Digital Audio Streaming with Microcontrollers and Radios

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Digital Audio vs Analog Audio

Analog: Using a carrier wave with a frequency or amplitude that represents an analog sound wave.

Digital: Using a carrier wave with a frequency or amplitude that represents the 0s and 1s of encoded audio.

Pros of Digital Audio

- Error detection
- Less interference from nearby signals
- Less degradation over long distances
- Easy to record the audio
- Possible to encrypt the audio

Audio Transmission and Reception Process

The audio signal is picked up by the microphone

The audio signal is amplified with the LM386 IC

The audio signal is sampled at 44Khz by the microcontroller

The digital audio data is transmitted over the 2.4Ghz band with the nRF transceiver

The digital data is received by a separate nRF and microcontroller

The audio signal is recreated by the microcontroller using pulse width modulation

The audio signal is smoothed with a square wave to sine wave circuit

The audio signal is wired to the headphone jack

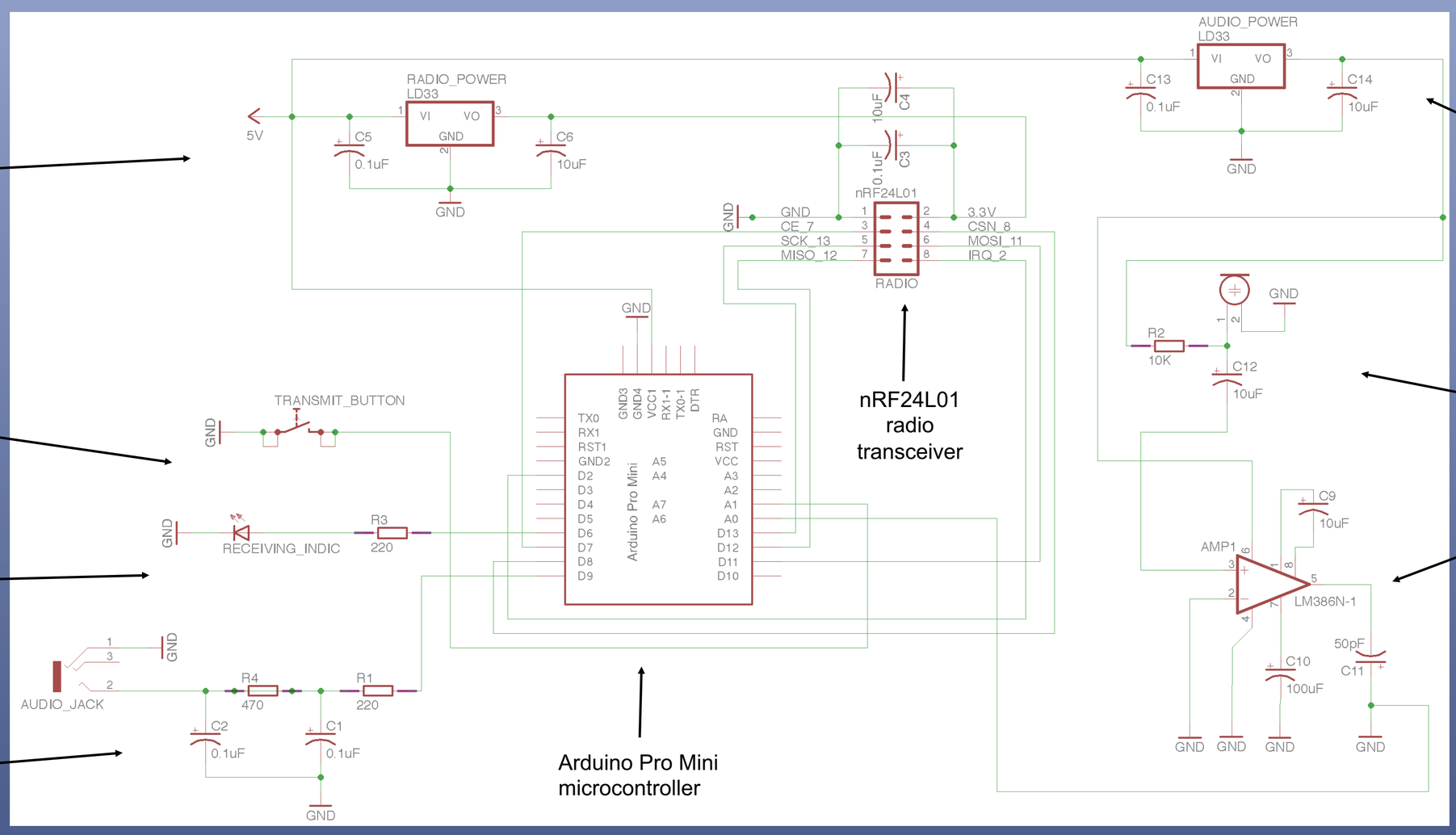
My Design Specs	
Frequency	2.4 Ghz
Audio Sample Rate	44 Khz
Bandwidth	2 Mbps
Power	42 mA
Range	120 ft (line of sight)
Cost per Unit	~$10

Applications of my Design

- “Walkie Talkie”
- Field radio
- Baby monitor
- Music streaming
- Home security system
- Wireless headphones

target.com

Circuit Diagram



Project Outcomes

- Functioning “Walkie Talkies”
- Built completely open source, code on GitHub.com
- Community following with 150+ views and 20+ followers on Hackaday.com
- Next project: Radio streamed audio with video

Acknowlegements

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