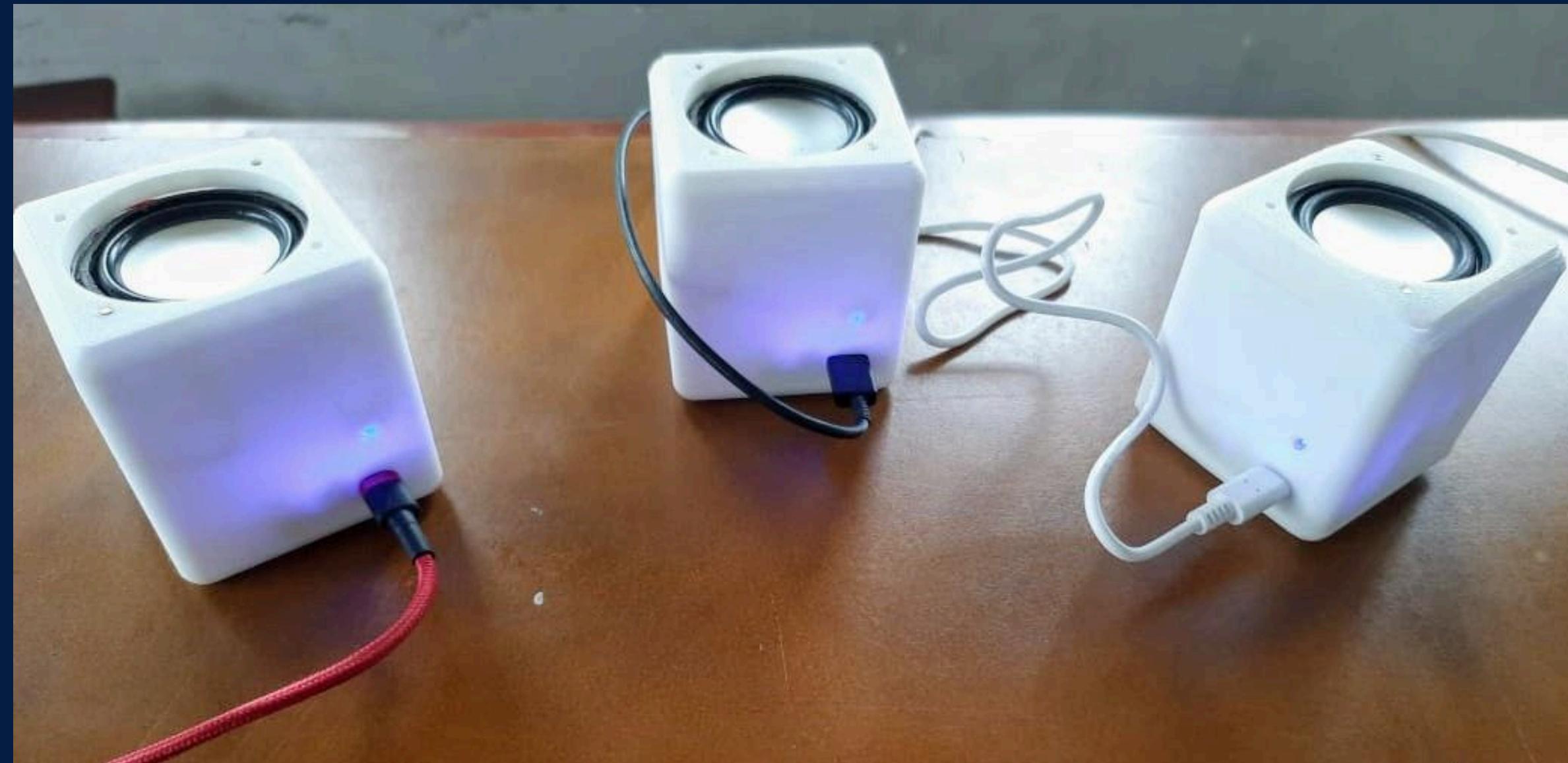


AURA

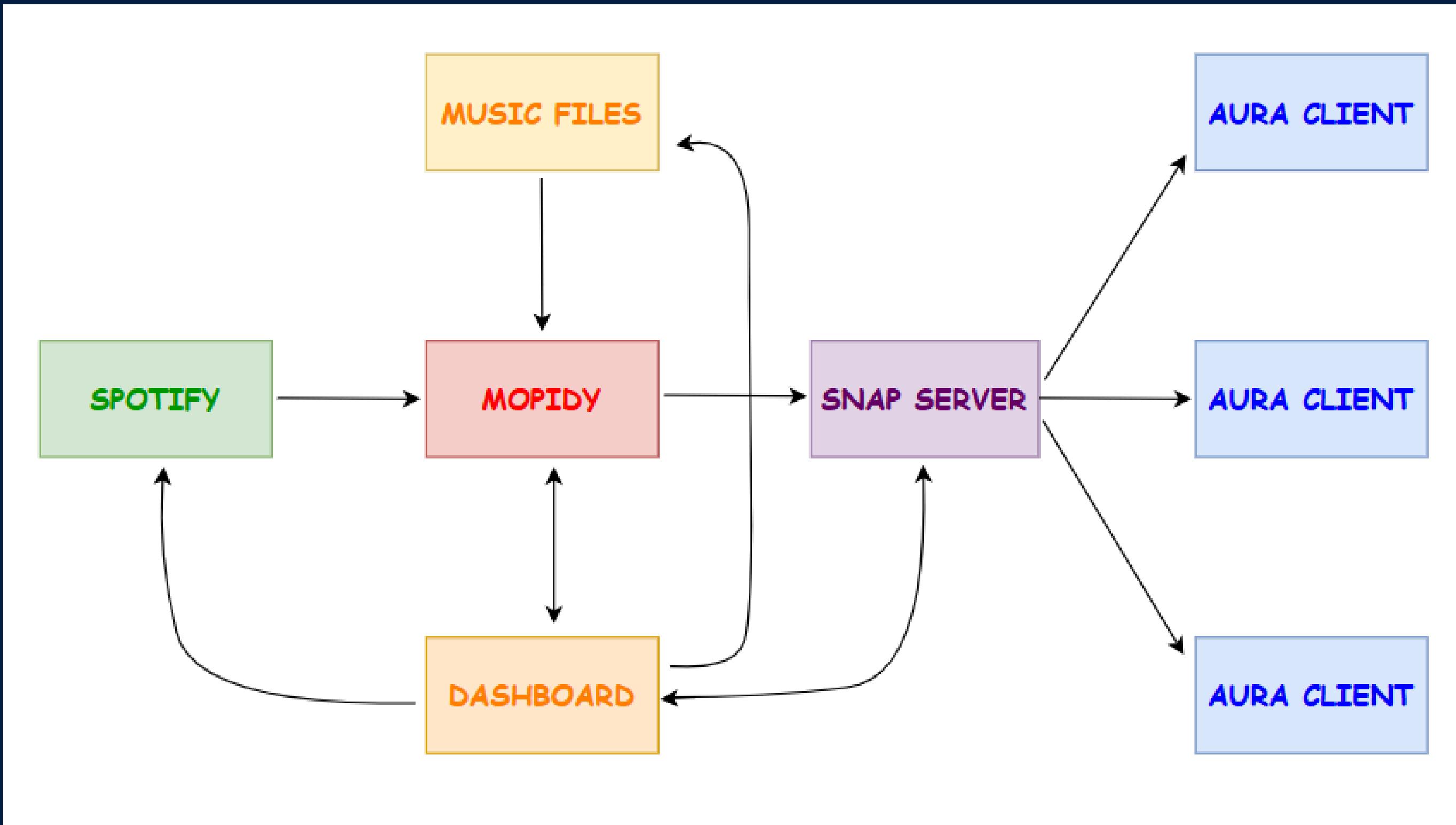
MULTI ROOM SOUND SYSTEM



AURA



SYSTEM ARCHITECTURE



SNAPCAST BINARY PROTOCOL

Each message sent with the **Snapcast binary protocol** is split up into two parts:

1. A **base message** that provides general information like time sent/received, type of the message, message size, etc
2. A **typed message** that carries the rest of the information

SNAPCAST CLIENT JOINING PROCESS

1. Client opens a TCP socket to the server
2. Client sends a Hello message
3. Server sends a Server Settings message
4. Server sends a Codec Header message
5. The server will now send Wire Chunk messages, which can be fed to the audio decoder.
6. When it comes time for the client to disconnect, the socket can just be closed.

SNAPCAST CLIENT JOINING PROCESS

1. Client periodically sends a Time message, carrying a sent timestamp $t_{client-sent}$
2. Receives a Time response containing the client to server time delta $\text{latency}_{c2s} = t_{server-recv} - t_{client-sent} + t_{network-latency}$ and the server sent timestamp $t_{server-sent}$
3. Calculates $\text{latency}_{s2c} = t_{client-recv} - t_{server-sent} + t_{network_latency}$
4. Calculates the time diff between server and client as $(\text{latency}_{c2s} - \text{latency}_{s2c}) / 2$, eliminating the network latency

SNAPCAST CONFIGURATION

1. **FLAC 44,100Hz Sample Rate & 16-bit Depth** - Ensures efficient compression while maintaining high fidelity for audio playback.
2. **Supports PCM** - Raw digital audio format compatibility enables smooth integration with various devices.
3. **Chunk Size: 26ms** - Audio data is processed balancing low latency with efficient streaming.
4. **Sample Insertion** - Used to handle latency correction and synchronization across multiroom environments.

DASHBOARD

▶ Now playing

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DISCOVER

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- Featured playlists
- New releases

MY MUSIC

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- Artists
- Albums
- Tracks
- Browse
- Settings

