

Design of a 6 degree of freedom anthropomorphic robotic jaw

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We have created a 6 DOF robotic jaw capable of producing, in real-time, the complex set of motions described by the human jaw during speech or mastication. The jaw is designed to fit within a larger robotic human figure such as the head, neck and torso of the 25 DOF Infanoid. [Kozima, Hideki: Infanoid: A Babybot that Explores the Social Environment, K. Dautenhahn *et al.* (eds.), *Socially Intelligent Agents: Creating Relationships with Computers and Robots*, Kluwer Academic Publishers, pp. 157–164, 2002]. The produced mechanical prototype has been designed to accommodate a prosthesis mandible with dentures. The mechanism could fit within the skull of the average man; where it would occupy less than 1/3 of the skull cavity. Two TMJs (temporomandibular joints) support the prosthesis, where each is driven by a 3 DOF parallel manipulator. In order to combine the motion of both manipulators each TMJ is capable of 3 DOF. The system is controlled via a USB port using software that models the human skull including collision detection mechanisms. The jaw allows for linear control, zero-backlash, and up to three times exaggerated mobility ranges making it also suitable for speech research, facial gesture affect research and dentistry applications.