Ear-Bot: Locust Ear-on-a-Chip Bio-hybrid Platform

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34   **Figure S1**

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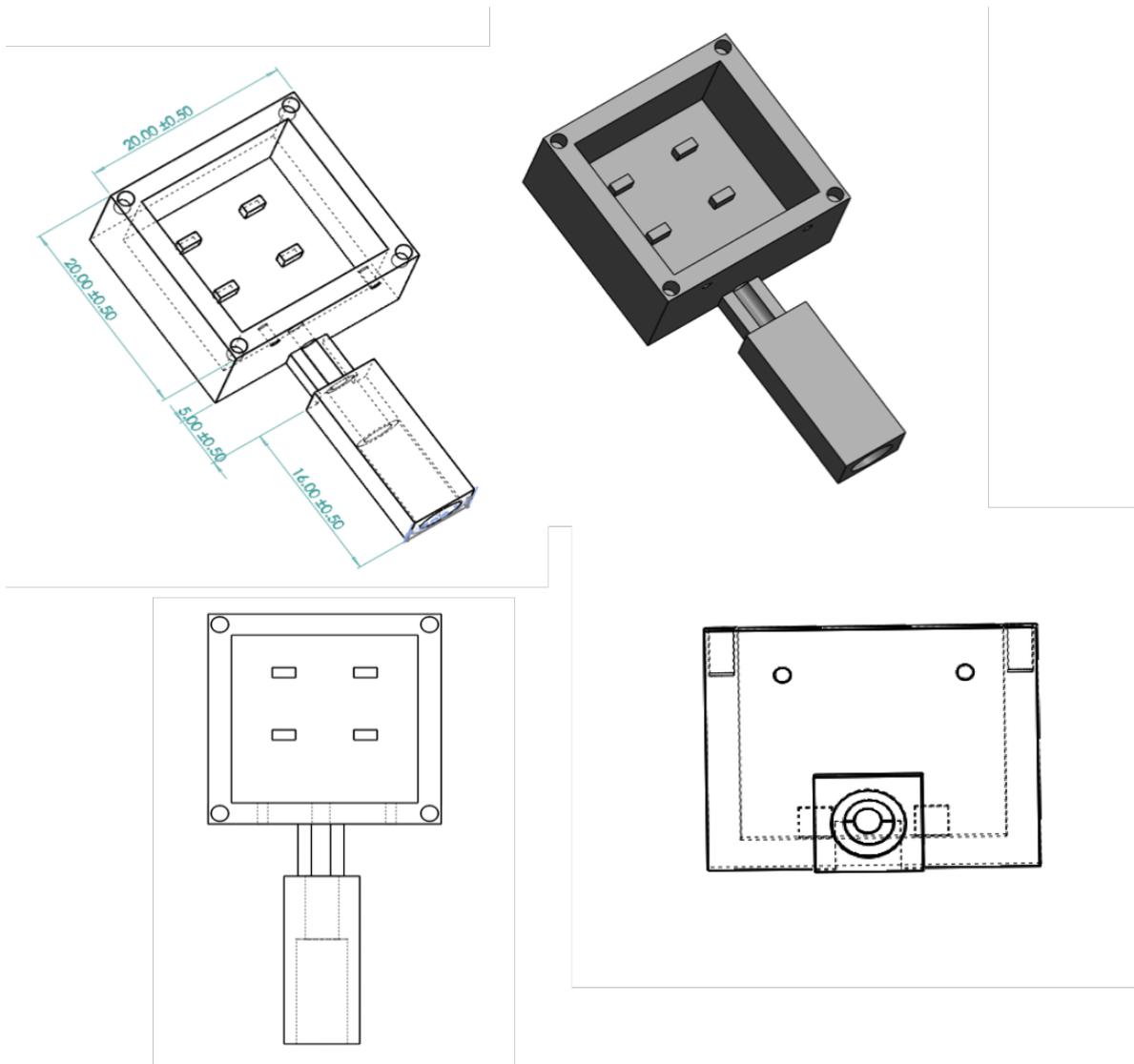
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37   **Figure S1: The Ear-Chip**

