

Final Project Proposal

Year: 2020

Semester: Spring

Team: 8

Project Name: AudioBeamer

Creation Date: November 3, 2019

Last Modified: January 5th, 2019

Team Members (#1 is Team Leader):

Member 1: Carson Tabachka

Email: ctabachk@purdue.edu

Member 2: Calvin Walter Heintzelman

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Member 3: Aditya Biala

Email: abiala@purdue.edu

Member 4: Aditya Thagarthi Arun

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1.0 Description of Problem:

Playing an electric guitar with an amplifier can be such a hassle when there are electric cords everywhere. Needing to constantly untangle and untie cords when all you want to do is jam is such a bummer. People who play guitar should be able to pick up and play their instrument seamlessly and effortlessly. Wireless technology is everywhere nowadays, so why is it not mainstream for guitar players to have wireless audio transmission between their guitars and amplifiers? There are about 16 million guitar players just in the United States [1] and all of them could potentially run into this issue when using an amplifier.

In addition to the proposed guitar application, we plan to make our system universal. It should be compatible with any electronic music instrument that outputs sound using a 3.5mm or 6.3mm audio port. (DJ Controllers, Digital synthesizer etc.)

2.0 Roles & Responsibilities:

1. Team Leader – Carson Tabachka

- Carson has great interpersonal communication skills. He coordinated his environmental engineering team to best delegate tasks and ensure timely completion. He has interest in software design especially with respect to networking and security.

2. Systems Engineer – Aditya Thagarthi Arun

- Aditya T A has interest in software development. He will also understand the PCB design in full in order to serve the role as a systems engineer in this team. He has personal interest in audio and has a prior experience with working on audio related projects. He will be responsible with tying the hardware and software components of this project.

3. Hardware Engineer – Aditya Biala

- Aditya B. has experience with Audio Hardware Development during projects with his internship with the audio team at Amazon. Additionally, he has completed numerous audio projects involving PCB design and embedded software both personally and as part of coursework. He has a lot of interest in audio hardware, and therefore he will be responsible for reliable, robust hardware design of this project.

4. Software Engineer – Calvin Walter Heintzelman

Commented [WTA1]: Approved. Please see comment below.

Commented [VR2]: Going forward, for the individual homework assignments please only list the person who was responsible for the assignment as the author. Don't list the whole team as authors for individual assignments.

- Calvin has a personal interest in software engineering and has taken specialized classes regarding the topic, including a class in software for embedded systems. He has done personal projects and has developed websites, apps, and neural networks. He will therefore be primarily responsible for the proper functionality and quality of software/code.

2.1 Homework Assignment Responsibilities:

<i>Design Component Homework</i>		<i>Professional Component Homework</i>	
3-Software Overview	A.T.A	9-Legal Analysis	C.W.H.
5-Electrical Overview	A.B.	10-Reliability and Safety Analysis	A.B.
7-Mechanical Overview	C.T.	11-Ethical/Environmental Analysis	C.T.
8-Software Formalization	C.W.H.	12-User Manual	A.T.A.

Carson Tabachka - C.T.
Aditya Biala - A.B.
C.W.H.

Aditya Thagarathi Arun - A.T.A.
Calvin Walter Heintzelman -

3.0 Estimated Budget:

Item	Estimated Price
<i>Electrical</i>	
Microcontrollers	\$30
3.5 mm to 6.35 mm converter https://www.amazon.com/UGREEN-6-35mm-Female-Stereo-Adapter/dp/B01D82XXGO/ref=pd_sbs_t_2/137-6701114-4457541?_encoding=UTF8&pd_rd_i=B01D82XXGO&pd_rd_r=e76ad8c3-dae4-492f-815b-e11492849946&pd_rd_w=k05EY&pd_rd_wg=OGMYx&pf_rd_p=5cfcfe89-300f-47d2-b1ad-a4e27203a02a&pf_rd_r=N0FZA16TWV22VMTRXKMK&psc=1&refRID=N0FZA16TWV22VMTRXKMK	\$8
NRF24L01 Transceiver	\$10

Batteries	\$20
PCB	\$70
Miscellaneous Electrical components (resistors, wires, LEDs, etc)	\$10
Non-Electrical	
3D printing material	\$25
Shipping Costs	\$50
Total	\$223

4.0 Project Specific Success Criteria:

1. The ability to interface with an external Audio Codec using I2S that delivers digital data sampled at a 16-bit resolution from an electric guitar and outputs analog audio.
2. The ability to use Bluetooth data received from an Android cell phone to control audio equalization on the Receiver PCB using UART.
3. The ability to apply audio effects & equalization such as bass, middle, treble, distortion, and reverb on digitally sampled audio using Digital Signal Processing.
4. The ability to use a developed Android app to pass user-customizable audio equalization data to the receiver MCU using inbuilt cell phone Bluetooth.
5. The ability to power the system using an external battery while being able to measure remaining battery levels using a coulomb meter and displaying it using an LED based UI.

5.0 Sources Cited:

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- [5] "Xvive U2 Guitar Wireless System with Rechargeable 2.4GHz Digital Guitar Transmitter and Receiver for Electric Guitar, Bass, Violin." Amazon.com. https://www.amazon.com/Xvive-Wireless-Rechargeable-Transmitter-Receiver/dp/B01N4DSQBR?ref=fsclp_pl_dp_1&th=1 (accessed Nov. 7, 2019).
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https://www.amazon.com/Getaria-Wireless-Rechargeable-Transmitter-Receiver/dp/B07L5B64RG/ref=sxin_3_ac_d_pm?ac_md=2-0-VW5kZXIgJDUw-ac_d_pm&crd=2GDW7CD75H14M&keywords=wireless%2Bguitar%2Btransmitter%2Breceiver&pd_rd_i=B07L5B64RG&pd_rd_r=d45ef3f4-4691-40ad-bc9b-dda170ba6bc9&pd_rd_w=GXplv&pd_rd_wg=Fq9FG&pf_rd_p=24d053a8-30a1-4822-a2ff-4d1ab2b984fc&pf_rd_r=JC41M1CEC09B1RX30W7N&qid=1573167971&s=musical-instruments&sprefix=wireless%2Bguitar%2B%2Cmi%2C166&th=1 (accessed Nov. 7, 2019).
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<https://www.instructables.com/id/FM-based-Wireless-Electric-Guitar/> (accessed Nov. 7, 2019).
- [11] “Beetle Mk III: Connect your Guitar to the Airwaves.” TalkingElectronics.com.
<http://www.talkingelectronics.com/projects/BeetleMkIII/BeetleMkIII.html> (accessed Nov. 7, 2019).
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Appendix 1: Concept Sketch