♪ My tracks

To exit full screen, press and hold Esc

Q t As loaded All Play all Refresh

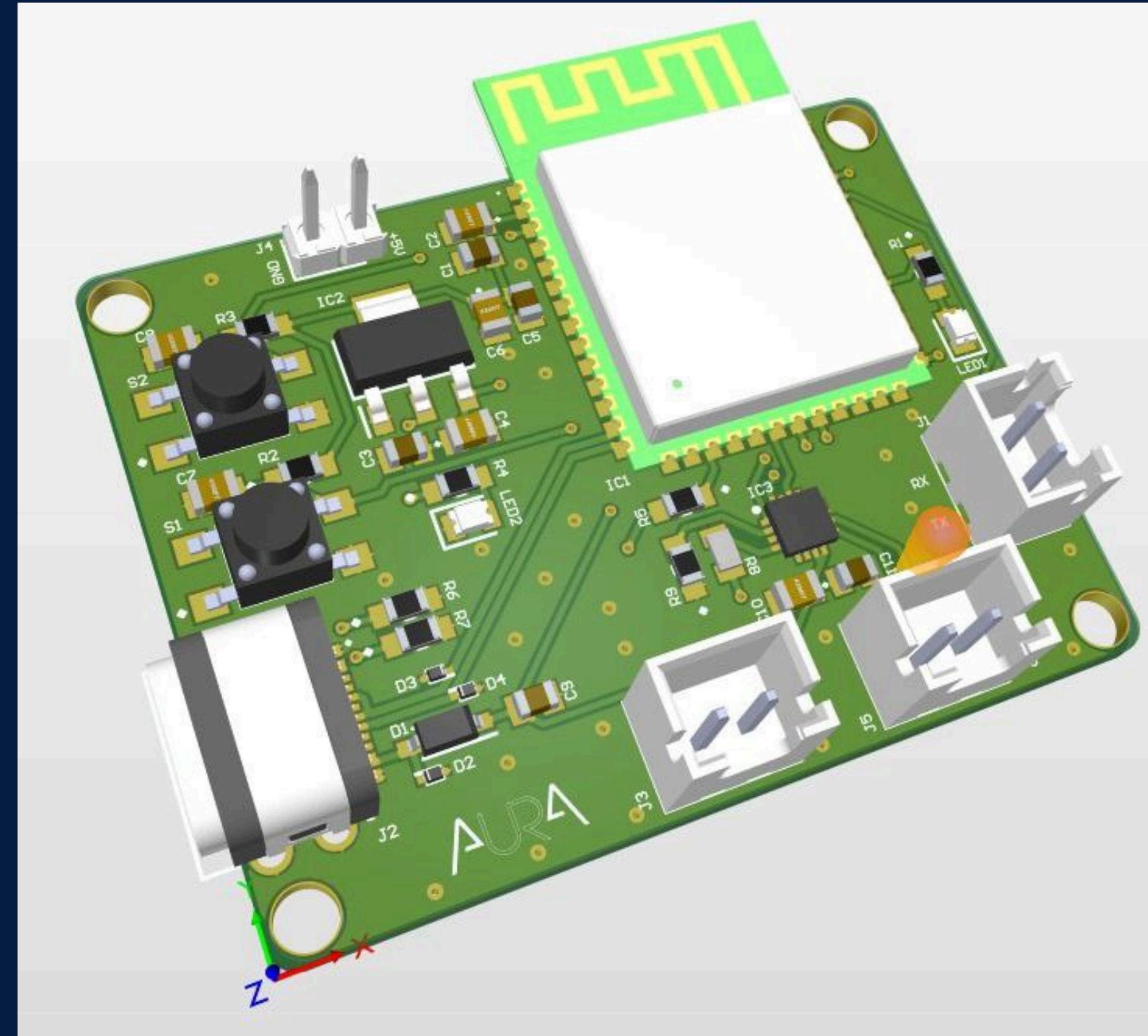
Artist	Title	Length	Actions
Fly Project	Toca Toca	2:45	...
Adele	River Lea	3:45	...
Charlie Puth and Selena Gomez	We Don't Talk Anymore (feat. Selena Gomez)	3:37	...
Billie Eilish	bury a friend	3:13	...
Hozier	Take Me To Church	4:01	...
Wardruna	Lyjaberg	8:26	...
Danheim	Berserkir	3:55	...
Eivør	Trøllabundin	4:30	...
Billie Eilish	bad guy	3:14	...

