

# Development of an Ankle CPM for Prevent Contracture Using the Pneumatic Balloon Actuator

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**Abstract:** Our proposal rehabilitation instrument for prevent contracture of ankle is making carrying and installation at the time of use easy in the place like the medical institution. This instrument is for people such as the flaccid hemiplegic. Because the ankle is moved when it is worn, contracture of the ankle can be prevented. It consists of the new tendon drive systems using a pneumatic balloon actuator, power transfer mechanism and ankle foot orthosis.

New tendon drive system using a pneumatic balloon was developed as actuator of this instrument. It consists of a tendon and a silicon tube. Both ends of the silicon tube are closed and the tube expands like a balloon with the supply of air, which distends the silicon tube and pulls the tendon. The system is simple, compact and high power. Furthermore, it is very lightweight by composition material and structure.

This paper is a study on characteristics of the tendon drive system using a pneumatic balloon, composition and operation method of rehabilitation instrument for prevention of contracture of ankle. Result of operation test on the instrument intended for able-bodied person is also presented.

*Keywords:* Medical systems, Pneumatic systems, Actuators, PID control, Human-machine interface, Quality of work life, Bionics

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