Development of Walking Assist Machine (Prof. H. Yokoi and Prof. T. Arai)

INTRODUCTION - Gerontology becomes significant research in recent rapidly-aging society for the purpose of supporting elderly people on life self-reliance. Even the field of robotics contributes to the research issue with developing assist machines for elderly persons and paralyzed patients.

In our research, we mainly focus on walking-assist system for difficulty-walking people such as muscle-weaken persons and leg hemi-paretic persons. At the present stage, we measure walking of a leg hemi-paretic person with surface electromyographic (EMG) sensor, angular sensor, accelerating sensor, and ground reaction force sensor and analyze its walking characteristics. On the basis of the analytical results, we develop two assisting devices for walking improvement: functional electric stimulation and power assist machine.

FUNCTIONAL ELECTRIC STIMULATION is a method to activate leg muscles in paralysis with electric stimulation from an external device. For the purpose of walking in leg paralysis, FES has an advantage on utilizing impaired motor function and, therefore, it is not necessary to build actuation system. In our research, we focus on establishing system, which feedbacks bio-information (surface EMG signal, joint angle, and ground reaction force) representing walking characteristics of a leg paralyzed patient, and, then, assist walking by giving stimulation to appropriate muscles at appropriate time.

POWER ASSIST MACHINE is leg-wearable design as shown in fig.1 and purposes to assist weaken muscles by pulling wires as muscle mechanism. The advantage of this wire actuation is to adjust assist positions corresponding to characteristic of users.

Keywords: Functional Electrical Stimulation, Power Assist, Gerontology.

References

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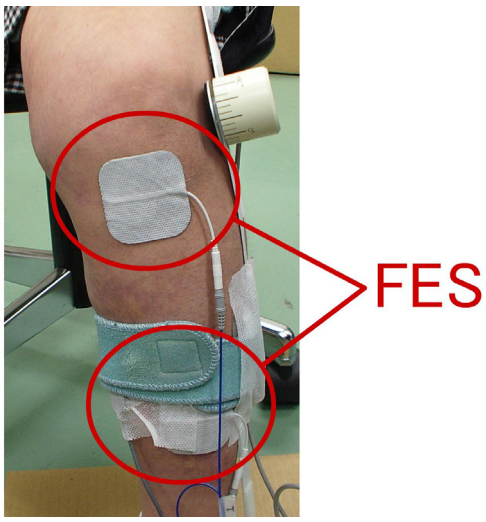

Fig. 1 FES System

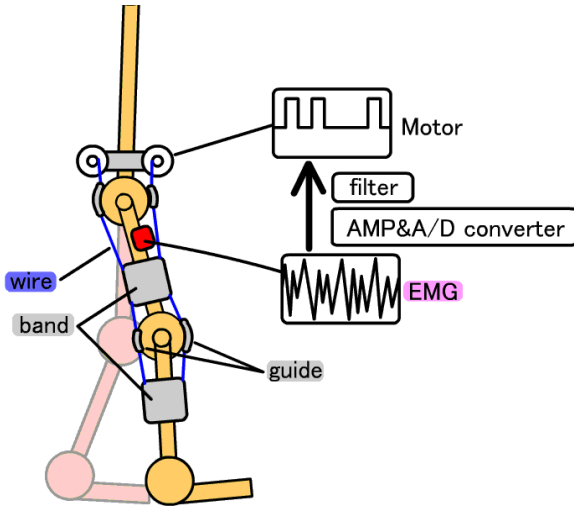

Fig.2 Power Assist Machine