River Lea
Adele

II 0:02 3:45

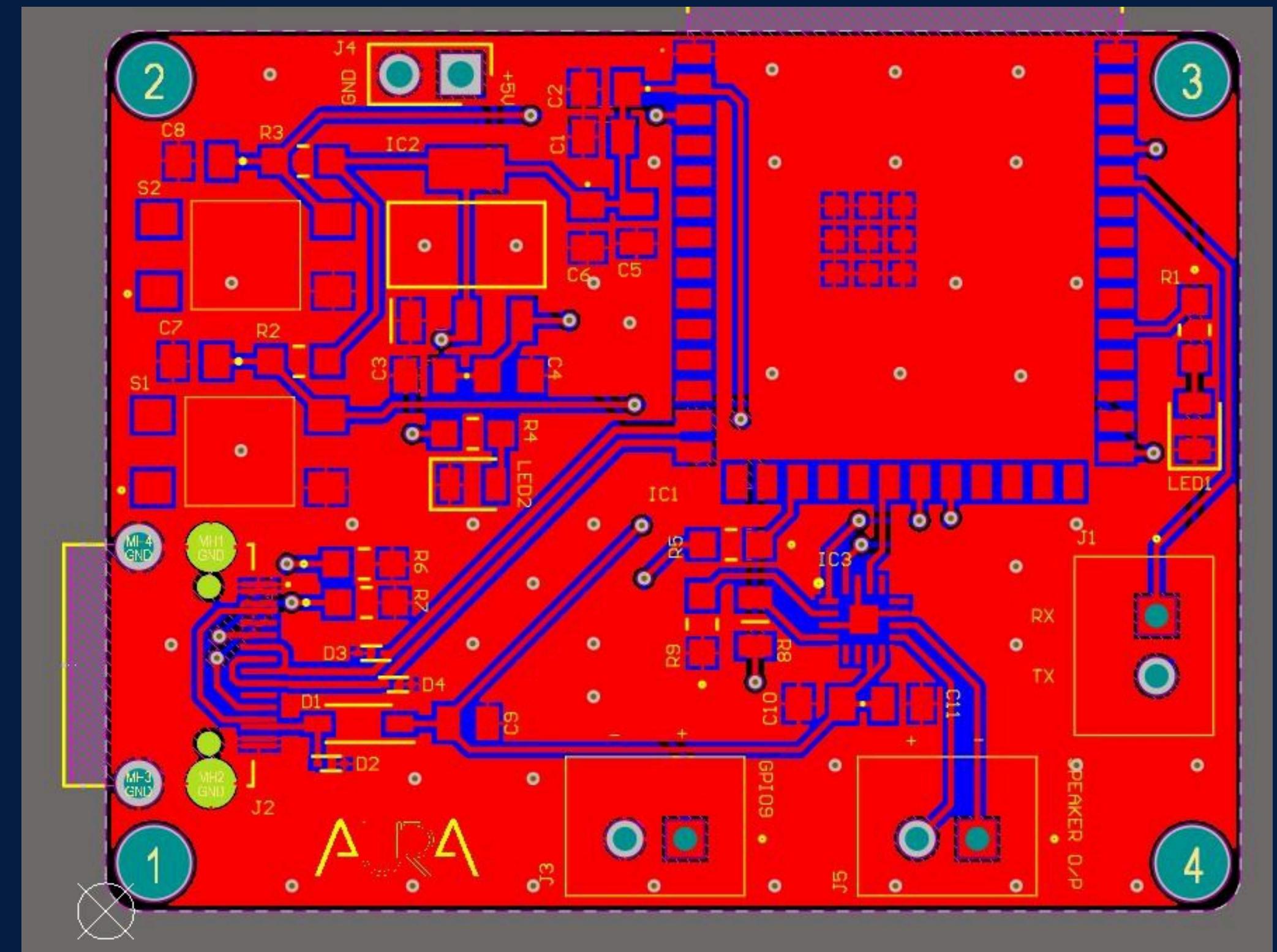
PCB DESIGN

1. ESP32 S3 WROOM
2. USB Type-C Integration
3. Power Regulation
4. Audio Amplifier

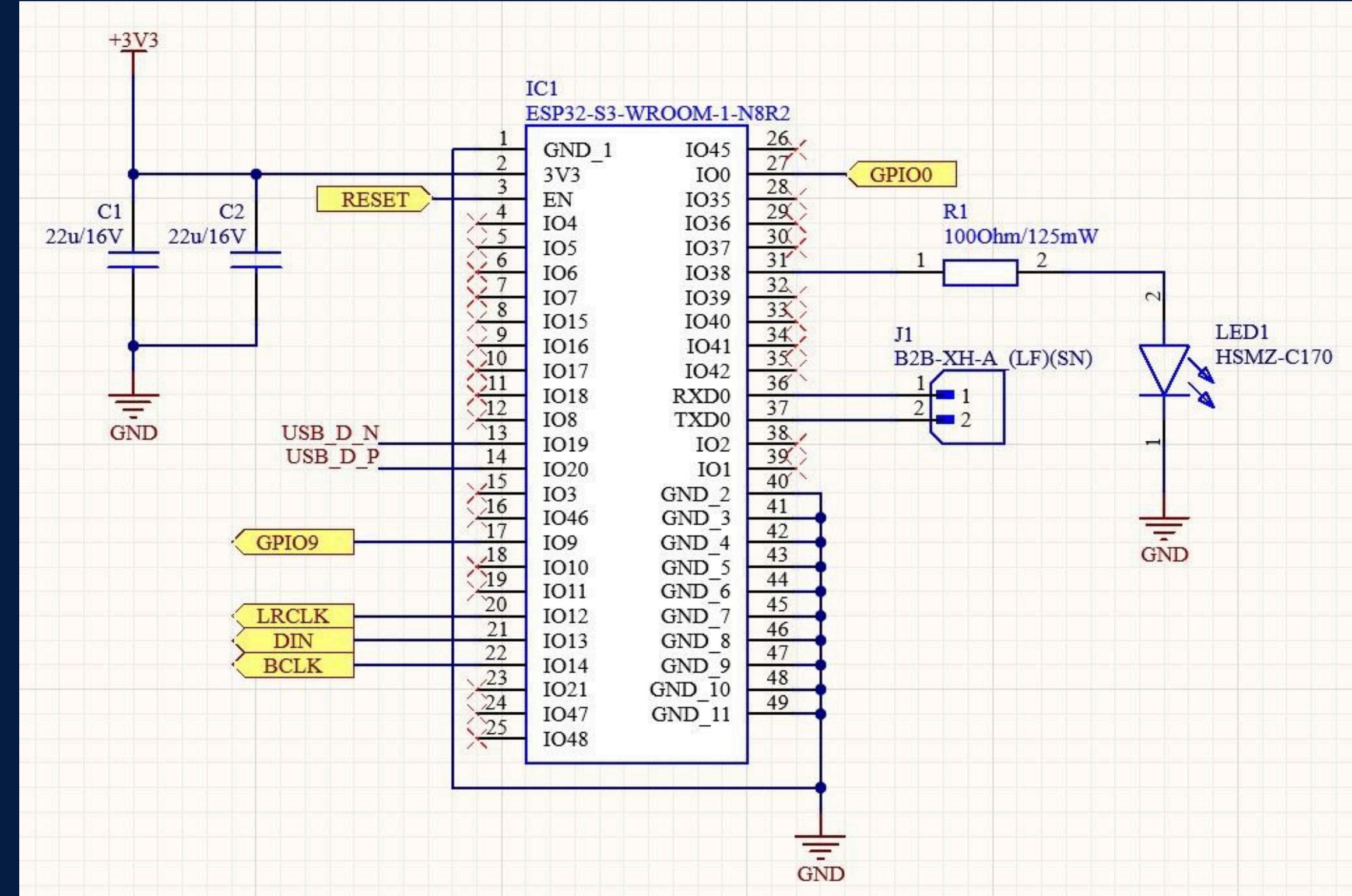


PCB DESIGN

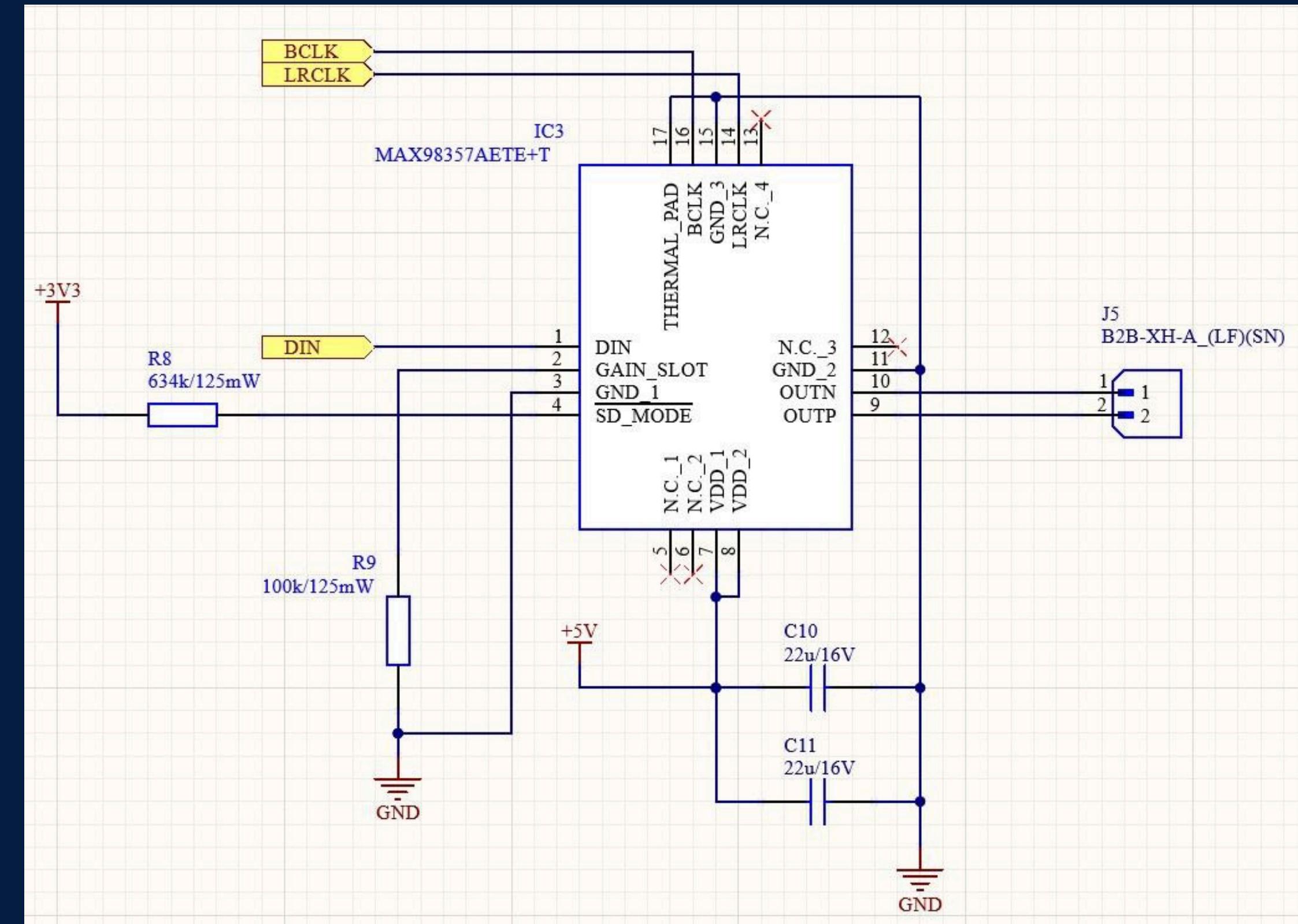
1. Differential routing and impedance matching ensure reliable USB Type-C signal integrity
2. A two-layer PCB design balances simplicity and performance
3. Ground planes on both the top and bottom layers help minimize noise and improve signal quality



