# SONICLEVEL-CRICKETS APP FOR THE ICAD 2023 SONIC TILT COMPETITION

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## ABSTRACT

The SonicLevel-Crickets App is modelled on a singing cricket that stops singing when you move toward it. This sonification provides information about relative movement rather than absolute position in the 2D space. It is a minimal approach where sound and silence provide binary information.

## 1. LINK TO APK FILE

The SonicLevel-Crickets App builds on the Tiltification App [1] using code from the open source project Sonic Tilt.

The SonicLevel-Crickets App can be downloaded onto your mobile phone from `https://drive.google.com/file/d/17pWjShlpR8wrfqiwPJ1C8RObAH3JzfEI/view?usp=share_link`.

## 2. INTRODUCTION

Trying to level a 2D bubble is a steering task where the visual position of the bubble tells you which direction to tilt to head for the centre. If the bubble is to the right then tilt left, and vice versa. If the bubble is too high then tilt in the opposite direction. When the bubble is in the centre you are at the 2D level position.
In this experiment I explored reducing the task information to just two questions with Yes/No answers:

2) Is it closer to level if I tilt it in this direction? (Yes/No)
3) Is it level now? (Yes/No).

## 3. YOUR SONIFICATION

The metaphor for this sonification is the sonic behaviour of a chirping cricket. When you approach the cricket it stops chirping. IF you move away from the cricket it starts chirping again. When you have reach the location of the cricket (e.g. the level position) it will be quiet but a movement in any direction will cause it to chirp. After some trials with this super minimal version I found that I couldn't tell that I had reached the level position, because silence had two meanings - "Yes your last movement was towards level", and "Yes you are now level". I addressed this problem by adding a distinctly different chirp for "Yes you are level".



Figure 1: *Chinese Caged Singing Cricket*

## 4. IMPLEMENTATION

The implementation in PD consists of noise with a 10 ms triangular amplitude envelope that is triggered every 50 ms by a metro unit to produce a chirping sound bandpassed filtered with a centre frequency of 1 kHz. The radial distance from the centre position is calculated from the X,Y tilt angles. If the distance from level decreases the chirp is switched off, if it increases the chirp is switched on. When the distance is 0 the centre frequency of the chirp is switched to 2 Khz, the rate is set to 30 ms, and the envelope is shaped to fade over 300 ms.

A video of the SonicLevel-Crickets App can be found at `https://youtu.be/DeaK6L9e970`.

## 5. EVALUATION

I did a rudimentary evaluation by timing how long it took to level the phone by hand in 10 trials using the Visual, Sonic, and Visual+Sonic modes.

| | Visual | Sonic | Visual+Sonic |
|---|---|---|---|
| Mean | 6.4 | 22.1 | 7.6 |
| StdErr | 0.75 | 3.8 | 0.9 |

These results from a small number of trials by me alone cannot be taken too seriously, but the process helped me to pay attention

