Echo Lynx User Manual

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Part 1 - Echo Lynx Description

The Echo Lynx is a worn electrolarynx consisting of two parts: the collar and the remote. The collar houses the circuitry and motors and is worn around the neck. The remote is used to control the output of the collar through a BlueTooth connection.

Section a - Casing Description

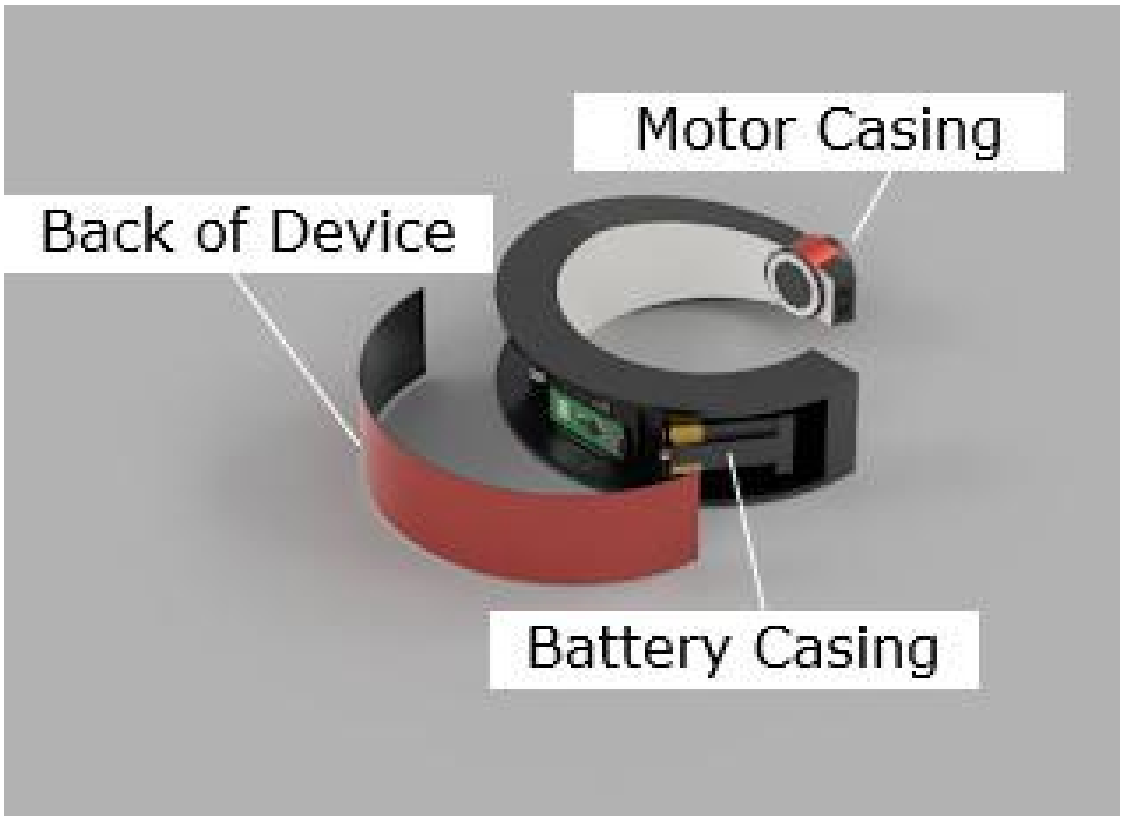

Figure 1 - Annotated Casing Design

The collar is worn with the wider part of the brace placed at the back of the neck and the motor casing at the front of the neck. The motor casing should rest comfortably at the front of the neck even when operating.

A 9V battery is inserted at the battery port, which can be accessed by removing the cover on the back. Once the battery is inserted, the device will be powered and free to use.

Section b - Remote Description

The remote has five buttons on it.

The power button is at the top of the remote. Pressing this button will toggle the output of the device.

Below that, there is a volume up button. Pressing this button will increase the sound output of the device.

Below the volume up button is the volume down button. Pressing this will decrease the sound output of the device.

Below the volume down button is the frequency up button. Pressing this will raise the pitch of the sound output of the device.

Below the frequency up button is the frequency down button. Pressing this will lower the pitch of the sound output of the device.

Holding the volume up, volume down, frequency up, or frequency down buttons will cause the device to increase in responsiveness and act on that command more frequently. Once the button is released, it will reset to its default responsiveness.

