Artificial Intelligence, Biomechatronics, and Collaborative Robotics

Artificial Intelligence, Biomechatronics and Collaborative Robotics

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Summary

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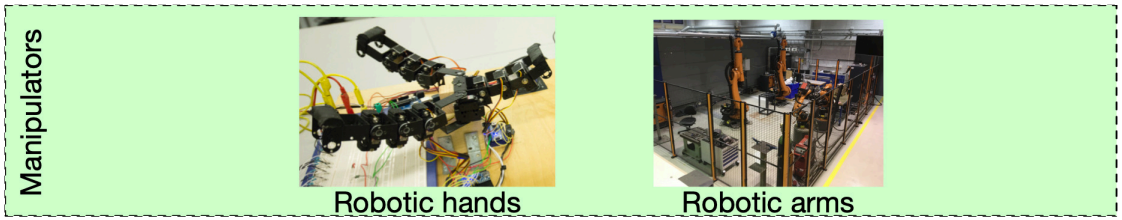

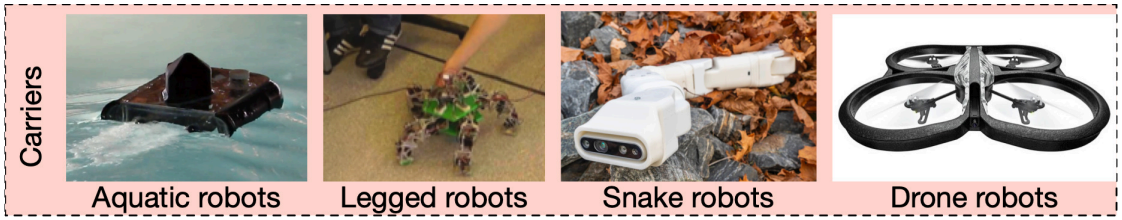

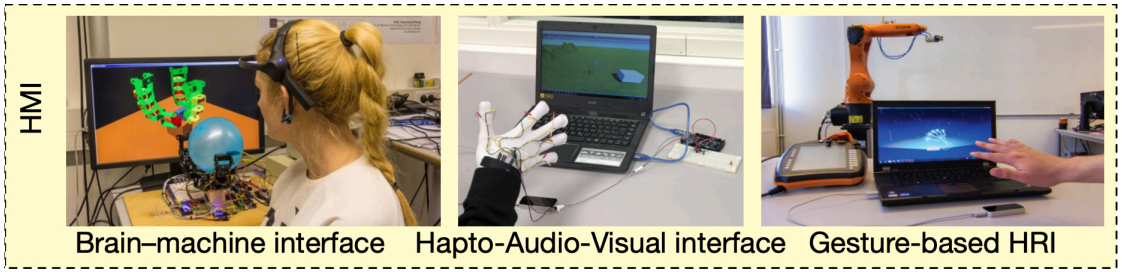

- Filippo Sanfilippo, Professor
- Mohammad Poursina, Associate Professor
- Muhammad Faisal Aftab, Associate Professor
- Svein Olav Glesaaen Nyberg, Associate Professor
- Morten Ottestad, Assistant Professor
- Hareesh Chitikena, PhD Fellow
- Minh Tuan Hua, PhD Fellow
- Even Falkenberg Langås, PhD Fellow
- Muhammad Hamza Zafar, PhD Fellow
- Syed Kumayl Raza Moosavi, PhD Fellow
- Martin Bjaadal Økter, Master Student

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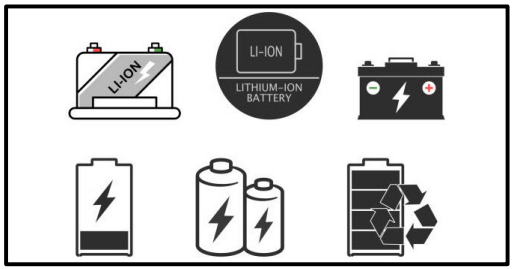
Video: https://youtu.be/4yttOVVFQ3g

Research Projects



Research Projects:

- RFFROGALAND. Development of battery modules. Co-investigator (CI). Budget: 1MNOK.
- KOMPFORS Competence center for major research and innovation initiatives in Agder. Principal Investigator (PI) for the Robotics cluster.
- Beyond the Classroom: Virtual Reality, Augmented Reality, and Haptics for Enhanced Surgical Training and Education (ImmersiveSurgicalEdu). PI. Budget: 250KEUR.
- Integrating virtual and AUGMENTED reality with WEARable technology into engineering EDUcation (AugmentedWearEdu). PI. Budget: 200KEUR.
- European network for 3D printing of biomimetic mechatronic systems (EMERALD). CI. Budget: 200KEUR.

