



## Making the Most of AT...

### ...From Chairs to Stairs

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## Introduction

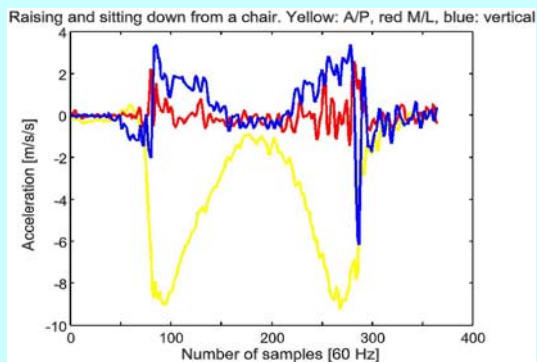
- It is generally accepted that it is best for older people to stay in their family homes for as long as possible (Royal Commission on Long Term Care, 1999).
  - This can be achieved by a combination of care, home modifications and AT
- But...
- How well do people achieve ADL with home modifications and AT? In other words, are people making the most of their AT?

## Measuring Performance

- The aim of the project was to develop a portable system, based on body-mounted triaxial accelerometers and gyroscopes (Xsens, The Netherlands) a PDA (personal digital assistant) used as data logger and proprietary analysis software written in Matlab, to conduct ecological studies.

## Overview

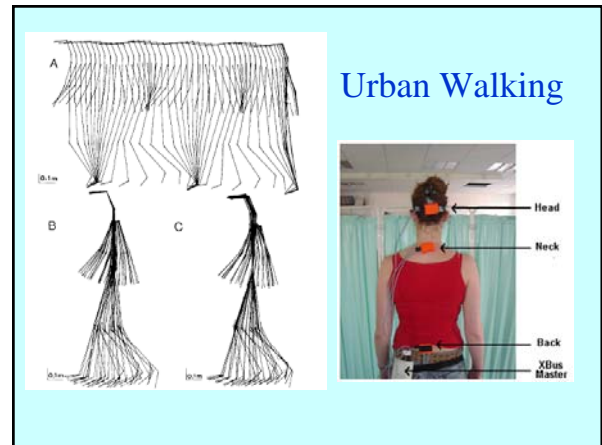
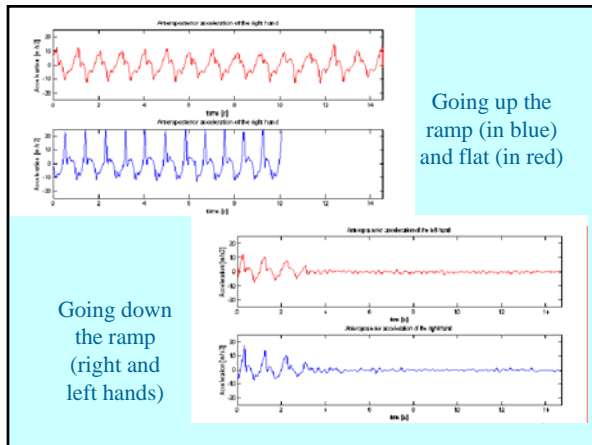
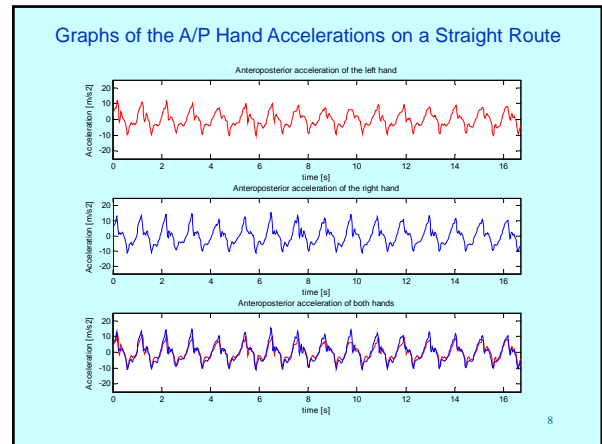
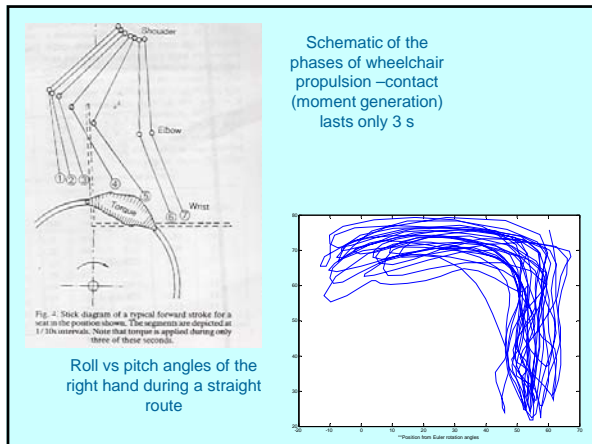
- Sit to stand
- Wheelchair self-propulsion
- Urban walking
- Stair climbing
- Stair climber
- Barriers to making the most of AT