Part 2 - Specifications and Features

Section a - Range Specifications

The frequency range of the Echo Lynx is between 60 and 240 Hz, with a default frequency of 120 Hz - the average pitch of the human voice.

The volume ranges from mute and full volume in 20 increments. Changes in frequency may result in an apparent change of volume, but the user will be able to account for this by adjusting the volume of the device.

Section b - Additional Features

As mentioned in Part 1, Section b, holding the frequency up or down, or volume up or down buttons will cause the device to start responding faster after an initial delay. This delay is initially set at 0.5s, and is 0.25s at the minimum. The longer the button is held, the more rapid the changes in this delay is. Releasing the held button or inputting a new command will reset the delay time to its initial value.

The Echo Lynx will store the user's current settings every minute while powered. If the batteries die or are removed, this ensures that the user's settings can be restored once power is restored.

While the device is in the Off state, it will not respond to any commands sent from the remote, except for the command to power it on. This ensures that unintentional inputs do not change the settings that the user has the device set to.

Part c - Response specifications

The Echo Lynx responds to 99% of commands within 0.1 seconds, and 100% of commands within 0.11 seconds. Of these commands, the EchoLynx will properly parse 100% of them.

These details are collected from a sample size of 400 commands, 100 of each of volume up, volume down, frequency up, and frequency down. On the next page is a graph and two charts showing the details of these tests.

