CRITIAS
CHAIRE DE RECHERCHE INDUSTRIELLE CRSNG-EERS EN TECHNOLOGIES INTRA-AURICULAIRES

ÉTS
Le génie pour l'industrie
ÉCOLE DE TECHNOLOGIE SUPÉRIEURE
Université du Québec

4 in 4 out USB implementation using Tympan

ASA 2021

Valentin PINTAT/Elliot Drees

2021-11-29

2

Summary

- Our Team
- Context
- Problem
- Objectives
- Our quest
- Developed System
- Results
- Benefits

3 Our team

Audio wearables

Digital signal processing

In ear devices

Electronics

3D Design

Elliot Drees

CRITIAS

Valentin PINTAT

Audio systems

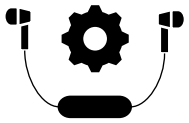
Prototyping

Programming

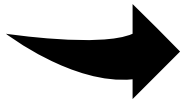
3D Printing

Audio Measurement

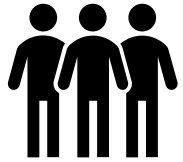
4 Context



Smart wearables



Tympan

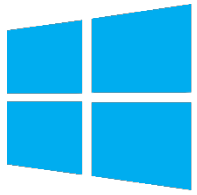


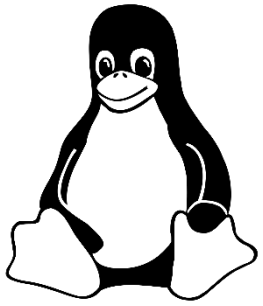
Maker community

Open source

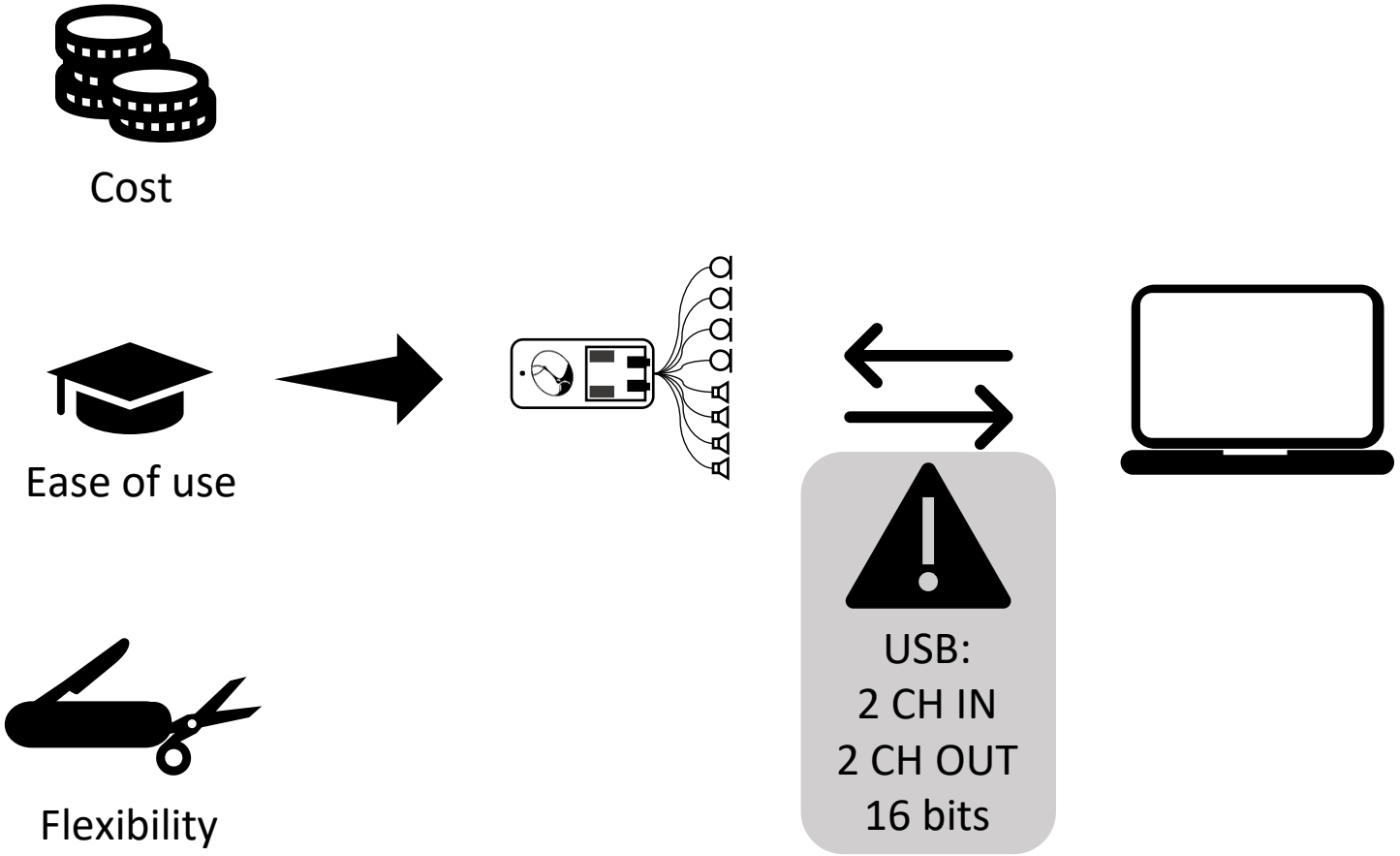
Hardware possibility :

