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3D printer applications for developing robotics

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3D printers are useful for seamless development of robotics. The author uses 3D printer for making parts of robotics. Specially, in the area of manufacturing surgical instruments, the ability to rapidly design, prototype, and test surgical instruments is critical. A case study of the rapid development of two biomechanism-based surgical instruments which are ergonomic and aesthetic are mentioned. It is designed, prototyped and conceptually tested in a short period of time by using 3D printer. Recently, there has been an increasing need for surgical instruments that can hold organs delicately yet stably. Such an instrument increases the efficiency of surgical operations by decreasing the physical and mental strain on both surgeons and patients. New biomechanism-based surgical instruments, based in part on the anatomical structure of a fish, provide soft-handling forceps where pressure is distributed over a larger area. The author created a seamless design method and prototyping process. This process has been used to prototype biologically-based mechanisms using 3D CAD and a 3D printer. Specifically, a fish-based mechanism which produces an elastic oscillating fin and shark skin which effectively controls hydrodynamic resistance have been found to be effective in creating superior surgical instruments. Developed user-friendly surgical instruments enable more efficient surgery, for example 50 percent reduction of surgical operating time. This process is effectively facilitated using a more seamless design through to the prototyping. Rapid manufacturing by 3D printer is important to check product in advance. In addition, several cases where 3D printer are used for the development of robotics are mentioned by the author.

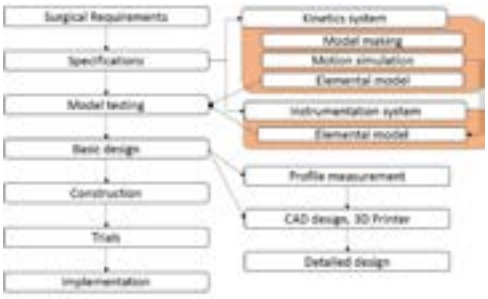

Figure 1: Development process

Figure 2: Soft handling forceps

Biography

Ikuo Yamamoto is a Professor of Nagasaki University, Nagasaki, Japan. He has worked with Mitsubishi Heavy Industries Ltd. And JAMSTEC, Japan. He is a Professor at Kyushu, Kitakyushu and Nagasaki University, Japan. He was a leader of AUV "Urashima",which established the world record for autonomous cruising; developed "Kaiko&Seabot", which was crowned champion remotely operated vehicle at 10000m depth cruising and at the World convention 2012, 2014 and 2016 and his robotic fish 'swam' in the International Space Station in 2009. He sucessfully flied multi-rotor flight robotics with real-time monitoring and environmental sensor systems in Japan, 2008. He received International Awards for developing medical robotics in 2014 and 2015. He was nominated as GlobalScot by Scotland Government, UK in 2017. His research interests are Robotics and IoT (Internet of Things).

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