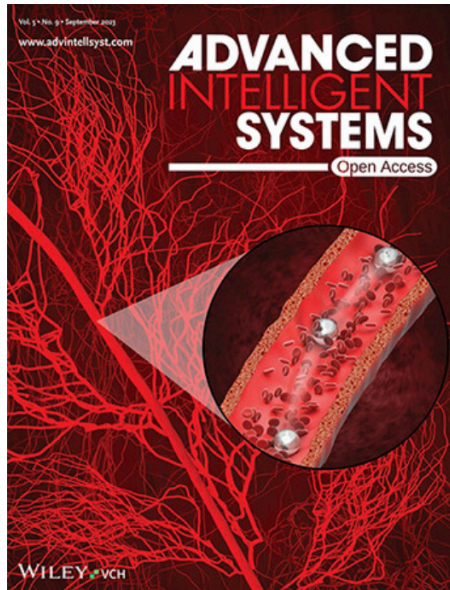
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2370042 | First Published: 23 September 2023



Surface Microrollers

Magnetic surface microrollers possess great potential for the navigation in the circulatory system for applications such as drug delivery. Computational fluid dynamics analyses were conducted by Metin Sitti and co-workers (article number **2300099**) to investigate the performance of surface microrollers in the human circulatory system and it was found that the microrollers are effective in veins and arteries for locomotion.

Abstract | **PDF**

Advanced Intelligent Systems back cover featuring my microrobotics research

Key numbers: 200x simulation speedup • 4 publications (3 journals + 1 conference) • 2 co-first author papers • 25+ citations and growing • Journal cover selection • Methodology adopted by PhD candidates across Germany • Created wiki documentation used by other researchers • Reduced simulation time from months to days

References:

- Max Planck Institute for Intelligent Systems: <https://is.mpg.de/>
- Scientific Reports: <https://www.nature.com/srep/> (IF/h-index from PubMed.ai citing Clarivate JCR)
- Advanced Intelligent Systems: <https://onlinelibrary.wiley.com/journal/26404567> (IF/h-index from Journal Searches citing JCR/Scopus)
- Advanced Theory and Simulations: <https://onlinelibrary.wiley.com/journal/25130390> (IF/h-index from WoS Journal Info citing JCR)