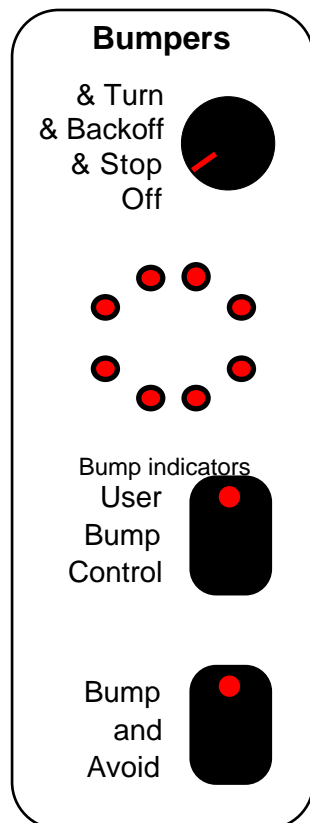


Bump Tools

Suppose now that you want to delegate the responsibility for dealing with impacts to the wheelchair itself, leaving you with just the task of deciding when to go or stop. The wheelchair tools to do that are called **Bump Tools**.

The Bump detectors are mounted all round the chair. Separate sensors at front, back and sides let the chair sense the location of the obstacle. The Bumpers plug into the ‘Bumper’ socket on the back of the Smart Controller. The bumpers are rubber tubes connected to pressure switches: when the chair hits something, the tube is squashed and the air inside operates the pressure switch.

The Bump sensors do not make the chair completely safe: it is physically impossible to spot a 60 kg. wheelchair, plus rider, moving even quite slowly, before the rubber compresses and the metal bumpers contact.



Bump Tools allow the user to let the chair deal with any obstacle that might cross its path, while the user is able to concentrate on making it go. Bump Tools can be used by independent drivers to help protect the user and environment (*Bump and Stop*), to help get out of trouble after a collision (*Bump and Back Off* or *Bump and Avoid*), or to give a crude means of exploration and play (*Bump and Turn*).

There are several different bump tools, all selected using the ToolBox.

No Bump

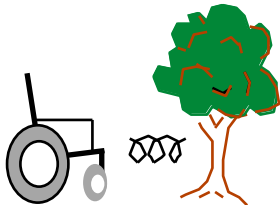
The chair will do nothing on colliding with an object

Bump and Stop



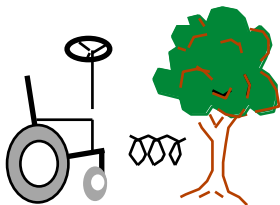
Recognises that the chair has collided with an object, stops the motors and waits for you to press go again. If you try to keep going at the object, the chair will not let you - it knows that there is an obstacle in your way and will only let you move off in a different direction. Bump and Stop is essentially a safety system.

Bump and Backoff



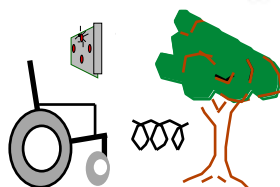
Recognises that the chair has collided with an object, stops the motors and backs away from the obstruction. Useful for pilots who can drive and steer, but need a little help to get out of tight corners.

Bump and Turn



Recognises that the chair has collided with an object, stops the motors, backs away slightly and turns the chair through a small angle to allow you to go off in another direction. The direction of the turn (left or right) is set up with the ToolBox programming switch. Bump and Turn is useful to introduce steering; play games; and for a single switch user to explore.

Bump and Choose Turn

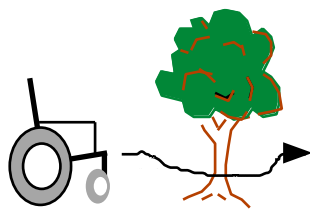


Bump and Choose Turn, offers choices to the user over which direction to go after a bump. Bump and Turn must be selected on the ToolBox for this tool to be on. Program Bump and Turn for choices the following programming must be carried out.

Not available yet

Parameter	Tool Switch	User Switch	Control knob	Motion Tool	Bump Tool	Line Tool	Scan Tool
Scanning Bump Choices ON	-	Forward	-	-	Bump and Turn ON	None	Single / Double Scan
Scanning Bump Choices OFF	-	Back	-	-	Bump and Turn ON	None	Single / Double Scan

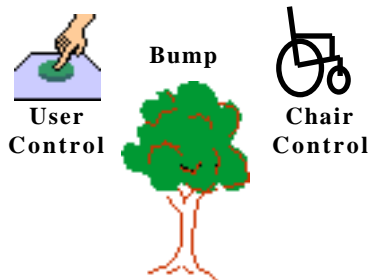
Bump



Standard Bump Tools are very simple and easy to understand, and are good for games and early exploration.