- 4 Line IN (with Audio Shield)
- 4 Headphone OUT (with audio Shield)
- Programmable Microphone Bias
- ⟷ Data width programmable as 16, 20, 24 or 32 bits

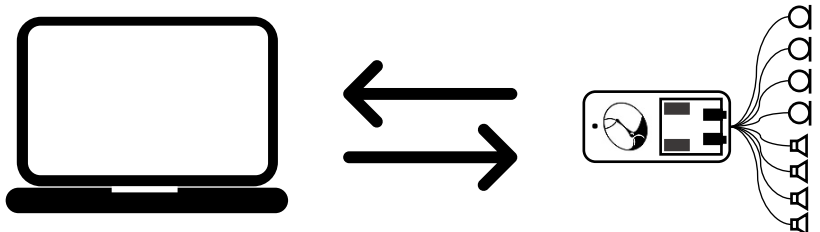




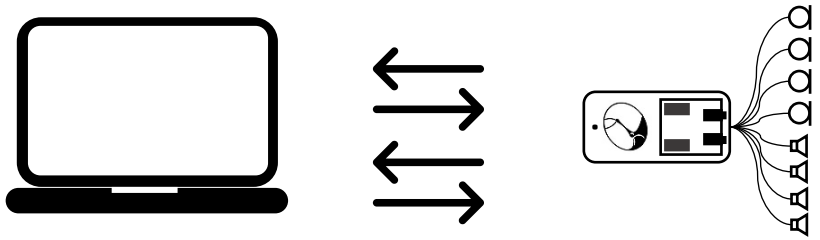
Problem

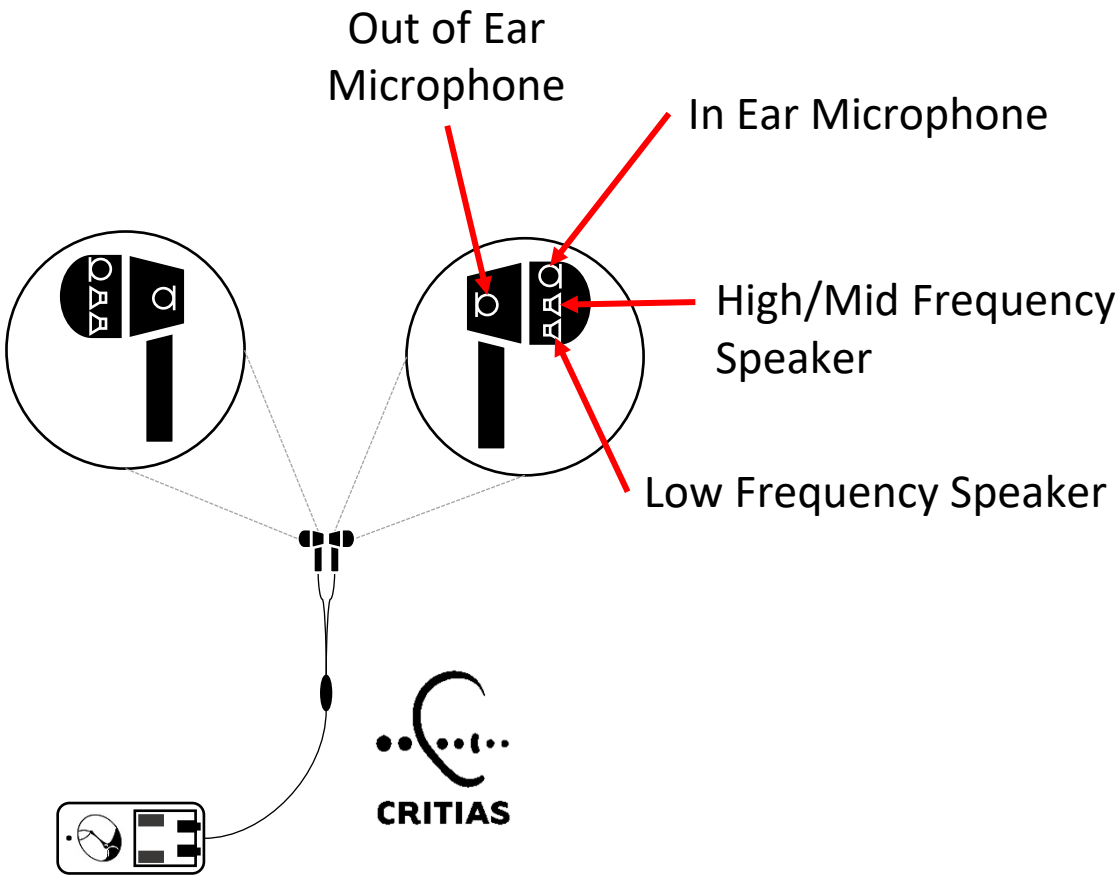


Objectives

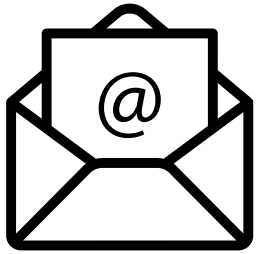


USB:
2 CH IN/2 CH OUT
16 bits





Our quest



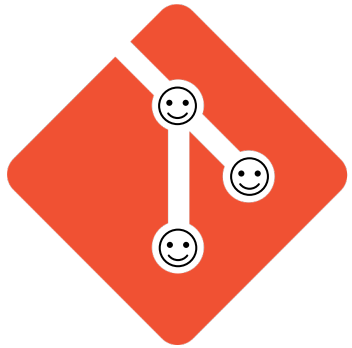
I'm so glad to hear about your ideas! Thank you!

I think that 4-channel audio via USB would be great. Please do be aware, however, that you would be modifying parts of the system that are outside of Tympan, which means that it is outside of my ability to provide much help.

So, looking forward, be aware that understanding USB protocols can be very difficult for non-specialists. It is much too hard for me. **But, if you and your team are brave, and if you are not scared by the idea of reading USB specification documents, your idea of a 4-channel USB audio interface would be an amazing contribution to the community!**

Chip

It's ok to try and break everything, git is your friend ☺

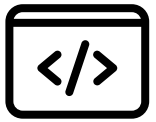


git

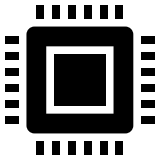
Our quest

- Studying the documentation
  - Teensy
  - Microcontroller data sheet
  - Codec data sheet
  - USB standards