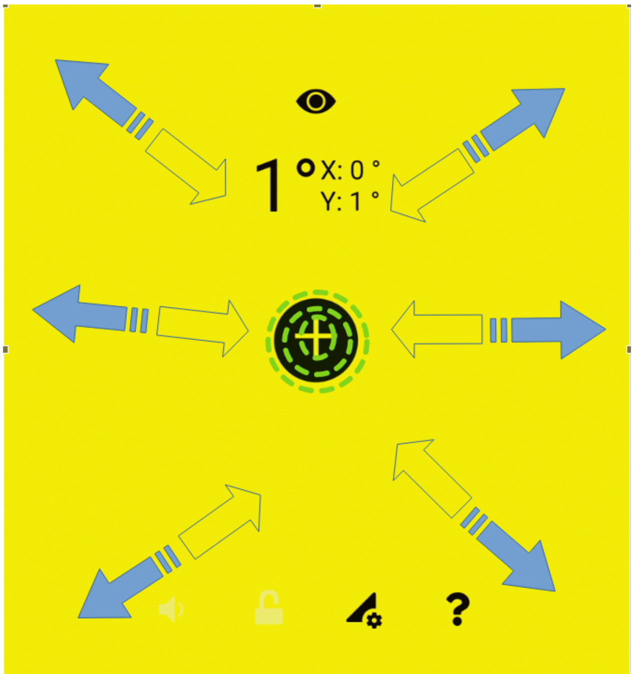


Figure 2: *Sonic Information Design.*

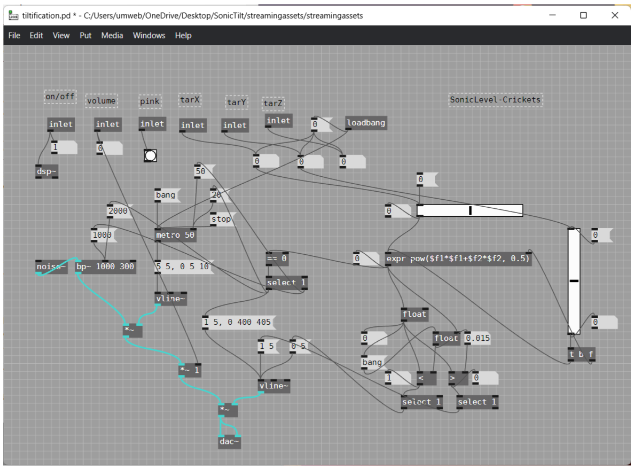

Figure 3: *PD Patch*

to, and reflect on, the relationship between the task and the sonic information I could hear while doing it. My performance in the Sonic mode was 350% slower than the Visual mode (22.1 s vs 6.4 s), while the combined Sonic+Visual mode was 18% slower than the Visual mode (7.6 s vs. 6.4 s). Performance in the Sonic mode was much more variable than the Visual or Visual+Sonic modes. I found the Sonic mode frustrating and had to take a break midway through the evaluation. Although I could tell when I had moved in the right or wrong direction I couldn't tell which way to go next. I developed a strategy of moving back and forward between silence and chirps to home in on a correct direction but after heading the right way for a while I would sometimes find that every next move was wrong and could not work out where to turn. The information

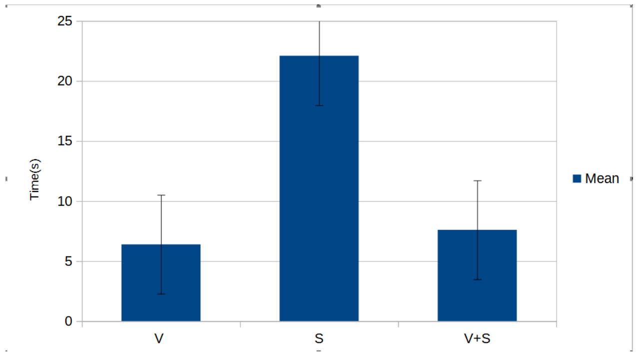


Figure 4: *Time to Level over 10 trials in Visual, Sonic and Visual+Sonic modes*

is too minimal to perform the task effectively. However, hearing the "Yes you are level chirp" was very rewarding! That being said, I would often overrun that position and was back to the frustrating hunting mode. After further exploration of the interface I found a clearly perceptible lag between the movement of the phone and the update of the tilt sensor values which means you have to move slowly to get sound feedback that is relevant to your current movement and position. From my experience with this App I would suggest that the sensor update rate to support interactive hand-ear information for this task needs to be an order of magnitude faster.

## 6. ACKNOWLEDGMENT

Big thanks to Tim Ziemer for all the time and effort required to organise the Sonic Tilt Competition, and to his students for building the App which provides a learning tool and software framework for sonification researchers who would like to make Killer sonification Apps for the masses.

## 7. REFERENCES

[1] M. Asendorf, M. Kienzle, R. Ringe, F. Ahmadi, D. Bhowmik, J. Chen, K. Huynh, S. Kleinert, J. Kruesilp, Y. Lee, X. Wang, W. Luo, N. Jadid, A. Awadin, V. Raval, E. Schade, H. Jaman, K. Sharma, C. Weber, H. Winkler, and T. Ziemer, "Tiltification — an accessible app to popularize sonification," in Proc. 26th International Conference on Auditory Display (ICAD2021), Virtual Conference, June 2021, pp. 184–191. [Online]. Available: https://doi.org/10.21785/icad2021.025