Lixie Universal Tuner

Project Plan
Version Final

Project Manager:

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GitHub: https://github.com/JeremyLesauvage/LUT-Lixie-Universal-Tuner

Revision history

Date	Version	Description	Author
02/10/2019	0.1		All the team
15/10/2019	0.2		All the team
24/10/2019	0.3		Oscar
10/03/2020	FINAL		Jérémy Lesauvage

1 Project overview

1.1 Product Vision Statement

The idea is to create a fascinating and easy to use tuner working with string, woodwind, brass and percussion instruments. In addition to having chromatic mode our tuner has the Bb, Eb and F transposed modes. Making it one of the rare universal tuners, and furthermore, it can display the frequency and even change the reference frequency! Our tuner is designed to be transportable by working with a rechargeable battery, meaning you can take it everywhere your musical spirit will lead you.

The Lixie tuner is a new version of the old nixie tube technology. The idea is to improve the nixie by having a greater lifespan and more robust build quality. The display will be easier to read and have a vintage look, in addition to use RGB LED.

1.2 Project deliverables
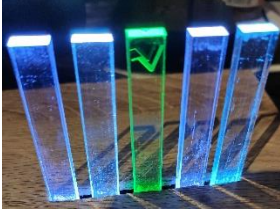
Required deliverables:

- 04.10.2019: Initial project plan
- Technical documentation version 1
- 25.10.2019: Detailed project plan
- System proposal (updates and final requirements)
- 08.11.2019: Technical documentation version 2
- 13.12.2019: Pitch
- Prototype
- 07.02.2020: Technical documentation version 3
- 05.03.2020: Poster
- 13.03.2020: Final product
- Wiring schematic
- Arduino code
- Final technical documentation
- Business plan
- User guide

1.3   Budget and resources

We will use the computer resources and meeting room available at Åbo Akademi. We will use our own laptops and free software and apps to develop the code (Arduino IDE) to communicate (whatsapp, slack), to manage the project (Trello, Google Drive, GitHub ...).

Picture	Resources	€
	Fake wood adhesive to cover the case.	5
	Cardboard	0
	LCD 16x2 RC1602B2-BIW-CSX	7
	ON-OFF switch (power on and off the device)	3
	Toggle switch (change between mode and reference frequency selection)	2
	Push button (change the value of the selection)	5
	BTF-LIGHTING WS2812B 1m 60leds individually addressable DC5V (just need 5 LED)	~2

	5V battery / power bank	0
	Microphone Adafruit Electret Microphone Amplifier - MAX4466 with Adjustable Gain	6
	Arduino Uno board	20
	Order made plexiglass from Studio Laser Cut	~15
	Access to tools (drill, glue, wire, soldering iron, tin, …)	0
	TOTAL:	**65**

2   Project organization

The project is led by the project manager, Jérémy Lesauvage. The project manager is responsible for the planning and organization of the project, as well as the communication with the customer. The project manager is the leader of the team assigned to the project.

The team has additionally the following roles:

Project owner:
Oscar Schauman

Developers:
Marine Poidevin, Thibault Cormery, Andreas Salminen, Benjamin Heinonen
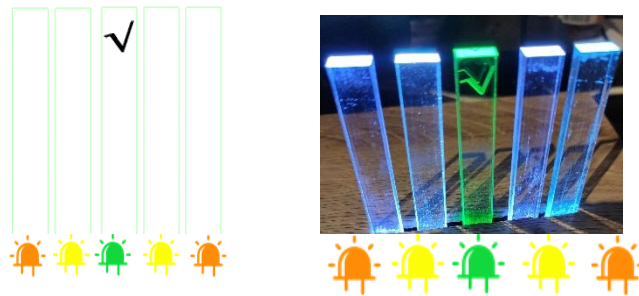
Quality manager:
Thibault Cormery

3   Activities and milestones

3.1   Design

- Lixie:

The design of the product is mainly hardware, the Lixie display is an important part of our project since it is what will catch the eye. They are order made from a Helsinki based company called Studio Laser Cut. The design is made with adobe Illustrator.

The middle green LED let the user know when he is playing in tune. The yellow ones, when the user is near the correct tune. And finally, the orange ones, when the user is not in tune.
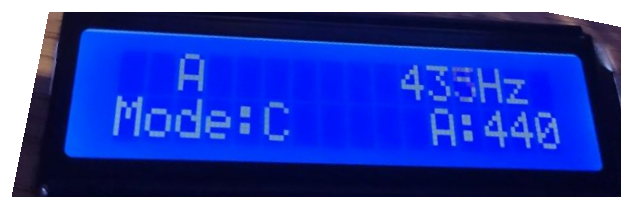
- Box:

The box will be built of cardboard because it is an easy material to work with and inexpensive. To hide the cardboard, we will use a fake wood adhesive.

- LCD:

The LCD will display the note played, the frequency, as well as the mode and the reference frequency the user has selected.

3.2 Milestones

- Order and receive the component. (November)
- Create the code to transform a frequency to it corresponding musical note.
- Create the code acquire the sound.
- Create a prototype with breadboard. (December)
- Create the code to transform sound into frequency.
- Add the mode selection.
- Add the frequency reference selection.
- Final product and documentation (March)

4 Risks

The risks are:
- Choose a wrong detection method to transform the signal of the microphone to frequencies (cross zero detection, autocorrelation, YIN, FFT)
- Having too much lag/reaction time between the moment we play and the moment the device displays the note.
- Obtain inaccurate frequencies due to microphone quality, environment noise, …
- Issue with low frequency detection, due to a microphone solution.
- Risks related to order the Lixie, such as delay, too expensive, unable to create the file under adobe Illustrator.
- Timing and schedule since half of the team member leaving after the first semester.

5 Tracking

5.1 Project team meetings

- Initial meeting:

Discuss about introducing people, exchange contact method, create a WhatsApp group, define each role and define a first planning.

- Second meeting:

Discuss about filling all the sheets, define precisely each role and define the planning for next meetings.

- Other meetings:

Since our project is hardware based, the team member needs to have access to the Arduino board to test their code.

5.2 Time tracking

All work hours used for the project should be recorded. The hours are recorded on ½ hour accuracy and categorized according to the following job types: meetings, research, management, analysis, design, implementation, testing, documentation.

Total hour: 383