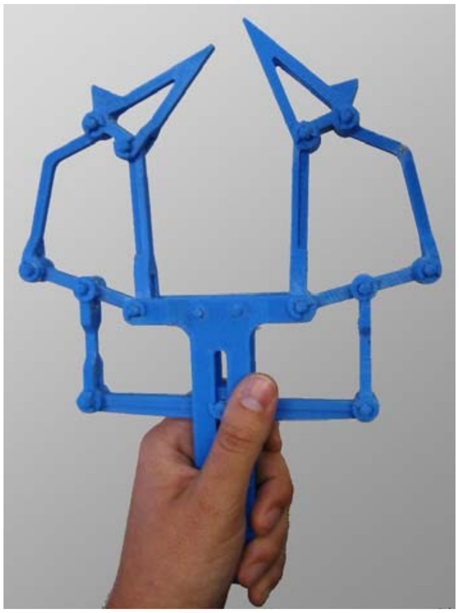

Figure 13: Actual plastic prototype of underactuated gripper (human hand shown in comparison).

ternational Journal of Robotics Research, vol. 1, no. 1, pp. 4–17, 1982.

[3] G. A. Bekey, R. Tomovic, and I. Zeljkovic, *Control Architecture for the Belgrade/USC Hand in Dextrous Robot Hands*, Springer-Verlag, New-York, 1999.

[4] N. T. Ulrich, *Methods and Apparatus for Mechanically Intelligent Grasping*, US Patent No. 4 957 320, 1988.

[5] J. Butterfass, M. Grebenstein, H. Liu, and G. Hirzinger, "Dlr-hand ii: Next generation of a dextrous robot hand," in *Proceedings of the 2001 IEEE International Conference on Robotics and Automation*, Seoul, Korea, May 21-26 2001, pp. 109–114.

[6] T. Okada, "Computer control of multijointed finger system for precise object-handling," *IEEE Transactions on Systems, Man and Cybernetics*, vol. 12, no. 3, pp. 289–299, 1982.

[7] A. Bicchi and V. Kumar, "Robotic grasping and contact: A review," in *Proceedings of the IEEE International Conference on Robotics and Automation*, San Francisco, CA, USA, 2000.

[8] G. Jia, G. Chen, and M. Xie, "Design of a novel compact dexterous hand for teleoperation," in *Proceedings of the 2001 IEEE International Symposium on Computational Intelligence in Robotics and Automation*, Banff, Alberta, Canada, July 29 2001, pp. 5–10.

[9] D. L. Akin, C. R. Carignan, and A. W. Foster, "Development of a four-fingered dexterous robot end effector for space operations," in *Proceedings of the 2002 IEEE International Conference on Robotics and Automation*, Washington, DC, USA, May 2002, pp. 2302–2308.

[10] J. D. Crisman, C. Kanojia, and I. Zeid, "Graspar: A flexible, easily controllable robotic hand," *IEEE Robotics and Automation Magazine*, pp. 32–38, June 1996.

[11] L. Biagiotti, C. Melchiorri, and G. Vassura, "Control of a robotic gripper for grasping objects in no-gravity conditions," in *Proceedings of the 2001 IEEE International Conference on Robotics and Automation*, Seoul, Korea, May 21-26 2001, pp. 1427–1432.

[12] G. Figliolini and M. Ceccarelli, "A novel articulated mechanism mimicking the motion of index fingers," *Robotica*, vol. 20, pp. 13–22, 2002.

[13] N. Dechev, W. L. Cleghorn, and S. Naumann, "Multiple finger, passive adaptive grasp prosthetic hand," *Mechanism and Machine Theory*, vol. 36, pp. 1157–1173, 2001.

[14] B.-J. Yi, H. Y. Ra, Y. S. Hong, J. S. Park, S. R. Oh, I. H. Suh, and W. K. Kim, "Design of a parallel-type gripper powered by pneumatic actuators," in *Proceedings of the 2000 IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2000.

[15] M. Rakic, "Multifingered robot hand with selfadaptability," *Robotics and Computer-integrated Manufacturing*, vol. 3, no. 2/3, pp. 269–276, 1989.

[16] S. Hirose and Y. Umetani, "The development of soft gripper for the versatile robot hand," *Mechanism and Machine Theory*, vol. 13, pp. 351–358, 1978.

[17] T. Laliberté and C. Gosselin, "Simulation and design of underactuated mechanical hands," *Mechanism and Machine Theory*, vol. 33, no. 1/2, pp. 39–57, 1998.

[18] S. Schulz, C. Pylatiuk, and G. Bretthauer, "A new ultralight anthropomorphic hand," in *Proceedings of the 2001 IEEE International Conference on Robotics and Automation*, Seoul, Korea, May 21-26 2001, pp. 2437–2441.

[19] C. Gosselin and T. Laliberté, *Underactuated mechanical finger with return actuation*, US Patent No. 5 762 390, 1996.

[20] B. Kennedy, "Three-fingered robot hand with self-adjusting grip," *Nasa Tech Briefs*, p. 59, December 2001.

[21] M. Kaneko and K. Tanie, "Contact point detection for grasping of an unknown object using self-posture changeability (spc)," in *Proceedings of the IEEE International Conference on Robotics and Automation*, 1990, pp. 864–869.