MP3 Task

The MP3 task is responsible for listening to commands from the Command Task, sending commands to the Display Task, and sending MP3 data to the VS1053 MP3 decoder chip via a SPI interface. The MP3 player tasks acts as a state machine with the following states:

- Init
- Pause
- Start Playback
- Playback
- Stop Playback
- Next Song
- Prev Song

Task Initialization

Upon initialization, the MP3 Task opens handles to the SPI and MP3 decoder drivers to allow streaming of MP3 data. It then initializes all variables needed for MP3 playback and sets the initial state to Init.

Operational Loop

During task operation, the MP3 Task checks a queue to see if any command messages are available. If a command is available, it is read from the queue and the MP3 Task state is updated. The MP3 Task then executes a bit of code depending on the state it is in before checking the queue for another command message.

Init

The Init state is entered upon start up or the completion of the last song in the playlist. During Init, the MP3 Task repetitively delays itself to allow other tasks to operate.

Pause

The Pause state is entered by pressing the “PLAY” button during the Playback state. Upon entering the Pause state, a message is sent to the Display Task to update the play/pause indicator. After that message is sent once, the Pause state is functionally the same as the Init state.

Start Playback

The Start Playback state is entered by pressing the “PLAY” button during the Init or Pause state, or upon exiting the Next Song / Prev Song states. Start Playback reinitializes all of the MP3

playback variables to the correct values for the current song. It then communicates with the VS1053 MP3 decoder chip, to inform it that playback is about to begin. First it puts the chip into command mode, and sends a command putting the chip into the play state. It then puts the chip into data mode so it can begin receiving MP3 data. After this, the MP3 Task then puts itself into the Playback state.

Playback

The Playback state is entered upon successful execution of the Start Playback state. It first checks if it is about to stream the last chunk of MP3 data. If this is true, it resizes the chunk to the size of the left over data, increments the index indicating the current song, sets a bool indicating if the end of the playlist has been reached, and sets the state to Stop Playback. It then writes a chunk of MP3 data to the MP3 driver.

Stop Playback

The Stop Playback state is entered upon pressing the “STOP” button during any other state, pressing “PREV” or “NEXT” from any other state, or completion of the Playback state. Upon entering the Stop Playback state, the VS1053 decoder chip is put into command mode and issued a soft reset command*. A message is then sent to the Display Task to indicate that playback has stopped. A bool is then checked to determine if the MP3 Task should transfer to the Init state or the Next Song state before updating the state accordingly.

Next Song

The Next Song state is entered upon pressing the “NEXT” button or execution of the Stop state when the playlist is not finished.* The Next Song state increments a global variable used to indicate the current song to be played. If the playlist is at its end, the variable is reset to 0. The state is then set to Start Playback.**

Prev Song

The Prev Song state is enter upon pressing the “PREV” button.* The Prev Song state decrements a global variable used to indicate the current song to be played. If the playlist is currently on the first song, it is reset to the last song in the playlist. The state is then set to Start Playback.**

* Pressing the “NEXT” or “PREV” button results in a two step process. First, a stop command is issued, putting the MP3 Task into the Stop state. Then a next or prev command is issued, putting the MP3 Task into the Next Song or Prev Song state.

**Pressing “NEXT” or “PREV” while the MP3 player is paused or stopped results in the MP3 player resuming playback on the next/previous song.