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Review of Sensing and Robot Solutions to Stroke Rehabilitation, Focusing on Upper Limbs

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***Abstract*—The abstract goes here.**

***Index Terms*—Stroke, robot, sensors.**

I. Introduction

THIS review is intended as a resource for people wishing to do further research into robot or sensor systems for rehabilitation of stroke victims with hemiplegia. Systems based on functional electrical stimulation (FES) will not be covered in this review.

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A. Effects of a Stroke

1) Right or Left Hemispherical Stroke: A stroke in the right or left hemispheres of the brain can cause partial or full paralysis down the opposite side of the body (hemiplegia). It can also cause problems with short term memory [1].

Right-hemispherical strokes can also cause the victim to suffer a loss of spatial awareness and an impairment of judgement that manifests as impulsiveness [1].

Left-hemispherical strokes can cause the victim to develop problems with language (aphasia) and may effect their judgement in the opposite way to right-hemispherical victims, becoming ponderous and unsure [1].

2) Cerebellar Stroke: A cerebellar stroke affects balance and co-ordination and can cause dizziness and nausea [1].

3) Brain Stem Stroke: Brain stem strokes are the most dangerous as this is the part of the brain that controls essential functions such as your heart, breathing and swallowing [1].

A stroke in the brain stem can also cause full or partial paralysis in either or both sides of the body [1].

B. Traditional Rehabilitation of Stroke Patients

The most basic aim of stroke victim rehabilitation is to allow the victim to regain thier independence. The management of stroke patients is broken down into three areas: acute care, rehabilitation care and community care [2].

1) Acute Care: This is the stage of care that covers preventing further strokes, making sure the patient is breathing and their heart is beating. The patient's bladder and bowel function should be checked at this stage along with their ability to perform the actions associated with such. The patient should also be brought to a point whereby they can move, albeit with impairments. The last element of care at this stage are emotional support to the patient and their family [2].

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2) Rehabilitation Care: This is the stage of care which most systems are focused on. This is where a program is decided with the patient to monitor and improve their ability to function. Any complications that arise are dealt with and the patient is prepared for release into the community [2].

There are several tests through which the patient's motor and sense function can be evaluated, a popular one is the fugl-meyer test which score the patient out of 100 for the whole body (66 for upper limbs, 34 for legs). This score can then be used to measure improvement over the course of treatment.

3) Community Care:

C. How Sensing / Robots can Help

Robots don't get bored. Give more detailed information. More quantifiable.

1) What they need to be able to do: Subsubsection text here.

2) Challenges: Impersonating a physiotherapist.

II. Existing Commercial Systems

A. InMotion2 and InMotion3

based on MIT-MANUS

III. Systems in development

IV. Other Possible Approaches

V. Discussion

Discussion goes here

VI. Conclusion

The conclusion goes here.

Appendix A
Hopefully won't have any of these

Appendix one text goes here.

Appendix B

Appendix two text goes here.

Acknowledgment

The authors would like to thank...

References

[1] National STROKE Association Web. 14th Apr. 2012 http://www.stroke.org/site/PageServer?pagename=EFFECT

[2] physiotherapy-treatment.com Web. 5th Apr. 2012 http://www.physiotherapy-treatment.com/stroke-physical-therapy.html

John Charlesworth Biography text here.