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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 hemishpreres 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 paralisis in either or both sides of the body [1].

### B. Traditional Rehabilitation of Stroke Patients

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) Rehabilitation Care:*

*3) Community Care:*

### C. How Sensing / Robots can Help

Robots don't get bored.

*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

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