



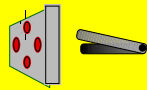
Communication aid/  
computer links



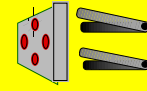
Switch controls



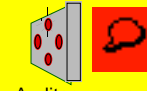
Joystick controls



Single switch  
scan control



Two switch scan  
control



Auditory scan



stop on collision



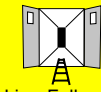
backoff after  
collision



back off & turn  
after collision



Line Follower with  
junctions



Line Follower



momentary  
movement



latched motion



timed moves



Speech  
Synthesiser



Specialised  
Seating

# The Smart Wheelchair

The award-winning  
mobility aid for:

- fun
- education
- training

- ✓ For children who have difficulty with standard electric wheelchairs
- ✓ Can be driven with any ordinary switch
- ✓ Bump detectors to protect the user and the environment
- ✓ Line Follower for driving through tight doorways, and from room to room
- ✓ Easy to set up for different users
- ✓ Proven tool for assessment and training
- ✓ Developed and tested with school staff



Winner of the  
Gold Award for  
Special  
Educational Needs  
at BETT '98

***Rickie, an Australian user, talking about the Smart Wheelchair:***

**WHAT IS NOT GOOD ABOUT THE CHAIR:**

"I can't be in it all the time"  
"I have to share it"

**WHAT IS GOOD ABOUT THE CHAIR:**

" I think it is clever and it makes me feel clever when I'm in it. But what is great is other people think I am clever when I am in it".

***This is exactly what the Smart Wheelchair is all about!***

# Questions and answers

## ***What is a 'Smart' wheelchair?***

A Smart Wheelchair is an electric wheelchair fitted with sensors and computer to help less able drivers achieve some independent mobility. We call it 'smart' because it's cleverer than an ordinary chair (although it still makes your average woodlouse look like Einstein).

## ***What the Smart Wheelchair isn't***

The Smart Wheelchair is not a mobile robot. It doesn't cart people around like sacks of potatoes with no control on their part. It won't decide where you want to go for you, and it won't take you down the shops all by itself. But if you have difficulty with conventional chairs, it *will* take some of the driving load off you, and let you drive more safely and effectively.

## ***Who might use one?***

Anyone who, for physical, intellectual or other reasons, can't manage an ordinary electric wheelchair. The current production chairs are for children:

- who want to develop their driving skills, possibly, but not necessarily, with a view to eventually using ordinary electric chairs;
- with more severe disabilities, to motivate and give independence and fun.

In our experience *almost everyone* can drive the Smart Wheelchair and enjoy at least some independent mobility - no-one is 'too disabled' to drive the chair.

## ***Can adults use the chair?***

Although the chair was originally designed for children, it is possible to fit large size seating for adults as well.

## ***Can the chair be used outdoors?***

The chair is really designed for indoor use, although it can be used outside on reasonably flat surfaces.

## ***What about support and training?***

CALL and Smile Rehab provide full training and support with each chair. As well as giving a thorough introduction to the system and how it can be used, we can also help you get started with setting up switches and controls for users.

Smile Rehab can also advise on seating and if necessary provide specialised seating, or interface boards to fit existing specialist seats, such as CAPS II or Freedom seats.

## ***Are new developments planned?***

The existing Tools are always being improved. Software updates are free for one year and a nominal charge is made thereafter. We are hoping to develop sensing systems for detecting obstacles at a distance. It is also possible to buy Smart Wheelchair components for fitting to your own wheelchairs.

## ***Where can I get more information about Smart Wheelchairs?***

The best way to find out about the Smart Wheelchair is to arrange for a demonstration from Smile Rehab or CALL. The CALL Centre also has books, a video and research reports describing how the chairs have been used in schools.

### **CALL Centre**

University of Edinburgh  
Paterson's Land  
Holyrood Road  
Edinburgh EH8 8AQ  
Tel. 0131 651 6236  
Fax. 0131 651 6234  
<http://callcentre.education.ed.ac.uk/>

### **Smile Rehab Ltd.**

Ability House,  
New Greenham Park  
NEWBURY  
Berkshire RG19 6HN  
Tel. 01635 37550  
Fax. 01635 250995  
[info@smilerehab.com](mailto:info@smilerehab.com)  
<http://www.smilerehab.com>

## **COST**

The cost of a complete system with all the 'tools', 50 yards line follower tape, one year warranty, and full training and installation, is £7700. Seating and controls cost extra.

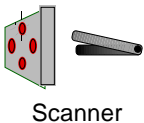
# The Smart Wheelchair Features and 'Tools'

## Wheelchair Base

The Smart Wheelchair is built on a compact power base. Virtually any seating system can be fitted to it, such as a CAPS II or Freedom system. A Controls Dynamic DX control system gives excellent control and manoeuvrability. The Smart Controller acts like a second DX joystick, and the various Smart systems, switches and controls plug into the Smart Controller.

## ToolBox

The ToolBox lets you select the Smart Wheelchair 'tools' that are needed by the driver, and set speeds and other settings. The ToolBox is built in to the Smart Controller and has simple switches and knobs to quickly adjust the operation - there is no need to connect up a separate programmer or computer.



## User Tools

The chair can be driven directly with one, two, three or four switches, joysticks, or a scanning direction selector. The scanner can be operated with one or two switches, and can even speak out the directions (auditory scanning) as they are offered.



## Integrated communication and mobility

The Smart Wheelchair can be driven by a laptop computer running programs like *Clicker*, or a communication aid such as a *DynaVox*, via the RS232 port. There is a 'swap switch' facility for controlling the chair and communication aid using the same switch.



## Motion Tools

The chair's movements can be either:

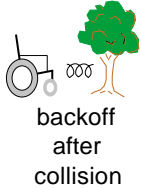
- Momentary (go while I press the switch) - good control for good switch users
- Timed (go for a set distance) - for drivers who cannot hold down the switch
- Latched (go until I press the switch again) - for those with good switch press and release skills

*The Smart Wheelchair was developed by the CALL (Communication Aids for Language and Learning) Centre and is manufactured by Smile Rehab Ltd.*



### Bump Tools

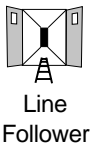
The Smart Wheelchair has wrap-round bumpers with zoned pneumatic sensors that detect collisions. The Smart chair can respond in several different ways:



- Bump and Stop detects the collision and stops the chair.
- Bump and Backoff stops the chair then reverses away from the obstacle.
- Bump and Turn stops, backs off, then turns the chair to a different direction.



The speeds and distances, and direction and angle of turn can all be configured for the user and situation.



### Line Follower Tools

An infra-red track follower is fitted to the Smart Wheelchair, which lets it follow reflective tape stuck to the floor. Tracks can be easily laid around classrooms, schools and homes. The tape is tough and will stick to most surfaces including wood, vinyl and shallow pile carpet.



The basic Line Follower lets the pilot follow tracks made with reflective tape on the floor from room to room, or helps them negotiate narrow doorways and tight corners.

Line Following with junctions lets the pilot choose tracks at junctions.

Tape can also be laid round dangerous features like stairwells, to stop the chair reaching them.



### Speech synthesiser

The speech synthesiser can confirm commands back to the pilot ("I'm going forward"), offer choices at track junctions ("Which way now - left or right?"), and report events ("Oops I've hit something - I'll back off and try going left").

***In 1998 the Smart Wheelchair was awarded the Gold Award for Technology for Special Educational Needs at BETT. The judges described it as 'leaping beyond what was previously thought possible.'***