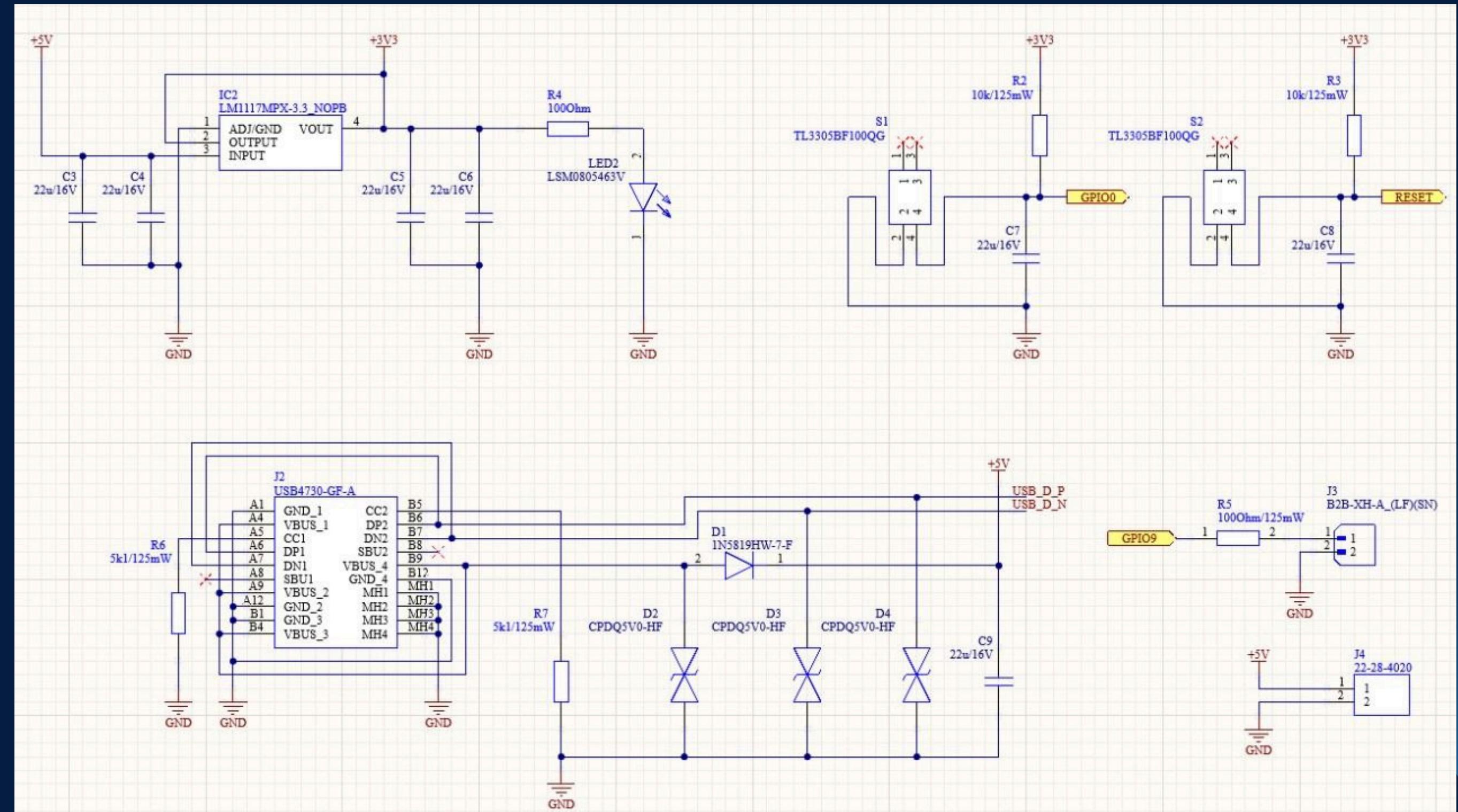
ESP 32 CIRCUIT



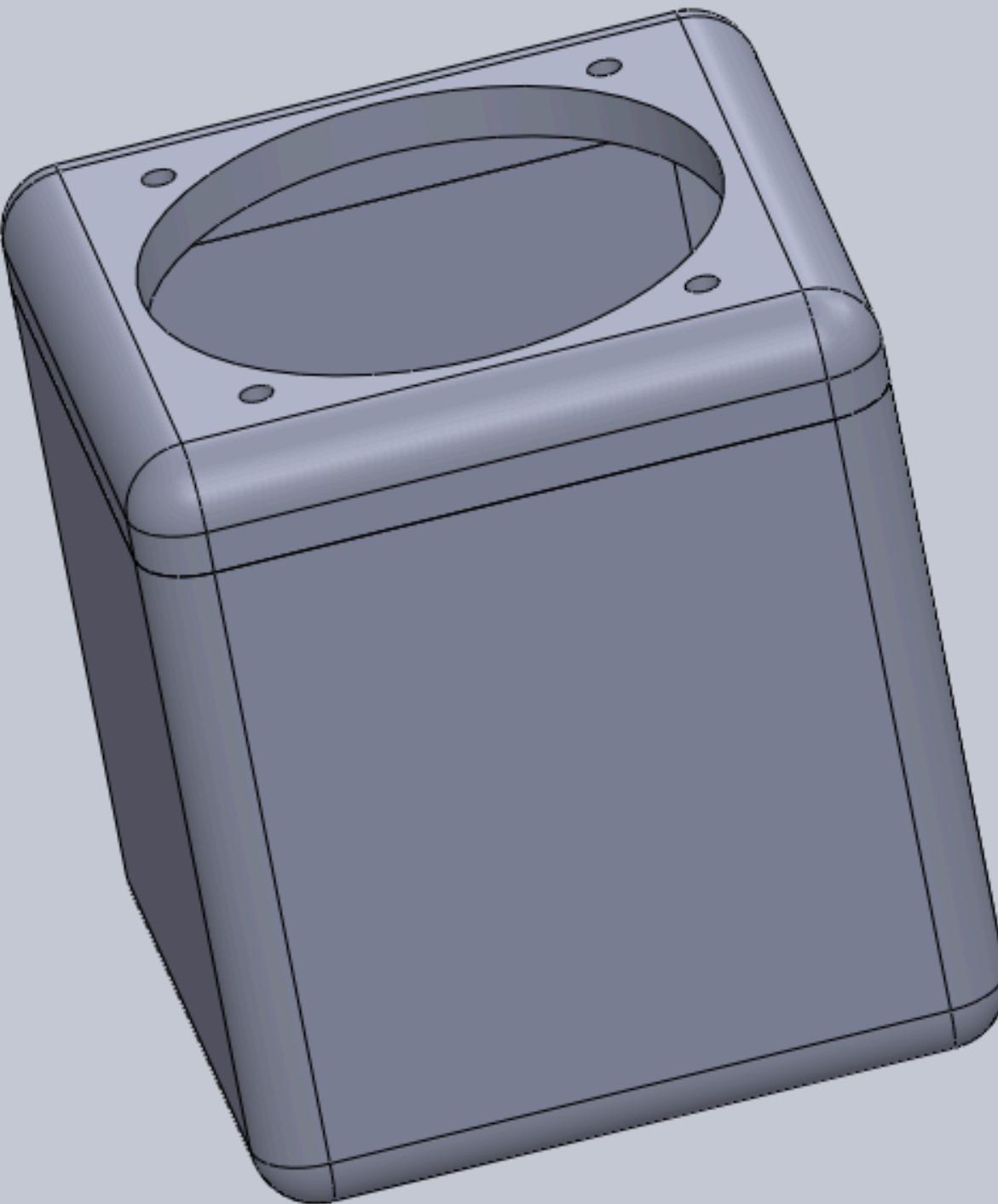