Single triaxial accelerometer placed on the small of the back

## Wheelchair Self-propulsion

- Sensors placed on both upper limbs,
- Differences on different surfaces
- Ascending and descending slopes
- This is work in progress to best highlight the features of the self-propulsion cycle under different rolling conditions.

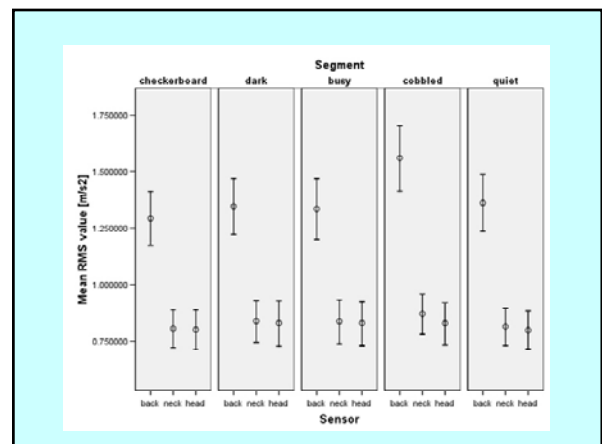


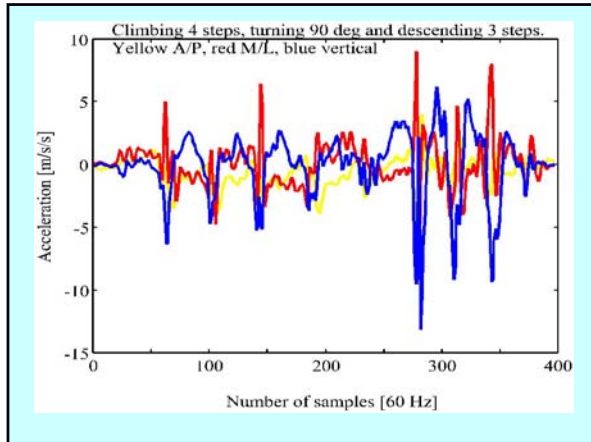
•Five data sections of 30 m (within 41 sections)

- quiet
- dark
- busy
- cobbled street and
- checkerboard floor

•The outcome was RMS of ML acceleration normalised to the subject's average velocity

### Test Protocol





| ASCENT     |                 |        |                |           |     |                 |     |  |
|------------|-----------------|--------|----------------|-----------|-----|-----------------|-----|--|
| Swing leg  | WT              | PO     | FC             |           | FP  |                 |     |  |
| Stance leg | WA              |        | PU             | FCN       |     |                 |     |  |
|            | Double support  |        | Single support |           |     |                 |     |  |
| Young      | 0%              | 11.50% | 17%            | 24%       | 30% | 43.50%          | 50% |  |
|            | Initial contact |        | Heel off       | Mid swing |     | Initial contact |     |  |
| Old        | 0%              | 10%    | 16%            | 24%       | 31% | 40%             | 50% |  |
|            | Initial contact |        | Heel off       | Mid swing |     | Initial contact |     |  |

