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Automatic  
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The Department of Automatic Control & Systems Engineering  
is pleased to announce the following seminar:

## **Making bacteria-sized robots**

**Dr Soichiro Tottori**  
*Postdoctoral Fellow*  
*MIT Department of Mechanical Engineering*

**Wednesday, 17 March 2021 at 14:00**  
Via Google Meet

*Host Academic: Dr Shuhei Miyashita, ACSE*

### **Abstract**

Medical robotics has developed rapidly in the last few decades, yet it remains challenging to reach deep inside the human body precisely with minimal invasion. A potential solution for such needs is microrobots, or self-motile microscopic untethered devices that can be operated inside the human body. To design microrobots, we need to first understand the physics in small scale, which is drastically different from that of the macroscopic world. For example, viscous force plays a dominant role over inertial force in small-scale fluid environments. In nature, such a difference in physics requires the microorganisms to develop unique swimming styles using thin filaments called flagella or cilia. Learning from the swimming style of *E. coli* bacteria, we developed *E. coli*-inspired swimming microrobots driven by an external magnetic field. This talk will cover the fundamental physics, design, fabrication method, and control of the microrobots. If time allows, the talk will also cover the interaction of multiple microrobots, the mastigoneme-inspired design, and also a novel robot design beyond the simple mimicry of nature.

### **Biography**

Soichiro Tottori is currently a JSPS postdoctoral fellow at MIT Department of Mechanical Engineering. He received BSc and MSc both in mechanical engineering from the University of Tokyo and PhD in physics from the University of Cambridge. His research interests are micro/nanoscale transport phenomena in the contexts of membrane science, microrobotics, and iontronics.