

# UltraCane

## INSTRUCTIONAL EXERCISES GUIDE



**Instructional Exercises for the UltraCane**

**Note:** Please read the UltraCane User Guide before performing the exercises in this guide

## **Introduction**

The following exercises have been designed to help you get to know your UltraCane and to build on your existing skills and confidence. However, as with all new skills, please ensure that you give yourself time to become familiar with the UltraCane and the way it works. It is recommended that when you first start using your cane you do so in a familiar, non-crowded and safe environment, and possibly with someone who can help you. Depending on how often you use the UltraCane, you should become confident with it within a week.

This document gives guidance on how to learn through progressive exercises. The more you practice using your UltraCane, the more you will develop a feel for its sensitivity and for the detection zone of the ultrasound 'beam' as you sweep the cane from side to side. Soon you will find a sweep speed with which you feel comfortable.

The UltraCane helps you to navigate your environment by giving you "tactile feedback" when objects are nearby. Tactile feedback is simple to understand in that the nearer you are to an object, the faster the tactile buttons will buzz.

The detection zone for the ultrasound beam of the UltraCane is approximately shoulder width (75cm) and therefore only gentle "sweeping" is needed in order for the UltraCane to detect obstacles in your path.

It is important that you remember to maintain good cane and sensory skills from the moment you start learning to use the UltraCane, so that integration of the two types of skills can be achieved. After a short period of time you will be able to incorporate the additional feedback provided by the UltraCane into your existing cane skills.

It is also important that you hold the UltraCane at the correct angle. If you hold the UltraCane too steeply you might find that it responds to unevenness in the ground immediately in front of you, and this will cause the front button to buzz excessively. If you hold the cane so that the angle is too shallow, it might not detect obstacles on the ground that you would like it to detect, such as a box or a step. When the cane is held normally the forward sensor will pick up objects in a zone immediately in

front of you. Twisting your wrist slightly enables you to get a feel for whether an object is immediately ahead of you, ahead and to the left, or ahead and to the right.

Good cane skills are required at all times, especially for detecting down drops such as kerbs and steps, as the UltraCane cannot detect these.

# Table of Contents

- Exercise 1: Building familiarity with feedback from the forward sensor (Long and Short Range).....6
- Exercise 2: Building familiarity with feedback from the upper sensor.....6
- Exercise 3: Building familiarity with simultaneous feedback from both sensors.....6
- Exercise 4: Detecting overhanging objects.....6
- Exercise 5: Avoiding multiple obstacles in your path.....7
- Exercise 6: Experiencing the advantage of the UltraCane.....7
- Exercise 7: Paralleling a wall without cane or body contact (shorelining) .....8
- Exercise 8: Paralleling a wall ('wrist twist' technique).....8
- Exercise 9: Scanning with the UltraCane to locate landmarks .....8
- Exercise 10: Scanning to locate and negotiate a landmark .....9
- Exercise 11: Finding the closest and farthest of two objects .....9
- Exercise 12: Negotiating pedestrians in your path .....9
- Exercise 13: Detecting intersecting hallways and door openings.....10
- Further Work.....10
- Some Properties of Ultrasound.....11

### **Exercise 1: *Building familiarity with feedback from the forward sensor (Long and Short Range)***

First locate a high wall that you can use as a target “object”. The wall should be higher than head-height, so the side of a building is ideal. Turn the UltraCane on to the Long Range setting and stand approximately 5 metres in front of, and facing the wall. Hold the UltraCane normally and place your thumb lightly over just the lower forward tactile button.

Without sweeping the cane, slowly take a few steps towards the wall and note how the button suddenly begins to buzz at a slow rate. Continue moving towards the wall and note how the buzzing speeds up. Continue walking towards the wall and note how the button buzzes almost continuously when you have reached the wall. Repeat this exercise a few times to gain familiarity with how the buzz speed changes with distance.

Repeat this exercise with the UltraCane switched to the Short Range setting, starting from 3 metres from the wall.

### **Exercise 2: *Building familiarity with feedback from the upper sensor***

Repeat Exercise 1, but this time placing your thumb over the upper button only and with the cane switched to the Short Range setting. As you move closer to the wall note how the upper button begins to buzz. While doing this exercise try to ignore the rapid buzzing which you may hear from the forward button.

### **Exercise 3: *Building familiarity with simultaneous feedback from both sensors***

Stand approximately 5 metres in front of and facing the wall. Hold the UltraCane normally and place your thumb lightly over *both* tactile buttons.