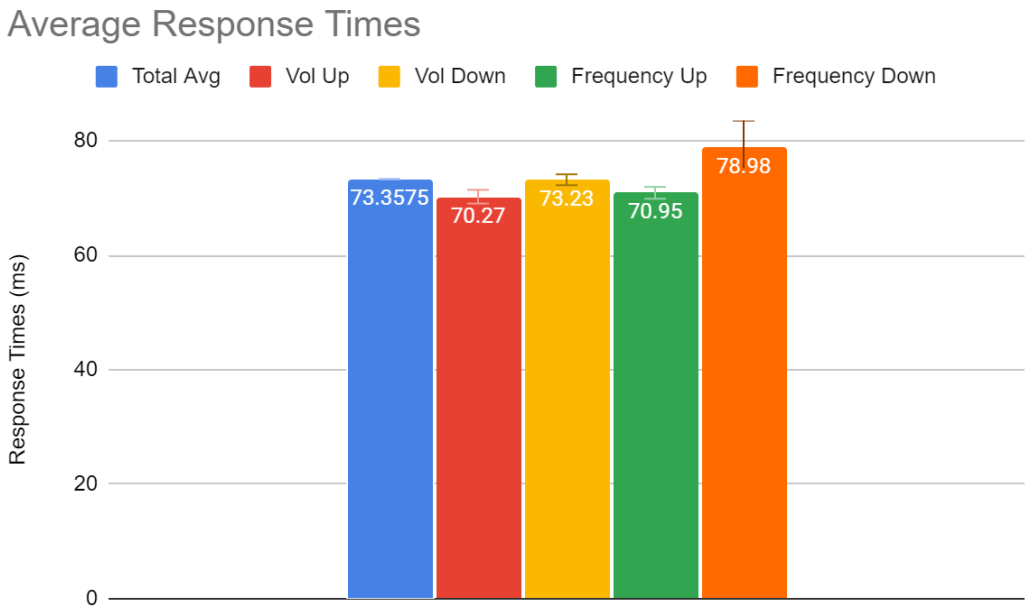

Figure 2 - Chart showing speed details

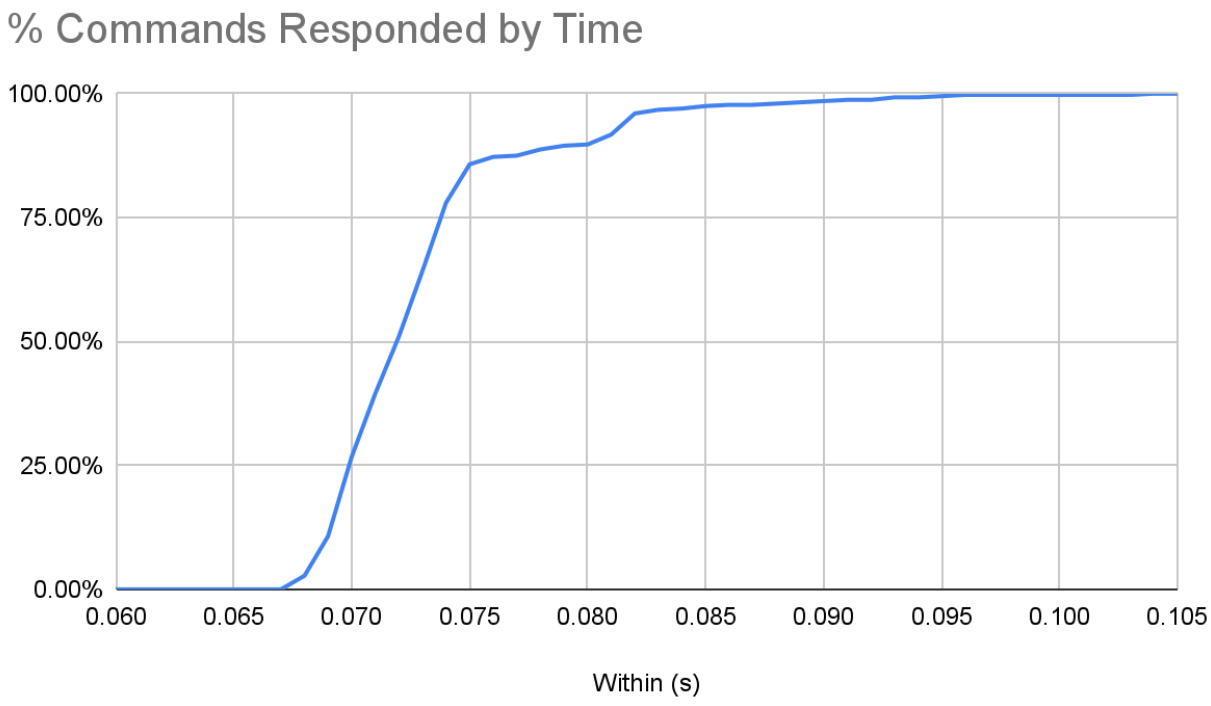

Figure 3 - % of commands responded to within a time interval

Chart 1 - Accuracy testing by command

Command	Count	# Correct	% Correct
Total	400	400	100.00%
<VOL_UP>	100	100	100.00%
<VOL_DOWN>	100	100	100.00%
<FREQ_UP>	100	100	100.00%
<FREQ_DOWN>	100	100	100.00%

Chart 2 - Statistics from Speed Testing by category

Command	Mean RT	Median RT	Standard Dev	25th Percentile	75th Percentile	IQR	# Outliers
Total	73.3575	72	4.677005	70	74	4	0
<VOL_UP>	70.27	70	1.716556	69	71	2	0
<VOL_DOWN>	73.23	73	1.301553	73	74	1	0
<FREQ_UP>	70.95	71	1.472817	70	72	2	0
<FREQ_DOWN>	78.98	76	5.823983	75	82	7	0

Part d - Power specifications

The Echo Lynx functions for approximately 110 minutes of speaking time before it needs to be recharged. Below is a chart showing the voltage rating over time until the device stops working.

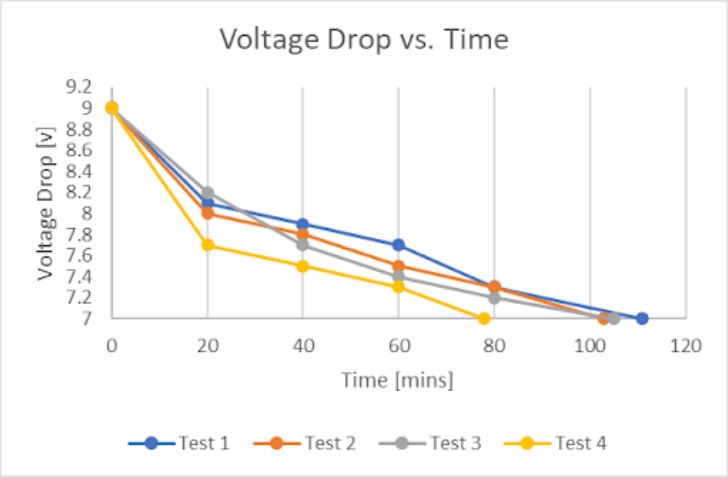

Figure 4 - Voltage over Time