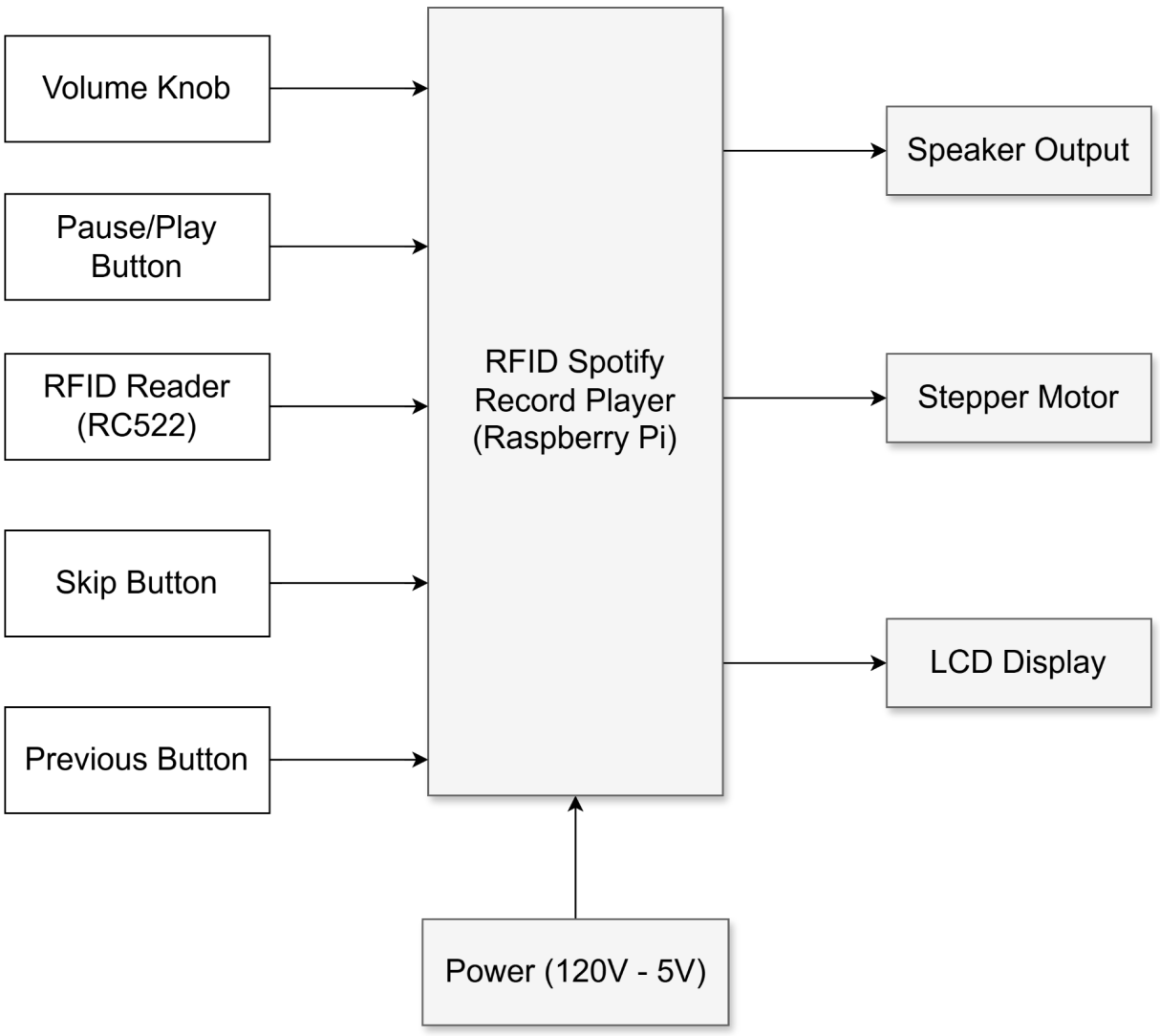
Team 16
Professor Greenberg
ECE 424
11/14/2024