38   CAD schematics of the Ear-Chip.

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46 **Figure S2**
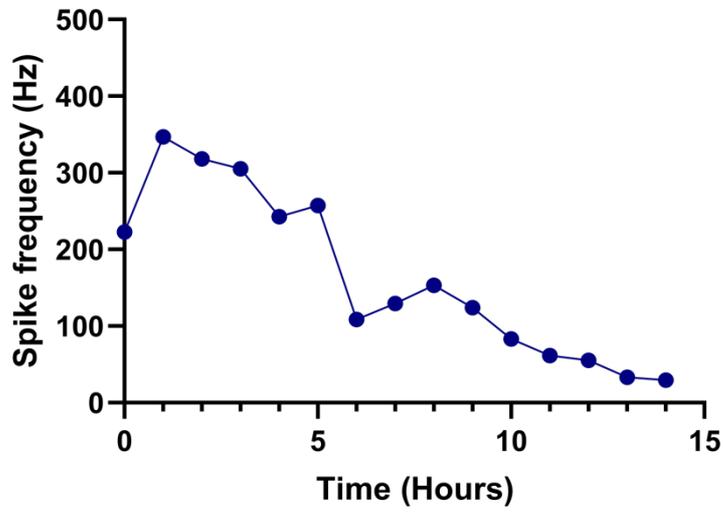
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49 **Figure S2: Stability analysis**

50 Stability analysis of a single ear responding to 1kHz sounds for several hours.

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66 **Figure S3**

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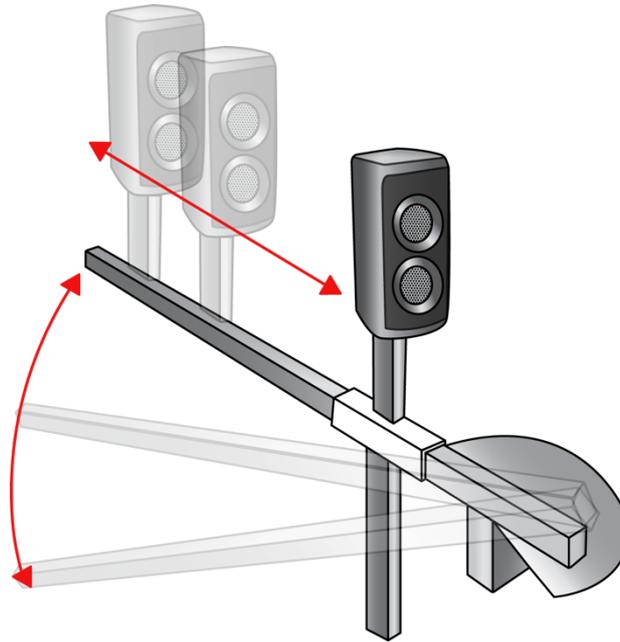
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70 **Figure S3: Custom platform for assessing the Ear-Chip spatial response to sound.**

71 A custom-made platform used to characterize the Ear-Chip response to sounds in different
72 frequencies and different angles. The system custom holder enables to move the speakers both
73 radially around the Ear-Chip and modify the distance from the Chip.

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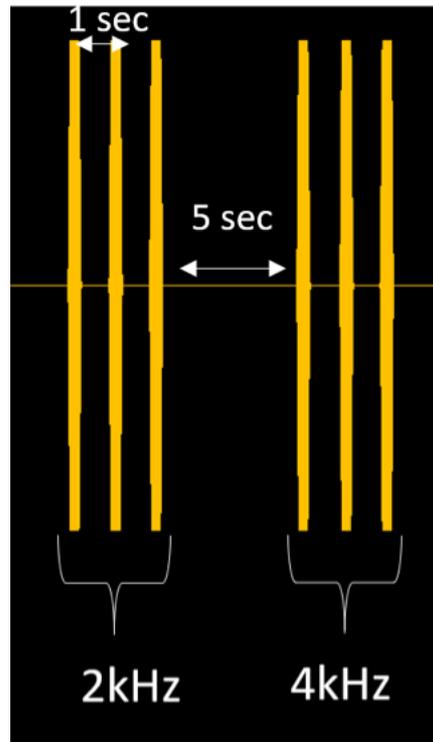
Figure S4

Figure S4: The sound stimulation.

