

## Development of Multi-DOF Powered Prosthetic Hand

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In this study, we develop a robot hand for the EMG prosthetic hand to realize Activity of Daily living (ADL). EMG prosthetic hand is an machine of the alternate function for a limb. The required functions include many things from a grasping to a manipulation of fine object. The design condition of EMG prosthetic hand is different from the industrial robot hand concerning on the three points of view: weight limit, water resistance, and autonomous portability. The purpose of this study is to develop the Robot hand with multifunction, lightweight, water resistance and autonomous portability. In this study, we extend the tendon wire mechanism and propose adaptive joint for interference-driven mechanism in order to use some outputs of actuator effectively.

### Adaptive joint for interference-driven mechanism

A schematic diagram of an adaptive joint mechanism is shown in Fig. 3. A spring connects a frame and a guide roll of wire. The guide roll can shift proportionally to the load. In the case of a light load, as shown in Fig. 3(b), the spring approaches the fulcrum, making its angular velocity high and its torque low. On the other hand, in the case of a heavy load, as shown in Fig. 3(c), the guide roll leaves the fulcrum, making its angular velocity low and its torque high. Accordingly, the spring-connected guide roll provides an adjustable power-transmitting function. From another viewpoint, the adaptive joint provides a “passive adaptive grasp.” Fig.1 and Fig.4 show the robot hand comprised by proposed method.

*Keywords:* Multi-D.O.F. EMG Prosthetic Hand, Tendon-driven Mechanism, Adaptive Joint for Interference-driven Mechanism, Passive and Active Joint

### References

- 1) Alejandro Hernandez Arieta, Hiroshi Yokoi, et al. “Integration of a Multi-D.O.F. Individual Adaptable with Tactile Feedback for an EMG Prosthetic System”, Intelligent Autonomous Systems 8 F.Groren et al.(Eds.) IOS Press, pp.1013-1021,2004.



Fig.1 Robot hand system.

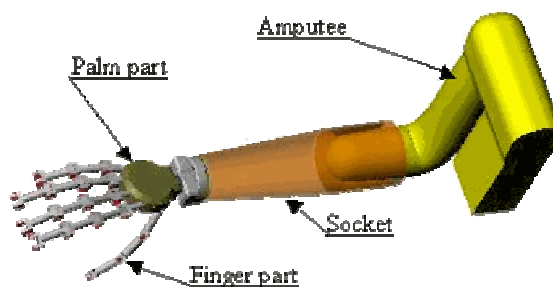


Fig.2 Powered prosthetic hand for forearm.

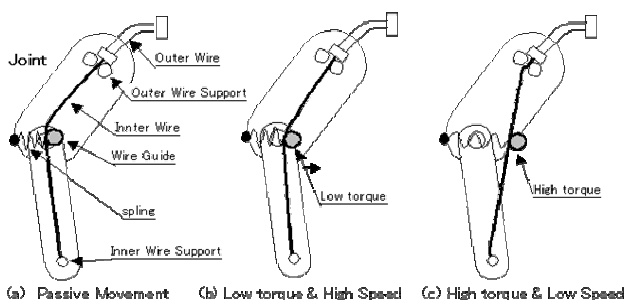


Fig.3 Adaptive joint mechanism.

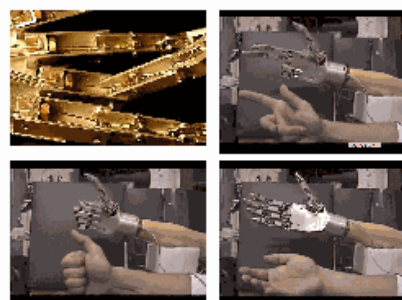


Fig.4 Multi-D.O.F. EMG prosthetic hand.