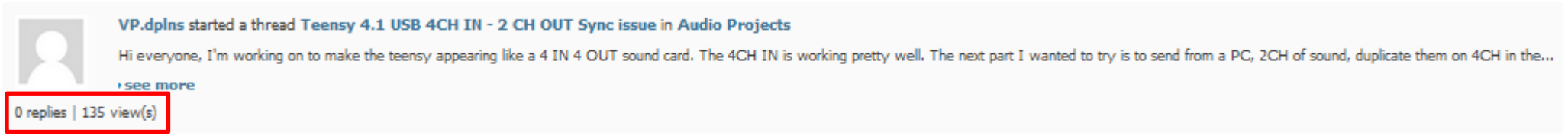
- Understanding the code when there wasn’t any comments



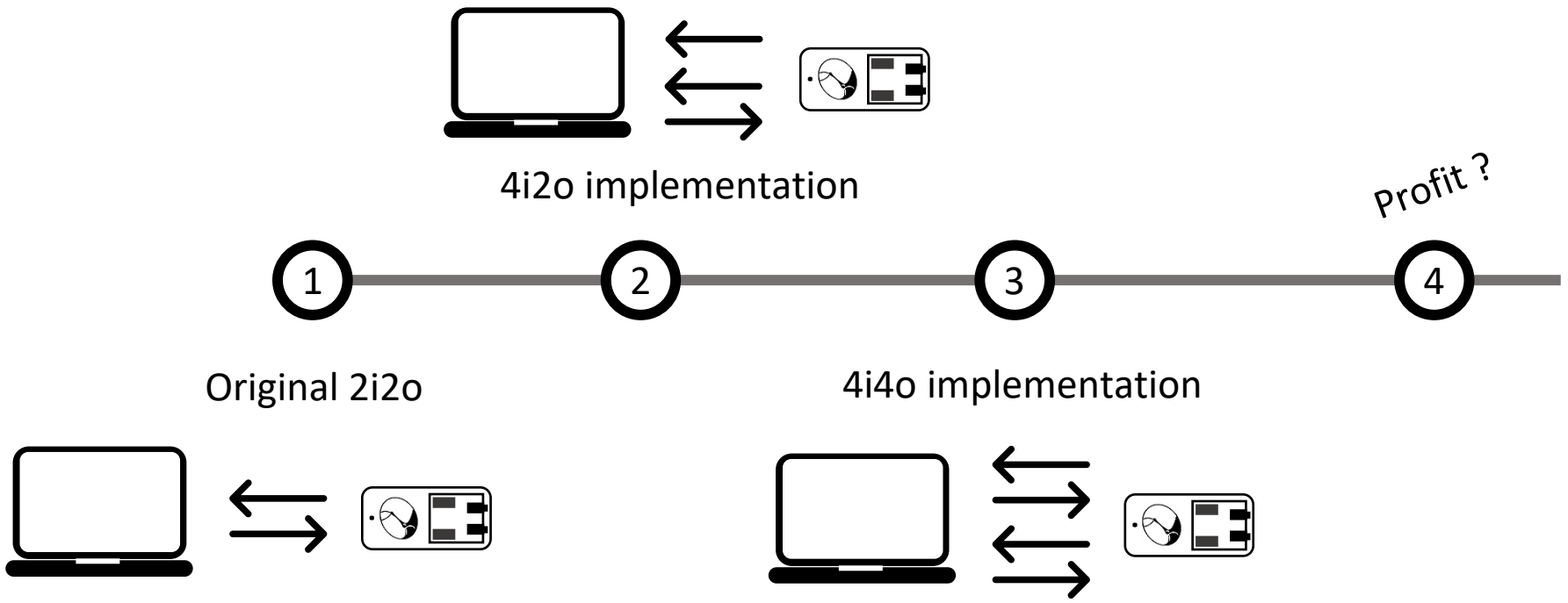
- Microcontroller-specific functions



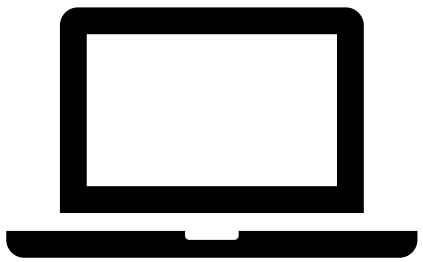
- Short timeframe
- No support on teensy forum