The stimulation protocol was composed of 60db, three 500ms long sound pulses, spaced by 1000ms of silence. Each group of three pulses was of different frequency (between 0.2 to 15KHz, and separated from the previous group by 5000ms
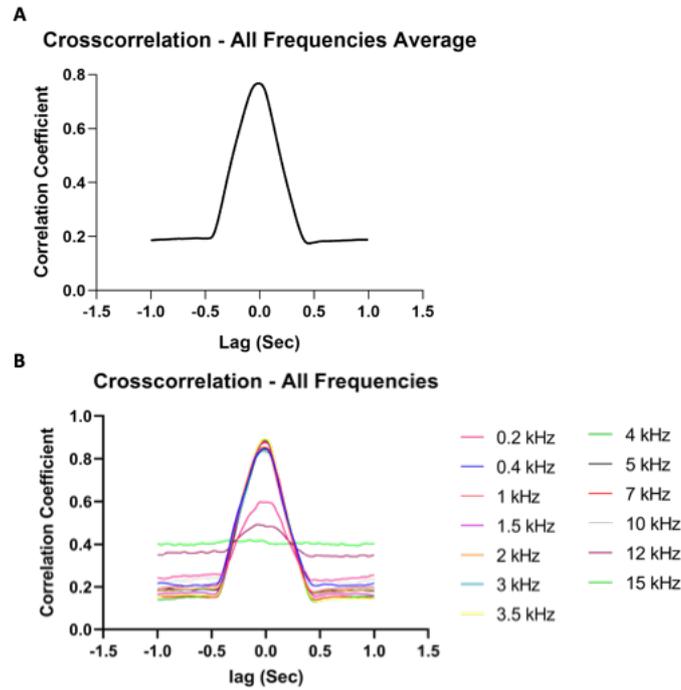
105 **Figure S5**

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108 **Figure S5: Cross correlation**

109 Cross correlation between the stimulus and the electrophysiological response of the Ear-Chip.
110 **(A)** present the average cross correlation of all the frequencies that were used to stimulate the Ear
111 Chip. **(B)** present an overly of cross correlation for each frequency that was used to stimulate the
112 Ear-Chip.

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124 **Figure S6**
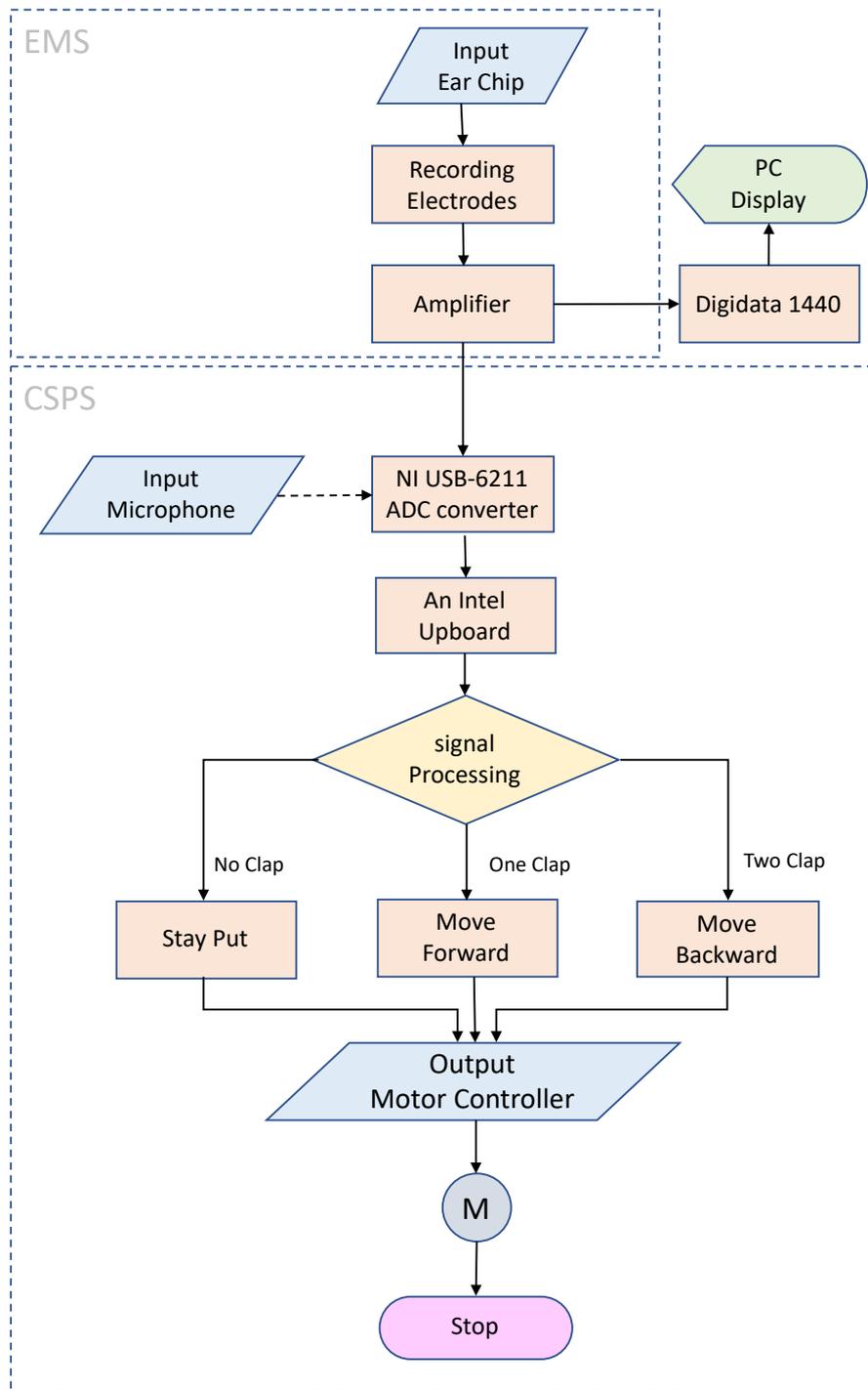
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126 **Figure S6**

