August 2025

OrChESTRA – Organ-on-a-chip Focused Strategic Partnership

Newsletter

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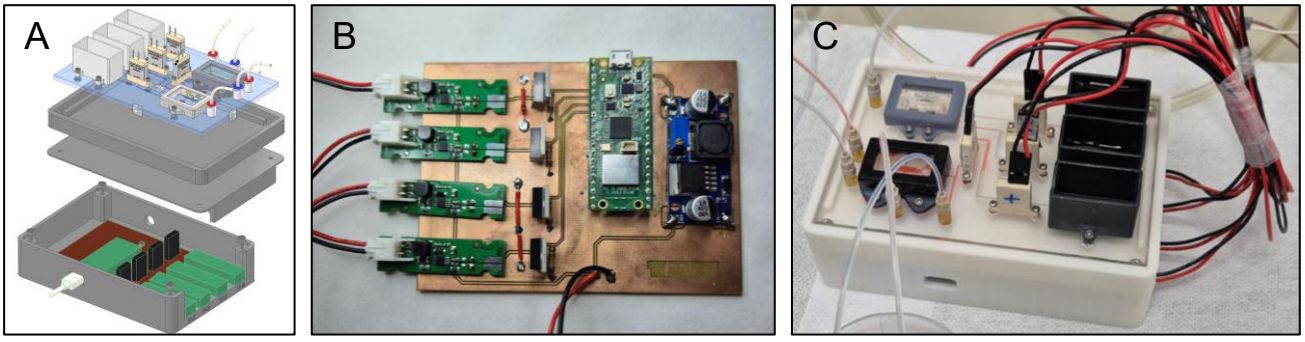
This month, our researchers hosted Dr. Hans Wyss and Dr. Rahman Sabahi Kaviani at ODTÜ MEMS Center, exchanging insights on Organ-on-Chip technologies and scientific communication. Meanwhile, significant progress was made on the OrChESTRA microfluidic platform, with successful validation of the fluidic circuit board and initial flow experiments.

As part of the **OrChESTRA Project's staff exchange program**, we were delighted to host **Dr. Hans Wyss** and **Dr. Rahman Sabahi Kaviani** at **ODTÜ MEMS Center**. During their five-day visit, they evaluated ongoing research activities and delivered a series of insightful seminars. On August 12, Dr. Rahman Sabahi Kaviani presented on the development of Nervous System-on-Chip technology, while Dr. Hans Wyss shared guidance on preparing scientific papers. On August 14, Dr. Sabahi Kaviani introduced a microfluidic Cartilage-on-Chip platform for transplant compatibility screening, and Dr. Wyss led a discussion on effective poster design.

The development of the fluidic circuit board (FCB), the central component of the OrChESTRA microfluidic platform, has been completed. The board, fabricated from PMMA with CNC-micromilled microchannels and integrated ISO 22916-compliant interfaces and building blocks, brings together the gut-on-a-chip module, MEMS-based electrochemical sensor, and essential liquid reservoirs into a single automated unit. A custom-designed control system with SMA valves, operated via a wireless graphical interface, enables precise, programmable routing of media, rinsing, and regeneration solutions, significantly simplifying experimental workflows. Following successful packaging into a 3D-printed housing, the complete platform underwent fluidic validation, demonstrating robust sealing, reliable valve actuation, and stable flow conditions. Initial microfluidic experiments confirmed the correct routing and operation of the integrated modules, showing the platform is now fully prepared for biological and electrochemical studies.



A. CAD rendering of the complete Orchestra microfluidic platform. The bottom section contains the control board, while the two lid parts cover the top and form a recess that holds the FCB in place. **B.** Photograph of the fully assembled board controlling the valves. **C.** Photograph of the fabricated microfluidic platform. The housing was printed in three parts with white PLA, and the PCB and FCB were assembled into a single compact unit ready for incubator operation.

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