| DESCENT    |                 |       |                |           |     |                 |     |  |
|------------|-----------------|-------|----------------|-----------|-----|-----------------|-----|--|
| Swing leg  | WT              | PO    | FC             |           | FP  |                 |     |  |
| Stance leg | WA              |       | FCN            |           | CL  |                 |     |  |
|            | Double support  |       | Single support |           |     |                 |     |  |
| Young      | 0%              | 7.50% | 15%            | 29%       | 38% | 44%             | 50% |  |
|            | Initial contact |       | Heel off       | Mid swing |     | Initial contact |     |  |
| Old        | 0%              | 15%   | 20%            | 29%       | 38% | 42%             | 50% |  |
|            | Initial contact |       | Heel off       | Mid swing |     | Initial contact |     |  |

|              |                          | Non HR users (N=12)          |                              | HR users (N=15)              |                              | Paired T test |
|--------------|--------------------------|------------------------------|------------------------------|------------------------------|------------------------------|---------------|
|              |                          | RMS Mean (m/s <sup>2</sup> ) | RMS S.D. (m/s <sup>2</sup> ) | RMS Mean (m/s <sup>2</sup> ) | RMS S.D. (m/s <sup>2</sup> ) |               |
| <b>Head</b>  | Ascent without handrail  | 2.36                         | 0.49                         | 2.62                         | 0.88                         | 0.37          |
|              | Ascent with handrail     | 2.67                         | 0.84                         | 2.88                         | 0.85                         | 0.53          |
|              | Descent without handrail | 2.44                         | 0.75                         | 2.79                         | 1.00                         | 0.33          |
|              | Descent with handrail    | 2.60                         | 0.65                         | 2.96                         | 0.93                         | 0.26          |
| <b>Trunk</b> | Ascent without handrail  | 2.24                         | 0.40                         | 2.68                         | 0.47                         | 0.02*         |
|              | Ascent with handrail     | 2.06                         | 0.38                         | 2.49                         | 0.48                         | 0.02*         |
|              | Descent without handrail | 2.74                         | 0.54                         | 3.20                         | 0.63                         | 0.06          |
|              | Descent with handrail    | 2.68                         | 0.50                         | 3.16                         | 0.69                         | 0.05*         |

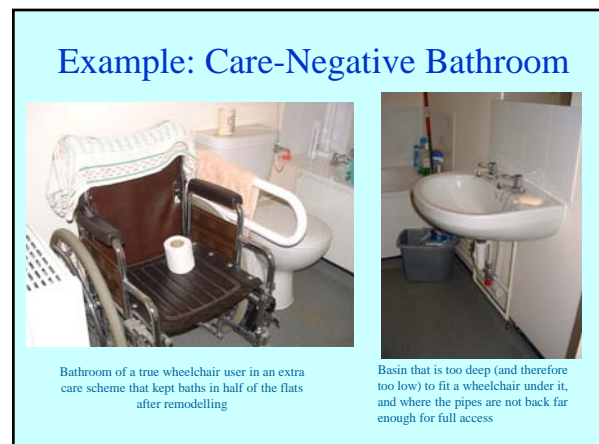
Descriptive statistics for handrail and non-handrail users and subgroup differences for mean acceleration RMS at the trunk and head. \* P<0.05



### What is Care Neutral?

- A building is **care-neutral** if it does not have any impact on the support and care regime that the building supports;
- A building can be regarded as **care-positive** if its inclusive design allows or even encourages the independence of its tenants;
- A building is **care-negative** if its poor, inaccessible design has adverse quality of life ramifications for the tenants or increased cost implications for the service provider.

Prof. Julienne Hanson 2007



## Discussion

- AT alone cannot breach environmental gaps
- To make the most of AT we first need to have a care-neutral (or preferably care positive!) environment
- AT developed used user-centred approach
- Portable, ideal for ADL/AT assessment
  - Inexpensive
  - Allows measurement of many activities
  - Allows long term measurements



## Questions?

