

## Development of Multi-DOF High Torque Joints Light Weight Robot Hand (Prof. H. Yokoi and Prof. T. Arai)

This research aims to the development of an externally powered myoelectric (EMG) controlled robot hand fit for daily life activities. The myoelectric upper limb prosthesis is a function recovery device for the hand, which functions goes from simple gripping tasks to more complex activities. Moreover, the prosthetic hand must be lightweight as well as waterproof. The hand uses two wires in parallel configuration for the interference driven joint mechanisms, which allow us to provide high grip power transference with a light structure. The hand has 18 joints and 13 control DOFs (Fig.1).

### 1. The Interference driven joint mechanisms imitates the human hand

The hand uses the wire driven mechanism at the fingers (Fig.2(a)), imitating the human hand structure. When the wire W3 is pulled, the MP joint curl. The wire W2 can curl not only the DIP joint and PIP joint but also the MP joint. Because the wire W2 passes through the wire guide that corresponds to the fiber sheath, this mechanism allows us to provide MP joint with a high grip power.

### 2. Interference driven joint mechanism using sliding materials

We developed an interference drive joint mechanism at the wrist joint and the thumb MP joint (2 DOFs). The main objective is to design a mechanism with lossless bearing power transmission. Fig.2(b) shows the mechanism developed in our laboratory with oil less bearing for the rotating axis forming a guide for the actuators wires, resulting in a 2 DOFs high torque joint.

*Keywords:* Multi-D.O.F. Prosthetic Hand, Interference Driven Link based on Parallel-Wire Mechanism

### References

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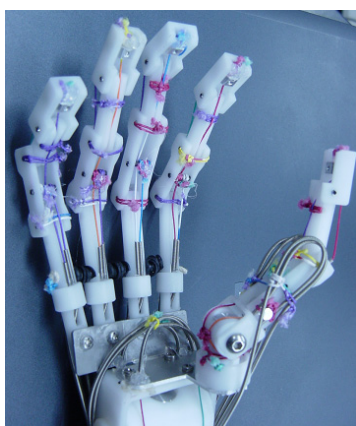


Fig.1 Five-fingered robot hand with interference driven finger and wrist.

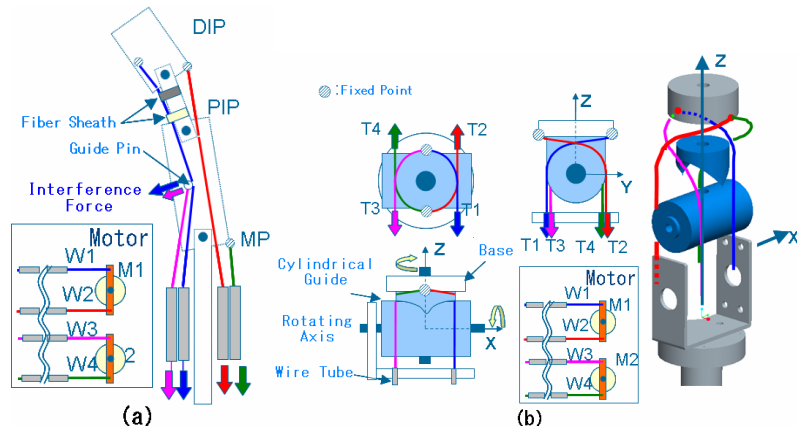


Fig.2 Proposed interference driven finger(a) and wrist(b) based on parallel-wire mechanism.