

Innovation in action

A successful partnership between Tecan and the Hochschule für Technik in Rapperswil, Switzerland, has resulted in the development of a new technology called Array Liquid Arrival Check (ArrayLAC) that shows great potential for built-in process control in Tecan pipetting platforms. ArrayLAC will be ideal for real time and parallel volume measurement in microplates before and after pipetting steps.



Hochschule für Technik in Rapperswil, Switzerland

Tecan's Innovation and Incubation (I&I) department was established in 2007 with the specific goal of developing technologies to be used in future product development, thereby significantly strengthening Tecan's position as a leader in technology. Since then, several successful technology projects have been completed, one of the most recent being the development of ArrayLAC. Dr Alois Krutzenbichler, Head of I&I, explained: "In the initial phases of establishing I&I, it was very clear that it would be important to match the right ideas to the right people. ArrayLAC technology has been one of the most outstanding examples of how this is the best approach for optimum success."

ArrayLAC was developed in association with the Hochschule für Technik (University of Applied Sciences) in Rapperswil (HSR), near Zurich, which is renowned for maintaining close contacts and cooperation between academia and industry, and is proactively involved in applied research and development through its network of 17 institutes. Professor Werner Hinn, from the Department of Electrical Engineering at HSR, heads the Institute for Micro-electronics and Embedded Systems (IMES), and explained: "It is very important for our students and academic staff alike to know what is happening in the industry, and this is what initially attracted me to the HSR. We first had contact with Tecan as an industrial partner twenty years ago, when we were asked to look into liquid level detection circuits. Since then, we have collaborated

on a number of projects, including, since late 2007, a system for checking liquid arrival based on our long tradition in capacity sensing applications."

Dr Krutzenbichler added: "In the past, several teams working on similar projects have tried to perform volume measurements based on changes in electrical capacity between the wells of a microplate. Through the ArrayLAC project, we were the first to overcome the core problem of crosstalk between the wells, reducing it to a level that has never been reached before and that we honestly had not even dared hope for. The result is a demonstrator, showing the patented ArrayLAC technology that achieves this outstanding performance, which is now ready to go into product development."

Prototype tests show that ArrayLAC technology is extremely fast, robust and sensitive, detecting addition of as little as 1 µl of liquid to a filled microplate well. The technology is compact, light, fully autonomous, and takes less than a second to measure all 96 wells in a standard microplate, alerting the user if an incorrect volume of liquid has been pipetted into the wells.

"The collaboration with Tecan has been extremely fruitful and interesting," said Professor Hinn. "Members of the team at Tecan were keen to get the project off the ground and develop a thorough understand of what we were trying to achieve. We had many meetings and



constant communication along the way to aid this process, and have already started discussions about new ideas and future collaborations; Tecan has worked very hard as an industrial partner and this has made the whole project so interesting and, hopefully, very successful. I really appreciate the fantastic cooperation we have had.”

Dr Krutzenbichler concluded: “With ArrayLAC, we are able to show that, given time to focus on a project and the right people in your team, there is still the potential to overcome the limitations inherent even in well-known and established technologies such as capacitive sensor systems. We are very proud that this project, in particular, has by far exceeded all our initial expectations.”

The ArrayLAC collaboration team (left to right):
Werner Hinn, Manuel Meier, Markus Wolf,
Johann L. Camenisch, David Kress, Simon Künzi