

SONOS

Portable Connected Speaker
UCSB Multidisciplinary Capstone Project
Year 2017-2018

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Introduction

Sonos is the wireless Home Sound System that fills as many rooms as you want with great-sounding music, movies and TV. Stream via WiFi. Play whatever you're craving. And amp up every moment with intense, pulse-pounding sound. The real power of a Sonos system kicks in when you add more speakers. Suddenly you're playing different songs in different rooms. Or grouping all your speakers together to blast one big jam to every room at once. With Sonos, the songs stream from your WiFi network (not your phone), so there's never any of the dropouts, delays or interruptions associated with Bluetooth. Sonos plays everything – the most popular streaming services, on-demand Internet radio, your favorite podcasts and audiobooks, your go-to collection of downloads – whatever you love to listen to.



Figure 1. Sonos Home Sound System

We are proposing a project to design a portable speaker that can be part of the Sonos system, and can also be used when outside of the home WiFi network. The portable speaker will be built using the Sonos Play1 as a platform, with the capability of being powered by either a wall plug or external battery. The design should include a WiFi access point functionality to allow users to stream music directly to the speaker when away from their home network.

The skills required to execute this project will be power electronic design, embedded system and software integration, and mechanical engineering with CAD, static/dynamic modeling, thermal analysis, and machining to build custom parts.

Basic Requirements

The design will be built on the Sonos Play1 platform. The project can be divided to three basic requirements listed below:

1. Power Supply
 - Modify the current Play1 power supply to bypass the flyback converter in order to access the 24V DC power input.
 - Design a DC battery pack that provides 24V DC power to the speaker, including a charging circuit. The battery should also power the wifi access point and any other components included in the final design.
2. Wifi Access Point integration
 - The design should include a wifi access point (AP) functionality to allow users to setup a household and stream music to the speaker while away from their home network. While the speaker is out of range of the user's home wifi network, the user can choose to connect to a mobile network or to stream directly from any cell phone to the speaker through the wifi AP. The transition from home network to the mobile network should be seamless and intuitive.
3. Mechanical integration of the system
 - Form factor: The student team should explore the final form factor and be creative. Other than re-using the Play1 electronics and transducers, the final product can be any shape and look that makes sense for a portable speaker product.
 - Build the enclosure that contains the battery pack, charging circuit, wifi AP, and other functionalities included in the final design.
 - Design should meet basic ME spec for robustness.

What SONOS Will Provide

1. Engineering guidance / mentorship.
2. Play1 speakers for tear down and prototyping.
3. Access to SONOS labs for specialized testing / fabrication.

Exploration

The student team are encouraged to explore other options of this project, such as:

1. What other features make sense for this product without sacrificing the simplicity?
2. How to manage stand-by power? How to check battery status?