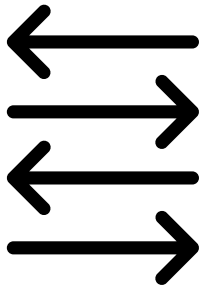


9 Results

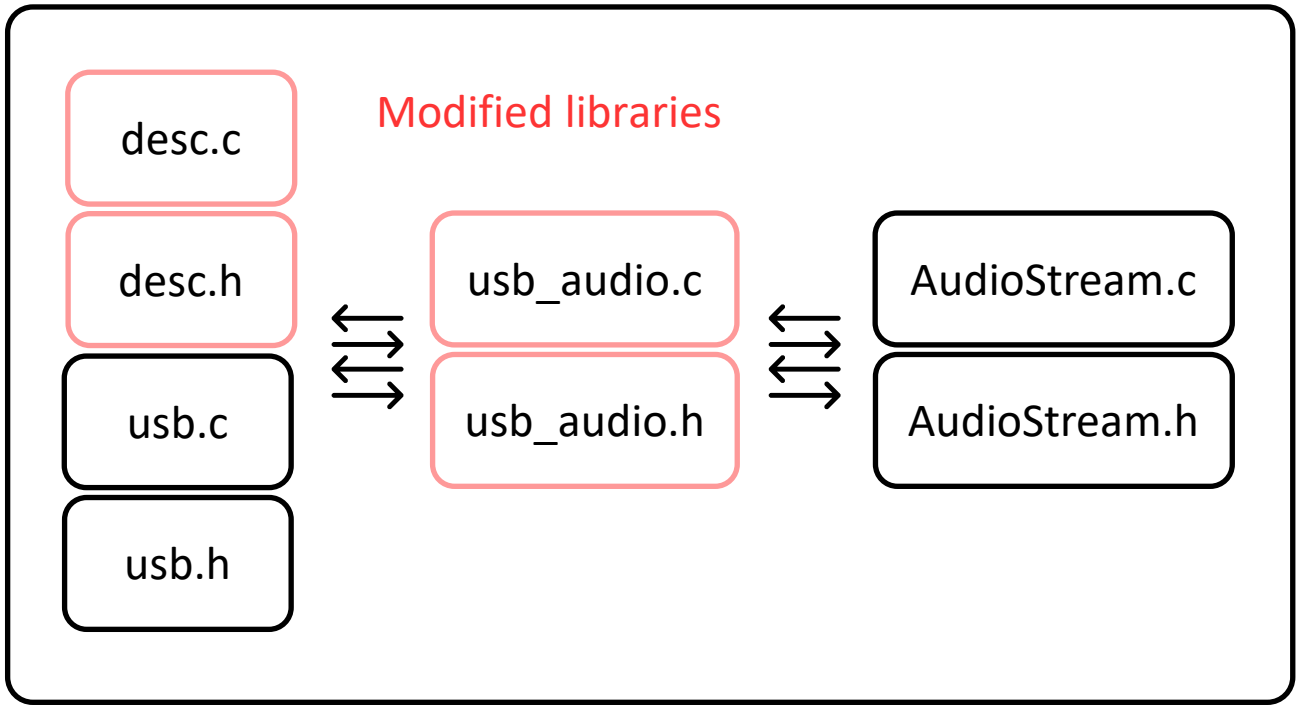

4i2o implementation
Profit ?
1
2
3
4
Original 2i2o
4i4o implementation

10 Results





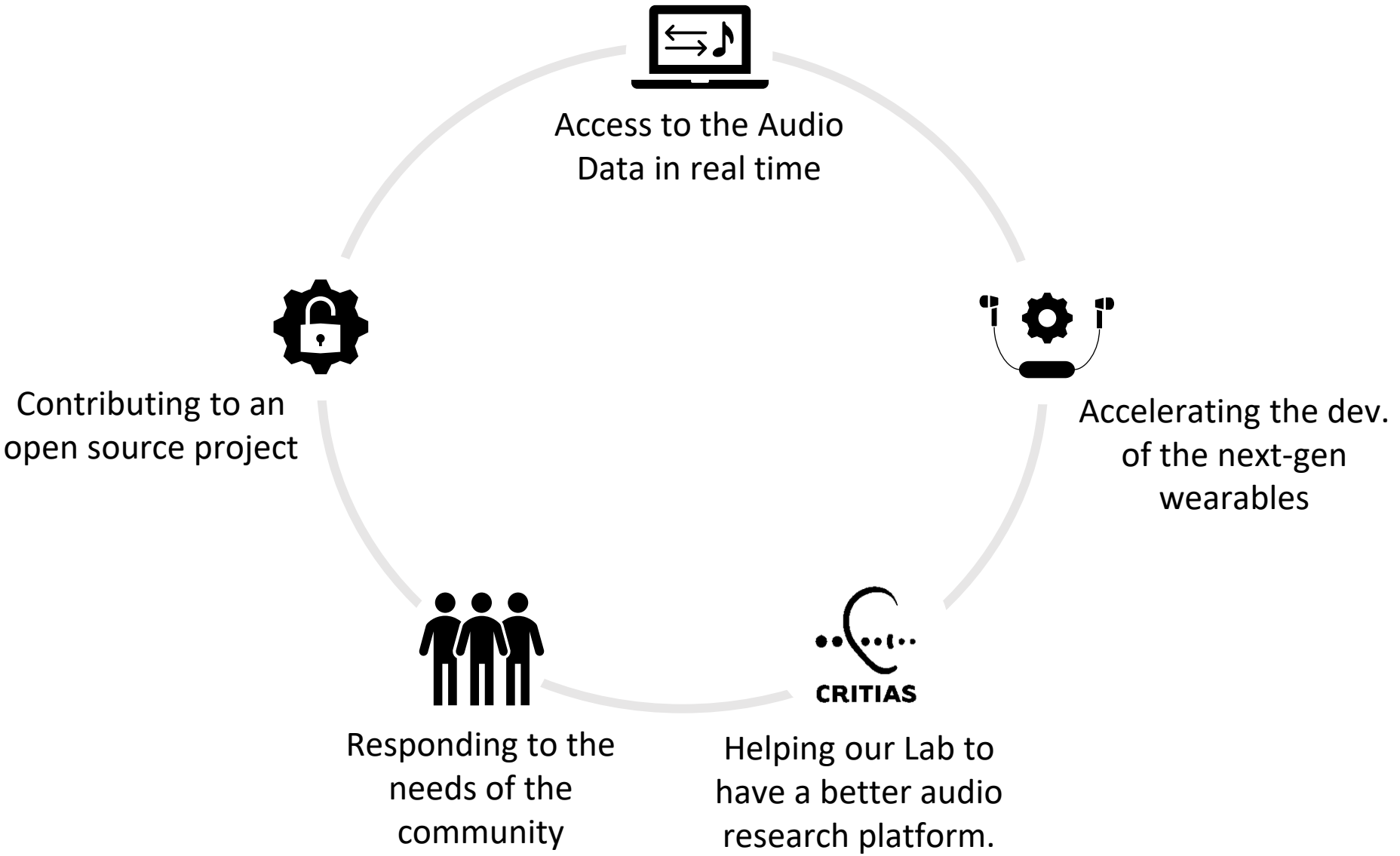
The PC is sending 4CH of audio using ASIO to the teensy



Teensy

The GIT will be released soon for more details !!!

Benefits


Access to the Audio Data in real time
Accelerating the dev. of the next-gen wearables
Helping our Lab to have a better audio research platform.
CRITIAS
Responding to the needs of the community
Contributing to an open source project

Thanks !

Thanks to ASA for hosting the Hackaton

Thanks to Chip and Eric for sending us some beautiful hardware and supporting us in our endeavors

Thanks to CRITAS to let us use the Laboratory space.

Thanks to Paul Stoffregen for the work on the teensy GIT repo

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Don’t hesitate to contact us for more information or any questions !