Without sweeping the cane, slowly take a few steps towards the wall and pause when the forward button begins to buzz. Now continue moving towards the wall until the *upper* button begins to buzz. At this point the forward button will be buzzing very quickly. Repeat this exercise a few times.

#### **Exercise 4: Detecting overhanging objects**

Locate a known overhanging object or have someone hold a stick or cane with a piece of cardboard, cloth or paper over it, suspended at head height in your path. Walk slowly towards this head-height obstacle without sweeping the UltraCane, and pause when you begin to get feedback from the upper sensor. Utilize the upper hand and forearm technique to physically locate the obstacle with your hand, moving closer if necessary. Repeat this exercise with the obstacle at various heights until you can consistently locate and negotiate the obstacle by moving around or under it.

#### **Exercise 5: Avoiding multiple obstacles in your path**

If you have someone to help you, have them place a number of 'obstacles' at least 4 metres in front of you, for example a couple of chairs a few metres apart. Also ask them to hold something in the air at head height level, such as a stick or pole.

Turn on the UltraCane to the Short Range setting and cover both buttons lightly with your thumb. Walk slowly towards the known first obstacle, while gently sweeping the UltraCane from side to side as you go, keeping the tip on the ground as you walk. Note: You only need to use small (shoulder width) sweeps.

As the forward tactile button starts to buzz, this will indicate to you that the first obstacle is within two metres of the UltraCane handle. At this point you can use the feedback from the tactile button to avoid the obstacle and negotiate a safe way around it. You do this by either feeling for reduced or no buzzing as you sweep the cane to the left and right of the obstacle detected.

Once you have negotiated the first obstacle, continue walking until you detect the next one. Negotiate this second obstacle in the same manner, using the feedback from the button. Similarly, you can detect and negotiate the head height obstacle when the upper tactile button starts to buzz, but remember to utilize the upper hand and forearm technique to physically locate the object to avoid contact with your head or face.

## **Exercise 6: Experiencing the advantage of the UltraCane**

For this Exercise, walk the same obstacle course but this time with the UltraCane switched off. Use it as you would use your normal white cane, by locating the obstacles utilizing your existing cane techniques of touch. By doing this, you will appreciate the level of additional information that the UltraCane provides through the tactile buttons. For instance, you will realize that you no longer need to physically locate an obstacle using the tip of a cane, but can detect it well in advance of hitting it.

## **Exercise 7: Paralleling a wall without cane or body contact (shorelining)**

Locate a known wall and stand alongside it with the UltraCane switched to Long Range. Walk along the wall by scanning with cane angled towards the wall. You can use the feedback from the UltraCane to maintain distance from the wall without touching it with the cane tip or your body.

Once you have walked along the side of the wall, reverse your direction and parallel on the opposite side. Repeat this exercise with UltraCane set to Short Range and try to remain a constant distance from the wall as you walk.

## **Exercise 8: Paralleling a wall ('wrist twist' technique)**

Repeat Exercise 7 using either the Short or Long Range setting, but modify your cane technique so that you roll your wrist slightly towards the wall. By gently rolling your wrist you will be able to feel through the buzzing that the wall is to your side. As you roll your wrist back the opposite way, the buzzing should reduce or stop, meaning that there is nothing in your path ahead. Repeatedly rolling your wrist gently back and forth allows you to continuously check for both the presence of the wall and a clear path ahead. Obviously if the forward tactile button buzzes to indicate an obstacle further ahead of you in your path, then you will need to find a safe way around it.

### **Exercise 9: Scanning with the UltraCane to locate landmarks**

With the UltraCane turned off, stand in a known open area where you know there is a “landmark” ahead of you. It could be a postbox or a street sign etc. Turn on the UltraCane to the Short Range setting and scan to locate the landmark. Slowly walk towards it, touching it with your free hand when you reach it. This will help you to maintain your landmark detection observations if you feel that by using the UltraCane you will lose some of this knowledge initially.

### **Exercise 10: Scanning to locate and negotiate a landmark**

So now that you know where your landmark is, move away from it and then, using the UltraCane switched on to the Short Range setting, walk back towards the landmark. Take notice of the tactile buzzing and safely negotiate it by feeling for reduced or no buzzing at all as you sweep the cane. Repeat from various distances from the landmark, and using both Short and Long Range settings, experimenting with clockwise and counter clockwise directions.