AMPLIFIER CIRCUIT



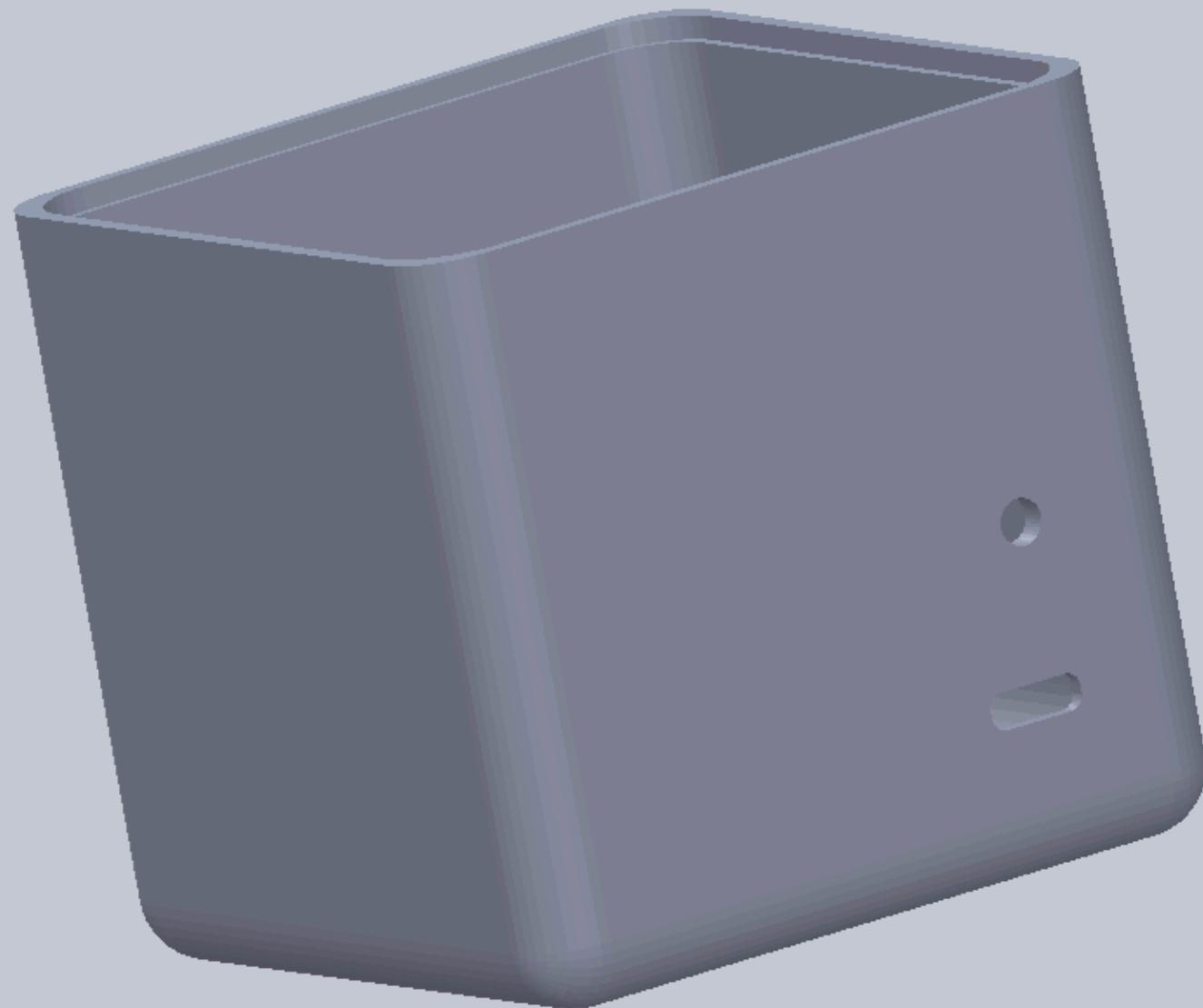