127 Logic diagram of the Ear-Bot.

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132 **Figure S7**

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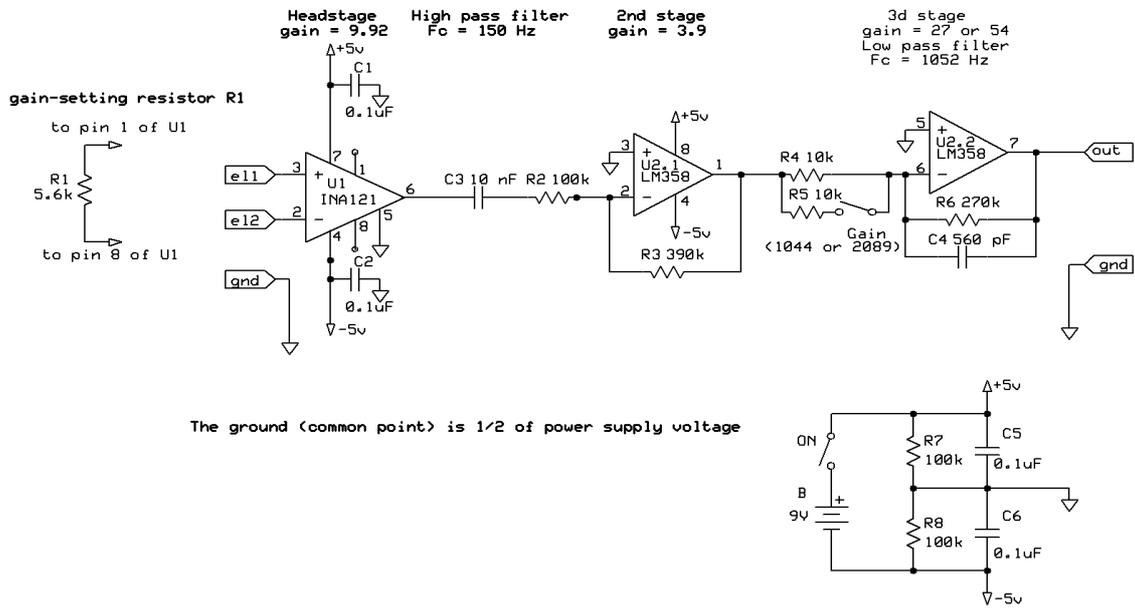
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135 **Figure S7: Schematics of the AC amplifier**

136 AC amplifier schematics

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SI movies:

Movie S1: Ear-Chip response to sound.

The locust tympanal organ integrated in the "Ear-Chip" and connected to the recording system. Top track on the computer screen shows the ear electrical response to a variety of sounds.

Movie S2: Custom platform for assessing the Ear-Chip spatial response to sound.

A custom-made system used to characterize the Ear-Chip response to sounds in different frequencies and different angles. The system custom holder enables to move the speakers both radially around the Ear-Chip and modify the distance from the Chip.

Movie S3: Ear-Bot response to sound.

The hybrid bio-robot moves forward as a response to one clap and backward as a response to two claps. The screen on the right shows the locust hearing organ's electrophysiological response to the claps.