

Title: Cost-Effective 18 DOF Dexterous Hand: Fusing Force-Position Multimodal Sensing of Whole Hand with a Monocular Camera

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Supplementary Materials

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Movie S5. The motion process for performing the gesture “OK”.

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Table S1. Parameters of the camera and lens in the base.

Model	MV-CB016-10UM-S
Sensor model	Sony® IMX273
Resolution	1440 × 1080
Max. frame rate	165.4 fps @1440 × 1080 Mono 8 (ADC 12) 249.1 fps @1440 × 1080 Mono 8 (ADC 8)
Data interface	USB 3.0
Power supply	USB 3.0 power supply
Power consumption	Typ. 1.5 W@5 VDC
Weight	Approx. 30 g (0.07 lb.)
Dimension (without lens)	35 mm × 35 mm × 8.6 mm (1.4" × 1.4" × 0.3")
Lens Model	MVL-HF0628-05S
Lens Type	6mm, F2.8, 1/1.8", 5MP Lens, M12-Mount
Field of View	D(8.86 mm):73° H(7.37 mm):63° V(4.91 mm):45°

Table S2. Material Properties of Tendons Used in the Hand.

Model	DSL00-0070
Material	Cover:Polyester 32 -plaited Core:Pre-stretched Dyneema
Line Diameter (mm)	0.95
Weight (g/m)	0.67
Elongation at Breakload (%)	3.6
Breakload min.(daN)	70
Breakload eff. (daN)	92
Elongation / Line creep at 10 daN (%)	0.19/0.14
Elongation / Line creep at 30 daN (%)	0.41/0.22
Strength after 5000 bending cycles (daN)	85

Table S3. Parameters of six-dimensional force sensor in force measurement experiment.

6-axis force sensor	Model	K6D40 50N/5Nm/MP11
	Nominal force	Fx: 50 N, Fy: 50 N, Fz: 200 N
	Nominal torque	Mx: 5 Nm, My: 5 Nm, Mz: 5 Nm
	Relative linearity error	0.2 %FS
	Relative zero signal hysteresis	0.2 %F S
	Relative repeatability error	0.5 %FS
Amplifier	Model	GSV-8DS SubD44HD
	Input sensitivity-steps	2 3.5 7 mV/V
	Resolution	24 bits
	Schnittstelle	USB, UART 3.3V, TEDS, Analog, CAN/CANopen, EtherCAT
	Relative linearity error	0.2 %FS
	Data frequency	0-48000Hz