Biomechatronics and Motion Platform

Video[5]: https://youtu.be/bzvPmc6_dmU

[5] Julie Madelen Madshaven et al. "Investigating the user experience of virtual reality rehabilitation solution for biomechatronics laboratory and home environment". In: *Frontiers in Virtual Reality* 2 (2021), p. 645042.

Twilligent, Empowering industries with digital twins and AI

Video[6]: https://youtu.be/ucsNbsLo6fM

[6] Filippo Sanfilippo et al. "Pervasive and Connected Digital Twins for Edge Computing Enabled Industrial Applications". In: (2023), pp. 6789–6798.

Selected Publications

1. Syed Muhammad Salman Bukhari et al. "Secure and privacy-preserving intrusion detection in wireless sensor networks: Federated learning with SCNN-Bi-LSTM for enhanced reliability". In: *Ad Hoc Networks* 155 (2024), p. 103407
2. Muhammad Hamza Zafar et al. "A novel hybrid deep learning model for accurate state of charge estimation of Li-Ion batteries for electric vehicles under high and low temperature". In: *Energy* (2024), p. 130584
3. Muhammad Hamza Zafar, Even Falkenberg Langås, and Filippo Sanfilippo. "Empowering human-robot interaction using sEMG sensor: Hybrid deep learning model for accurate hand gesture recognition". In: *Results in Engineering* 20 (2023), p. 101639. ISSN: 2590-1230
4. Syed Muhammad Salman Bukhari et al. "Federated transfer learning with orchard-optimized Conv-SGRU: A novel approach to secure and accurate photovoltaic power forecasting". In: *Renewable Energy Focus* 48 (2024), p. 100520. ISSN: 1755-0084
5. Syed Kumayl Raza Moosavi et al. "Early Mental Stress Detection Using Q-Learning Embedded Starling Murmuration Optimiser-based Deep Learning Model". In: *IEEE Access* 11 (2023), pp. 116860–116878
6. Hassan Mohyuddin et al. "A comprehensive framework for hand gesture recognition using hybrid-metaheuristic algorithms and deep learning models". In: *Array* 19 (2023), p. 100317
7. Muhammad Hamza Zafar et al. "Hybrid deep learning model for efficient state of charge estimation of Li-ion batteries in electric vehicles". In: *Energy* 282 (2023), p. 128317
8. Muhammad Hamza Zafar et al. "Step towards secure and reliable smart grids in Industry 5.0: A federated learning assisted hybrid deep learning model for electricity theft detection using smart meters". In: *Energy Reports* 10 (2023), pp. 3001–3019

Thank you for your attention

Contact:

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  Email: `filippo.sanfilippo@uia.no`.

- To know more about my research activity, please visit my website at: `http://filipposanfilippo.inspitivity.com`.

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References I

[1] Maximilian Unger et al. "New challenges for universities in the knowledge triangle". In: *The Journal of Technology Transfer* 45 (2020), pp. 806–819.

[2] Marko B Popovic. *Biomechatronics*. Academic press, 2019.

[3] Graham M Brooker. "Introduction to biomechatronics". In: *Signal Processing* 1 (2012), p. 3.

[4] Jacob Segil. *Handbook of biomechatronics*. Academic Press, 2018.

[5] Julie Madelen Madshaven et al. "Investigating the user experience of virtual reality rehabilitation solution for biomechatronics laboratory and home environment". In: *Frontiers in Virtual Reality* 2 (2021), p. 645042.

[6] Filippo Sanfilippo et al. "Pervasive and Connected Digital Twins for Edge Computing Enabled Industrial Applications". In: (2023), pp. 6789–6798.

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References II

[9] Muhammad Hamza Zafar, Even Falkenberg Langås, and Filippo Sanfilippo. "Empowering human-robot interaction using sEMG sensor: Hybrid deep learning model for accurate hand gesture recognition". In: *Results in Engineering* 20 (2023), p. 101639. ISSN: 2590-1230.

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References III

[14] Muhammad Hamza Zafar et al. "Step towards secure and reliable smart grids in Industry 5.0: A federated learning assisted hybrid deep learning model for electricity theft detection using smart meters". In: *Energy Reports* 10 (2023), pp. 3001–3019.