Title: Thin Artificial Muscle Pioneering New Robotics

Abstract:

I have developed several types of actuators. In this talk I will focus on pneumatic thin artificial muscles, which we have developed and commercialized last year. I believe it opens a new area of robotics; Musculoskeletal robotics, Giacometti robotics, Soft robotics, and Power-assist wears. I want to share these big potentials of the muscle in robotics with all participants.

Koichi Suzumori was born in 1959. He received the B.S., M.S., and Ph.D. degrees in mechanical engineering from Yokohama National University, Japan, in 1982, 1984, and 1990, respectively. He had worked for Toshiba R&D Center from 1984 to 2001, and also worked for Micromachine Center, Tokyo, from 1999 to 2001. He had been a Professor of Division of Industrial Innovation Sciences, Okayama University, Japan since 2001. He has been a Professor of Department of Mechanical Engineering, Tokyo Institute of Technology since 2014. He is mainly engaging in the research fields of new actuators and their applications. He received many awards such as JSME Medal for Outstanding Paper, in 1999, RSJ Best Paper Award in 2000, and JSAEM Best Book Award in 2006. He is a fellow member of the Japan Society of Mechanical Engineers.

Title: Tendon-driven robots using synthetic fiber ropes and their applications.

Abstract:

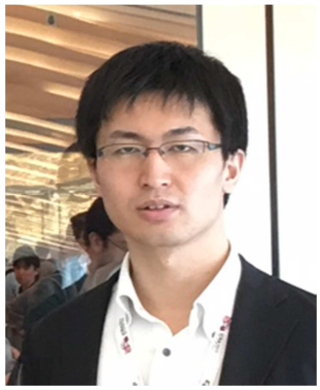
Synthetic fiber rope is promising robotic component for tendon-driven system because of its high tensile strength and lightweight. However, previous usages of synthetic fiber ropes are mainly based on trial and error experience. There are no industrial standards or mechanical design methodologies as a robotic component. In this talk, I will present some basic measurement experiment of synthetic fiber ropes, as well as their applications such as super redundant long-reach articulated arm, quadruped robot, and hexapod robot. Recent research projects will be also introduced.

Gen Endo received his B.E., M.E., and Ph.D. degree from Tokyo Institute of Technology, Japan in 1996, 1998, and 2000, respectively. From 2000 to 2007, he worked for Sony

Corp. and was also a visiting researcher as the Advanced Telecommunication Research Institute International. In 2008, he joined the faculty of Tokyo Institute of Technology, as an assistant professor. In 2014, he was an associate professor of Institute of Biomaterials and Bioengineering in Tokyo Medical and Dental University. He is currently an associate professor of Tokyo Institute of technology. He is a member of the Japan Society of Mechanical Engineers, the Robotics Society of Japan, IEEE and The Society of Instrument and Control Engineers.

Title: Analytical and Experimental Study on Actuation Time; Displacement Amplified Electromagnetic Actuator

Abstract:



This presentation introduces an analytical study about a particular electromagnetic actuator design with a displacement amplification mechanism by explaining the physical modelling and formulating actuation time of the actuator in terms of physical model variables, followed by the experimental study about the actuation time on the same electromagnetic actuator. The results of both simulations and experiments showed that there is an optimum point to increase the amplification ratio while advancing from actuation time for the same load and final stroke of the actuator.

Hiroyuki Nabae received the B.E., M.E., and Ph.D. degrees from the University of Tokyo, Tokyo, Japan, in 2010, 2012, and 2015, respectively. He was working as a JSPS Research Fellow from April 2013 to March 2015. He is currently an assistant professor at Tokyo Institute of Technology. His research interests include mechatronics, robotics, and actuators. He is a member of the Japan Society of Mechanical Engineers, the Robotics Society of Japan, IEEE and Japan Society for the Promotion Science.

Title: Human-like Robotic Hand Applying Soft Thin Mckibben Actuator

Abstract:

We are proposing a Human-Like robotics hand which intends to closely replicate the human hand not only in term of bone, ligaments and tendon shape and size but also in the muscles of the human hand by using McKibben type muscles. In this session i will talk about the muscles of the index finger which consist of three intrinsic and three

extrinsic muscles fabricated by using thin multifilament McKibben muscles with diameters 1.3 mm and 4.0 mm, respectively. We present the fabrication method of index finger and compared it for extension and flexion motion to validate the properties of our developed robotic finger.

Ahmad Athif Mohd Faudzi obtained his Dr. Eng. degree in System Integration Engineering from Okayama University, Japan in 2010. In 2004 and 2007, he received his B. Eng. and M. Eng. degrees from Universiti Teknologi Malaysia, Skudai, Johor, Malaysia, respectively. He is attached with Faculty of Electrical Engineering and Centre of Artificial Intelligence and Robotics (CAIRO) as an Associate Professor. Currently, he is a Visiting Research Fellow in Tokyo Institute of Technology. He is a member of IEEE Robotics and Automation Society, Japan Society of Mechanical Engineers and Asian Control Association. He is mainly engaged in the research fields of pneumatic actuators, soft mechanism actuators, mechatronics and their applications.

Suzumori Endo Lab YouTube:
https://www.youtube.com/channel/UCOz02yvsxufQPe1vWmlANAA