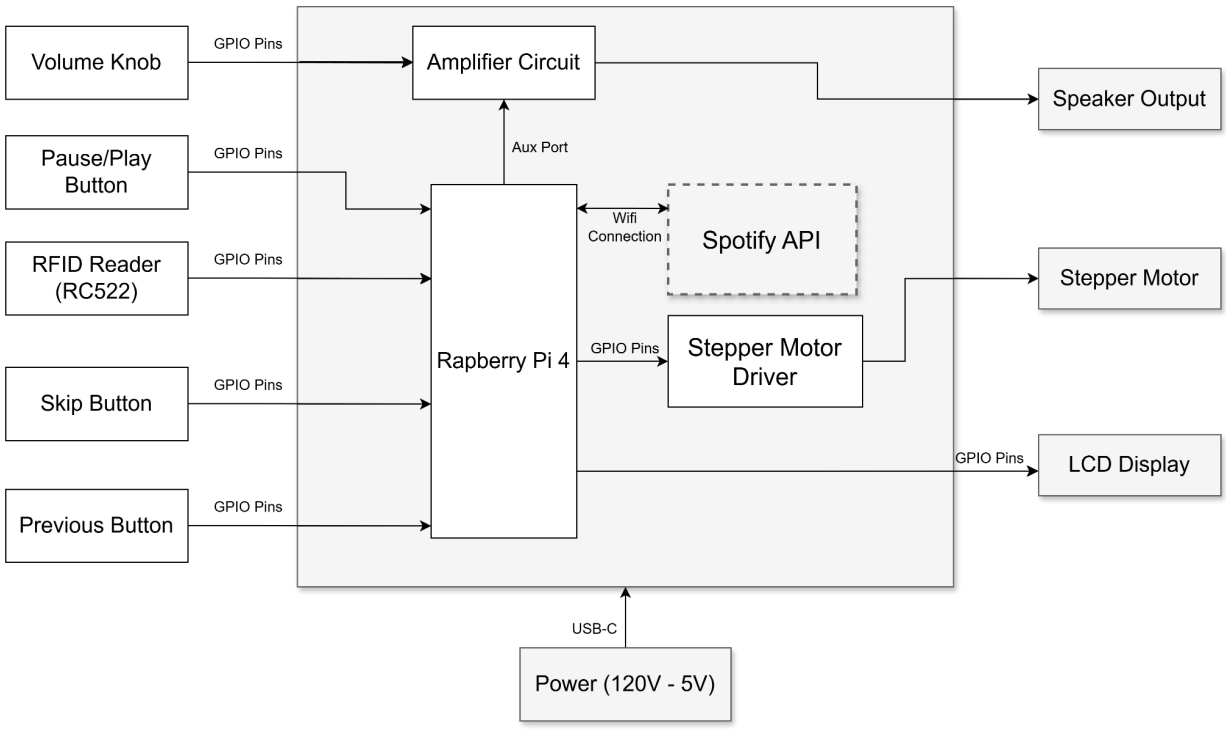
Functional Decomposition

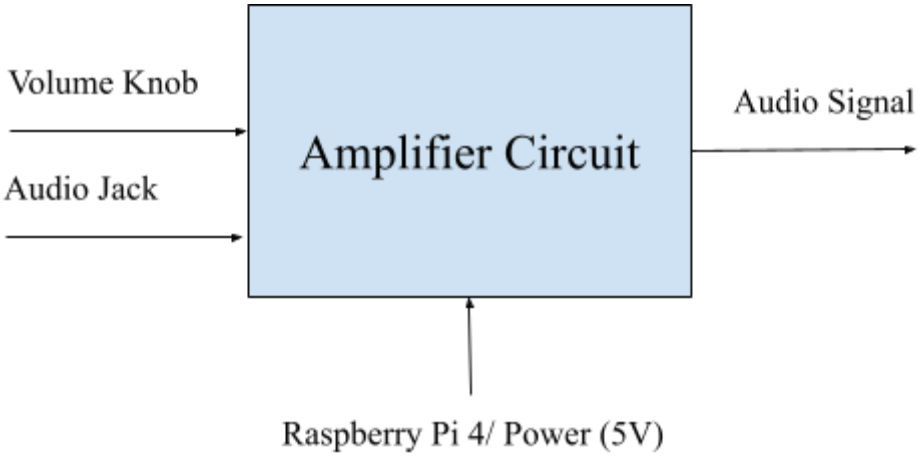
Level 0 Block Diagram:



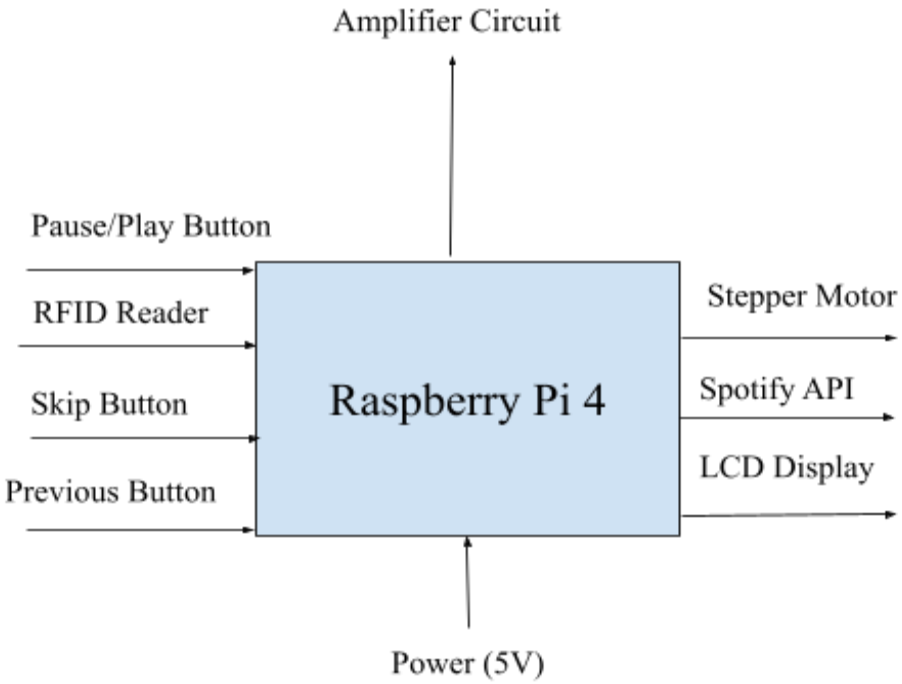
Module	RFID Spotify Record Player (Raspberry Pi)
Input	Volume knob Pause/play button RFID reader(RC522) Skip button Previous button Power(wall outlet 120V to input 5V)
Output	Speaker output Stepper motor LCD display
Functionality	Receive signal from RFID tag and process it to link with Spotify playlist and output the playlist.

Level 1 Block Diagram:

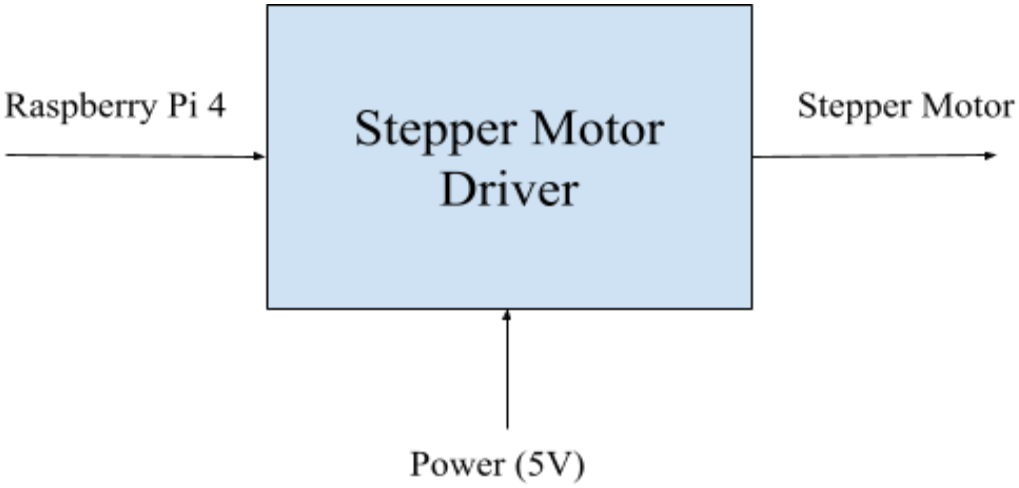




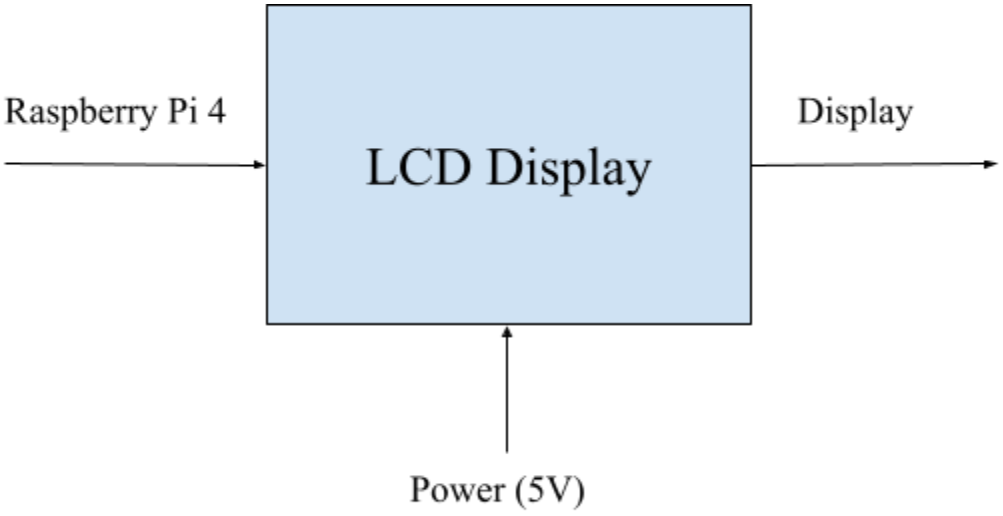
Module	Amplifier Circuit
Input	Volume knob Raspberry Pi 4 audio jack Power: 5V
Output	Audio signal speaker output
Functionality	Provides a voltage gain to amplify audio signals from the Raspberry Pi to a higher volume for the speaker.



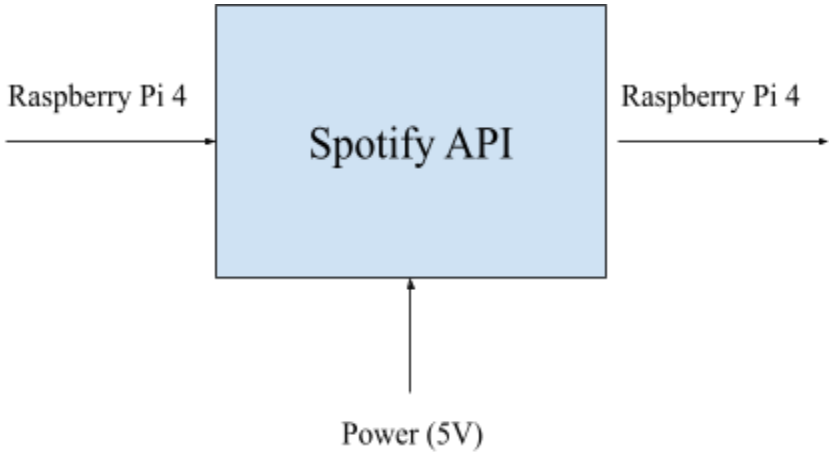
Module	Raspberry Pi
Input	Pause/play button RFID reader Skip button Previous button Power: 5V
Output	Stepper motor Spotify API LCD display
Functionality	Reads RFID tags, communicates with Spotify API to play corresponding songs, controls playback functions, and sends data to the LCD Display and stepper motor.



Module	Stepper Motor Driver
Input	Raspberry Pi 4 Power: 5V
Output	Stepper motor
Functionality	Controls the rate of rotation of the stepper motor to spin the mini-record player, simulating a traditional record player effect.



Module	LCD Display
Input	Raspberry Pi 4 Power: 5V
Output	LCD display
Functionality	Display the song title, playback control performed, or errors in playing a song.



Module	Spotify API
Input	Pause/play command RFID reader Skip command Previous command Power: 5V
Output	Music playback
Functionality	Connects with Spotify to stream the selected song based on RFID input and provides playback control.