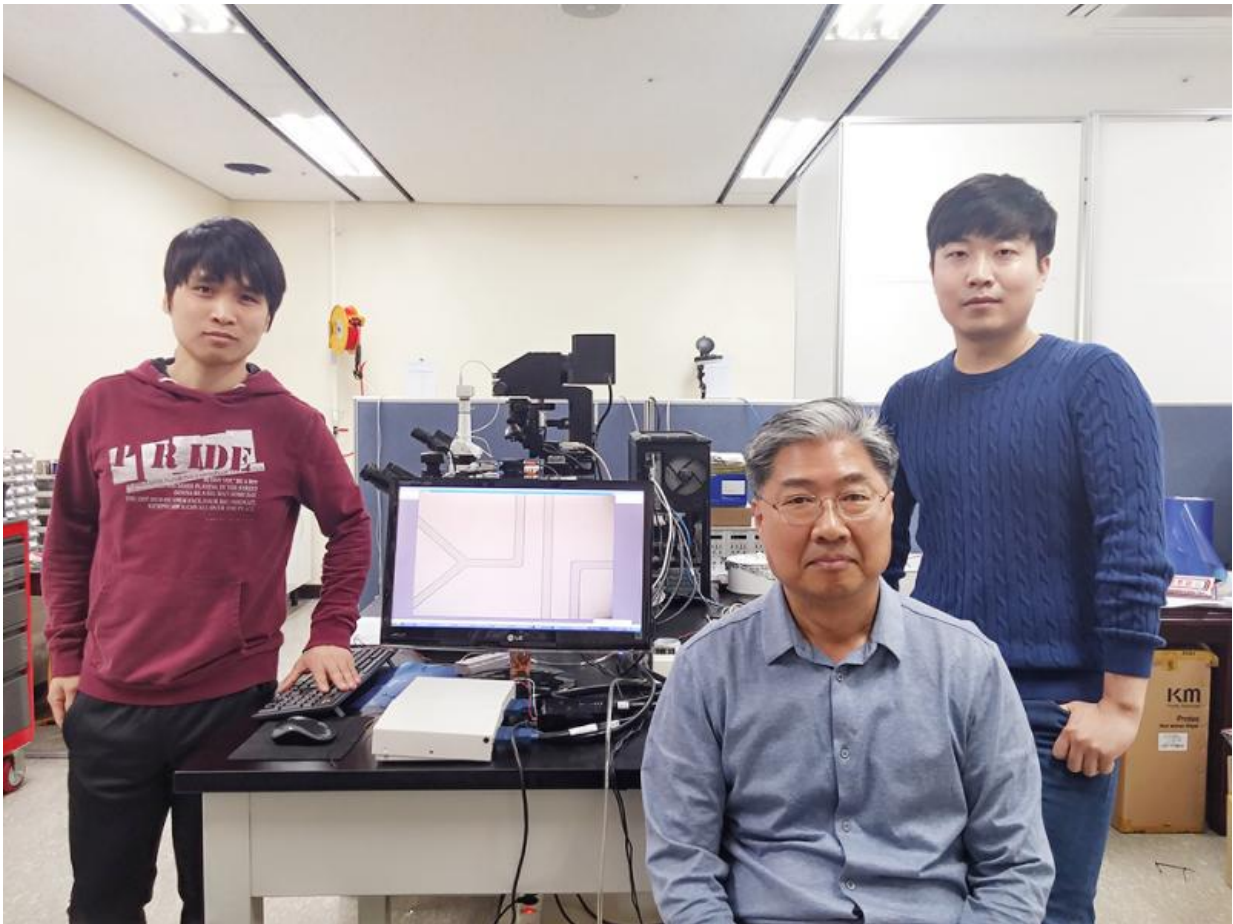


# Researchers develop a control algorithm for more accurate lab-on-a-chip devices

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Prof. Wan Kyun Chung with PhD student Young Jin Heo, MS student

Junsu Kang, and postdoctoral researcher Min Jun Kim in the Robotics Laboratory at POSTECH, Korea, have developed a novel control algorithm to resolve critical problems induced from a Proportional-Integral-Derivative (PID) controller by automatizing the technical tuning process. Their research was published in *Scientific Reports*.

Lab-on-a-chip designates devices that integrate various biochemical functions on a fingernail-sized chip to enable quick and compact biological analysis or medical diagnosis by processing a small volume of biological samples, such as a drop of blood. To operate various functions on a lab-on-a-chip device, the key technology is the precise and rapid manipulation of fluid on a micro-scale.

In [microfluidic devices](#), very small and trivial variables can frequently cause a large amount of errors. Up until now, Proportional-Integral-Derivative (PID) controller has normally been used for the manipulation of fluids in microfluidic chips. To apply the PID controller, a tedious gain-tuning process is required but the gain-tuning is a difficult process for people who are unfamiliar with control theory. Especially, in the case of controlling multiple flows, the process is extremely convoluted and frustrating.

The developed control [algorithm](#) can improve accuracy and stability of flow regulation in a microfluidic network without requiring any tuning [process](#). With this algorithm, microfluidic flows in multiple channels can be controlled in simultaneous and independent way. The team expects that this algorithm has the potential for many applications of lab-on-a-chip devices. For example, cell culture or biological analysis, which are conducted in biology laboratories, can be performed on a [microfluidic chip](#). Physical and chemical responses can be analyzed in the subdivided levels.

Provided by Pohang University of Science & Technology (POSTECH)

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