

DQMusicBox: Requirements

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1 About this document

This document specifies the requirements for a dementia-friendly music player called DQMusicBox. It is an open source project. This document exists so other people can modify or improve on DQMusicBox. If you want to make a DQMusicBox from the existing design, you don't need this document – you can follow the existing build instructions (readme.pdf).

2 Why I created this project



That's DQ in the photo – my Dad. I was inspired by the documentary [Alive Inside](#) -- it suggests that people with dementia come alive when listening to their favorite music. Following that suggestion, I put DQ's favorite music on an iPad. There was sustained joy on his face – joy from the familiar music and joy from the fact that nothing else in the frustrating world mattered for a few minutes. Unfortunately, he could no longer operate a traditional stereo or an iPad. Happily, he could use the music box that I later made for him.

3 The end-user's special requirements

3.1 The device must feel familiar – no new learning

A key hypothesis is that the end-user interface must be simple and familiar. In other words, it needs to be easy *and* not require new learning. Every person with dementia is different, but it is common for the old memories to be stronger than the new memories. Thus, the device would ideally be familiar in the sense of being like a device from the end-user's youth e.g. a vintage radio or a vintage phonograph. You may not agree with this hypothesis, and that's OK -- you may also have different ideas or requirements. But this hypothesis is part of my requirements, so I'm making it clear.

3.2 The end-user needs a playlist of favorites, not a vast library

The end-user doesn't need to have a lot of music on the device at any given time. Perhaps 50 old favorite songs. In modern terms, the end-user needs a playlist. Happily, this means that music selection is easier to implement – fewer songs to scroll through or otherwise navigate through. That said, the caregiver will want to change the set of music from time to time. By contrast, you probably use a cloud music service and have access to essentially an unlimited number of songs. That is a much harder navigation problem.

4 Use-cases

4.1 End-user

To keep things easy for the end-user with dementia, there are only three end user use-cases.

Name	Description
Be familiar	The device should immediately seem familiar to the user. For instance, by resembling a vintage radio or a vintage phonograph (you may have better ideas than these).

Start song	Start music playing
Change song	For instance, go to next song or prior song
Change volume	Make louder or softer

4.2 Caregiver

The caregiver is whoever setups up the device or helps the end-user with the device.

Name	Description
Pause music	Ideally should be possible both explicitly (e.g. a button press) and automatically (e.g. an automatic time-out).
Update the set of music	Add/remove music, including when preparing the device for first use. The caregiver will want to change the set of music from time to time, but not necessarily often.

4.3 Builder

This is a DIY project, so there is a builder. You may disagree, but I want as many people as possible to be able to build this. Thus:

Name	Description
Support builders that are not woodworkers	The DIY build plans should not require woodworking skills or woodworking tools.
Support builders that are not good at soldering	The DIY build plans should not require soldering skills or soldering tools.

4.4 System

Name	Description
Have good audio quality	Sound quality should be at least good.
Create playlist	The songs should play in some sensible order e.g. alphabetical by album name. In other words, the system needs to scan for music files and put them in some sensible order.
Play key music formats	e.g. MP3, AAC/iTunes, FLAC
Support sudden shut down	The device should tolerate being unceremoniously unplugged. That is, it should behave like any other consumer audio device.
Be secure	The device should have a known security plan. That plan could be that the device is not connected to a network. If the device runs a full operating system (Linux, Windows, ...) and is connected to a network then it should get regular security patching, ideally without caregiver intervention.

5 Discussion

The need is simple, so the requirements are short. But there are challenges implied by these requirements.

Use case	Challenge
[Caregiver] Update the set of music	The caregiver may be a non-technical elderly spouse. Thus, mucking with micro-SD cards may not be the best choice. A USB thumb drive could be OK.
[System] Play key music formats	It's helpful for the caregiver if the system supports a variety of music formats e.g. MP3, AAC/iTunes, FLAC. Not a problem if the device uses a full operating system e.g. Linux or Windows. But it is challenging for MP3 player boards and Arduino.
[System] Create playlist	Create a playlist in some sensible order e.g. alphabetical by album/folder name. Sounds easy, ya? And it is in the context of a full operating system like Linux or Windows. It is surprisingly not straightforward for MP3 player boards and Arduino.
[System] Have good audio quality	The sound quality should at least be good. It doesn't have to be amazing, but it shouldn't be aggravating. This is not a problem for most technology options, but it is a challenge for some.
[System] support sudden shutdown	The device should behave like a consumer electronics device e.g. you can unplug it with no issues. This is no problem for MP3 player boards and Arduino. If the device includes a battery, it's also no problem for a full operating system like Linux or Windows. If the device does not have a battery, then sudden shutdown is a challenge for a full operating system.