### **Exercise 11: Finding the closest and farthest of two objects**

If you have someone to help you, ask them to place two chairs at different distances in front of you, positioned so that one is off to the left and one is off to the right but both are within four metres of you.

Turn on the UltraCane to the Long Range setting and, without moving from where you are standing, turn to face the chair to your left, scanning to locate the chair by feeling for the tactile buzzing on the forward button. Once you feel the buzzing, turn to the right and locate the second chair, again without moving towards it. Compare the buzzing from both chairs and try to determine which chair gives you the strongest (quickest) buzzing. You will have then determined which of the two chairs is nearest to you. Try to use a variety of shapes and sizes of objects for this exercise.

### **Exercise 12: Negotiating pedestrians in your path**

If you have someone to help you, ask them to stand ahead of you and remain standing still.

With the UltraCane on the Short Range setting, walk forward until you detect your friend and then use the skills you have learnt from the exercises above to negotiate a safe path around them.

Turn around and then go back the other way, but ask your friend to walk towards you as you are walking towards them. Locate them using the information from the tactile buttons and use your skills to walk around them. Remember, to walk around your friend you want a slow tactile buzz or no buzz at all from the UltraCane. If you continue to walk towards your friend as they walk towards you, the tactile buzzing will increase until you walk into each other!

There may be occasions when you may want to walk with a friend along a footpath. To ensure that you always remain near to your friend, especially on busy footpaths, try walking behind them and learning how to detect them using the feedback from the buttons. Determine the level of feedback you require to be able to be at least one metre behind them and try to ensure this feedback remains at a constant level. Thus you will learn to stay close to them when out in busy streets.

### **Exercise 13: Detecting intersecting hallways and door openings**

Locate a hallway that has either other hallways intersecting it or a door opening into it. If using a door opening, ensure that the door is open.

Using the forward tactile button for detection purposes, hold the UltraCane so that there is a slight tilt towards the wall to detect an opening or intersecting hallway but do not touch or contact the wall as you walk along the side of it. Walk forward using the 'twisting wrist' technique described in Exercise 8. As you are walking, if you reach a door opening the buzzing will slow down slightly. It is likely that the buzzing will not stop completely because the UltraCane will continue to pick up the wall ahead of the door opening.

If there is an intersecting hallway ahead of you, the buzzing from the tactile buttons may stop when the hallway has been reached, but only for a short while as you pass the hallway.

Practice this Exercise on both range settings.\_

## Further Work

The Exercises described above form the basis for learning to use your UltraCane. Practice makes perfect, so please continue to practice until you feel confident in its use.

The skills learnt above can be adopted when you are using your UltraCane out in the environment: walking down streets, entering shops, going to work, walking in the park etc.

If you feel you need further training then please speak with your local mobility officer or contact us at Sound Foresight Technology Limited (contact details are below) so that we can assist you further. We want your experience of the UltraCane to be a successful one and one that increases your confidence over time so that you can use your UltraCane in areas where you would not normally go.

## Some Properties of Ultrasound

Like light waves, ultrasonic sound waves are reflected off objects. This sometimes results in variations in detection range since not all surfaces reflect ultrasound equally well. Sometimes an object will not be detected at all; this is not a defect in the cane.

There are variables that determine whether or not something will be detected, and the range at which it will be detected.

- a) Angle of approach or angle of object to channel: An object that is at such an angle to the channel that there is barely any surface area for reflection will be less detectable.
- b) Reflectivity of the object: A hard, smooth object will reflect the most energy from a beam at 90 degrees to it. A good example of this type of reflectivity is a large glass window. If we exchange the glass window for a carpeted wall, *some* of the energy will be absorbed by the carpet, and some will be reflected back. This may reduce the range at which the carpeted wall will be detected.

If we now change the carpet to several layers of a towel-like material, the new, softer material will absorb slightly more ultrasonic energy and the range may be reduced further.

Another variable is a rough surface. If we change our wall once more, and replace towel with stucco, the ultrasound waves hitting the wall will be scattered in different directions. This phenomenon will also reduce the detection range.

Fortunately, the overall range of the UltraCane is such that these range variables are rarely noticed.

- c) Size of the object: The smaller the surface area detected, the smaller the signal reflected.

So, it is important to remember that with all objects, some energy will be reflected, some will be absorbed and some will be scattered.

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