Avoid is for pilots who want slightly better mobility. If the chair is going forward, say, and something to the left or right, the Tool will turn the chair away to avoid the obstacle. If the chair hits the obstacle and the chair decides it can't be avoided, the selected Bump Tool (Bump and Stop, or Bump and Turn ON) will be used.

User / Chair Bump Control



The selected Bump Tools can operate under User or Chair control.

Chair Control: the selected Bump Tool operates automatically, i.e. for Bump and Turn it reverses and then turns by itself. The chair ignores any commands from the user while it is manoeuvring.

User Control: the distance reversed and/or turned is controlled by the user's switch, with whatever Motion Tool is selected. This gives better mobility, provided the pilot can control the backoff and turn distances accurately.

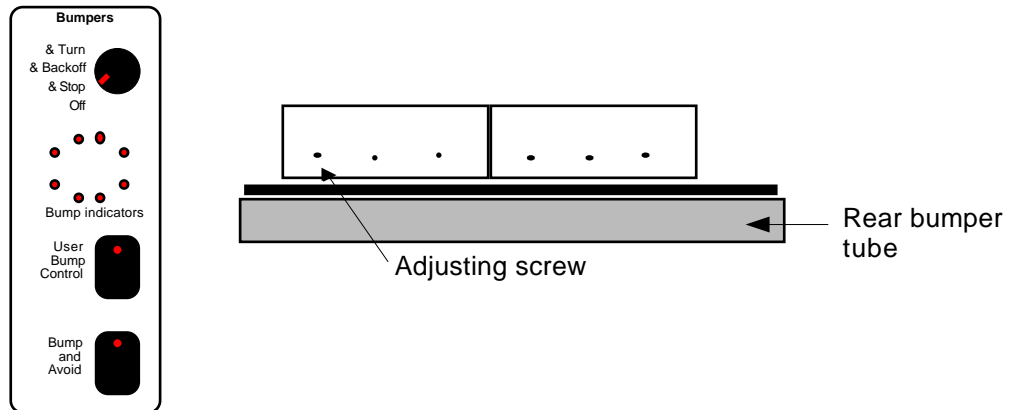
Programming the Bump parameters

The speed and distance or angle moved with the Bump Tools can be adjusted with the Speed and Distance controls. They can also be set individually - see below.

Parameter	User Switch	Control knob	Motion Tool	Bump Tool	Line Tool	Scan Tool
Bump reverse speed	Forward	Speed	Momentary	Bump & Backoff	None	None
Bump turn speed	Right	Speed	Momentary	Bump & Backoff	None	None
Bump reverse distance	Forward	Distance	Timed	Bump & Turn	None	None
Bump turn distance	Right	Distance	Timed	Bump & Turn	None	None
Bump turn to left	Left	-	Momentary	Bump & Turn	None	None
Bump turn to right	Right	-	Momentary	Bump & Turn	None	None

Bumper fault finding and adjusting sensitivity

The bumpers are designed to take a lot of punishment but sometimes faults can develop. The operation of the bumpers can be checked by monitoring the bump indicators on the Smart Wheelchair ToolBox panel.



Bumper sensors

When a bumper detects an object the indicator light up. If you think one of the bumpers is not working you can test it by pressing the area you think is faulty and check the indicator comes on. Another possible fault is where a bumper is stuck on - the indicator is on all the time. If there is this type of fault the Smart Wheelchair will detect it when you power on, and report it using the speech synthesiser.

If the Bumpers do not come on, or are stuck on, you can try and adjust the sensors by inserting a small screwdriver into the adjustment holes and turning the adjusting screws clockwise or anti-clockwise. If the fault is a non-working bumper try turning the screw clockwise until the indicator comes on all the time. Once you have reached this point turn the screw anti-clockwise about a quarter turn and check to see if the bumper works. If you can't adjust the bumpers so that they operate correctly, contact Smile Rehab.

If the bumper is stuck on, follow the same procedure except this time you turn the screw anti-clockwise until the indicator goes off. If the indicator doesn't go off contact Smile Rehab for help.

If you have successfully managed to adjust the bumpers, try making small adjustments to the bumper so that the indicator comes on for about one to two seconds when a bump is detected.