PERIPHERAL CIRCUITS



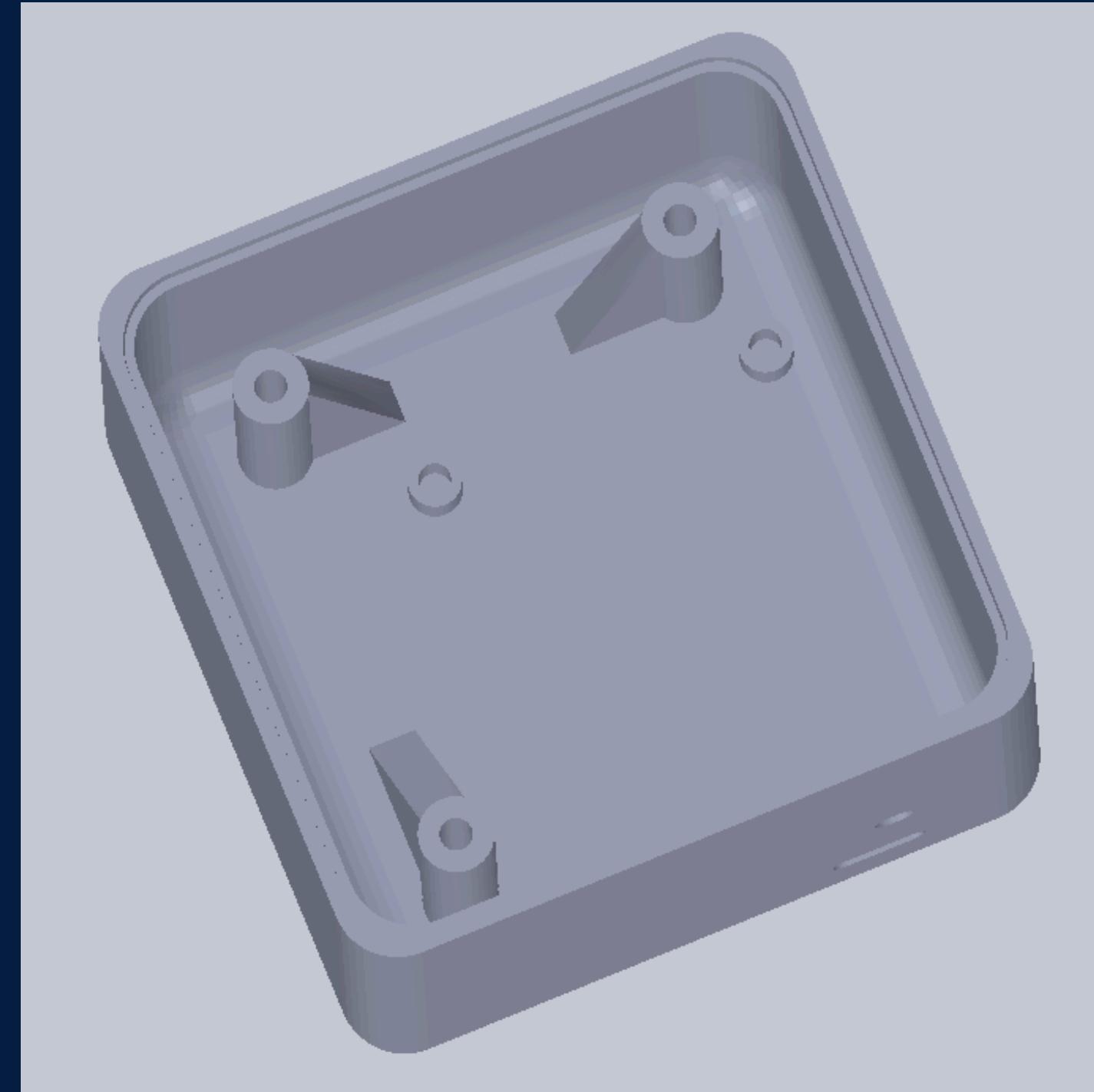
ENCLOSURE DESIGN



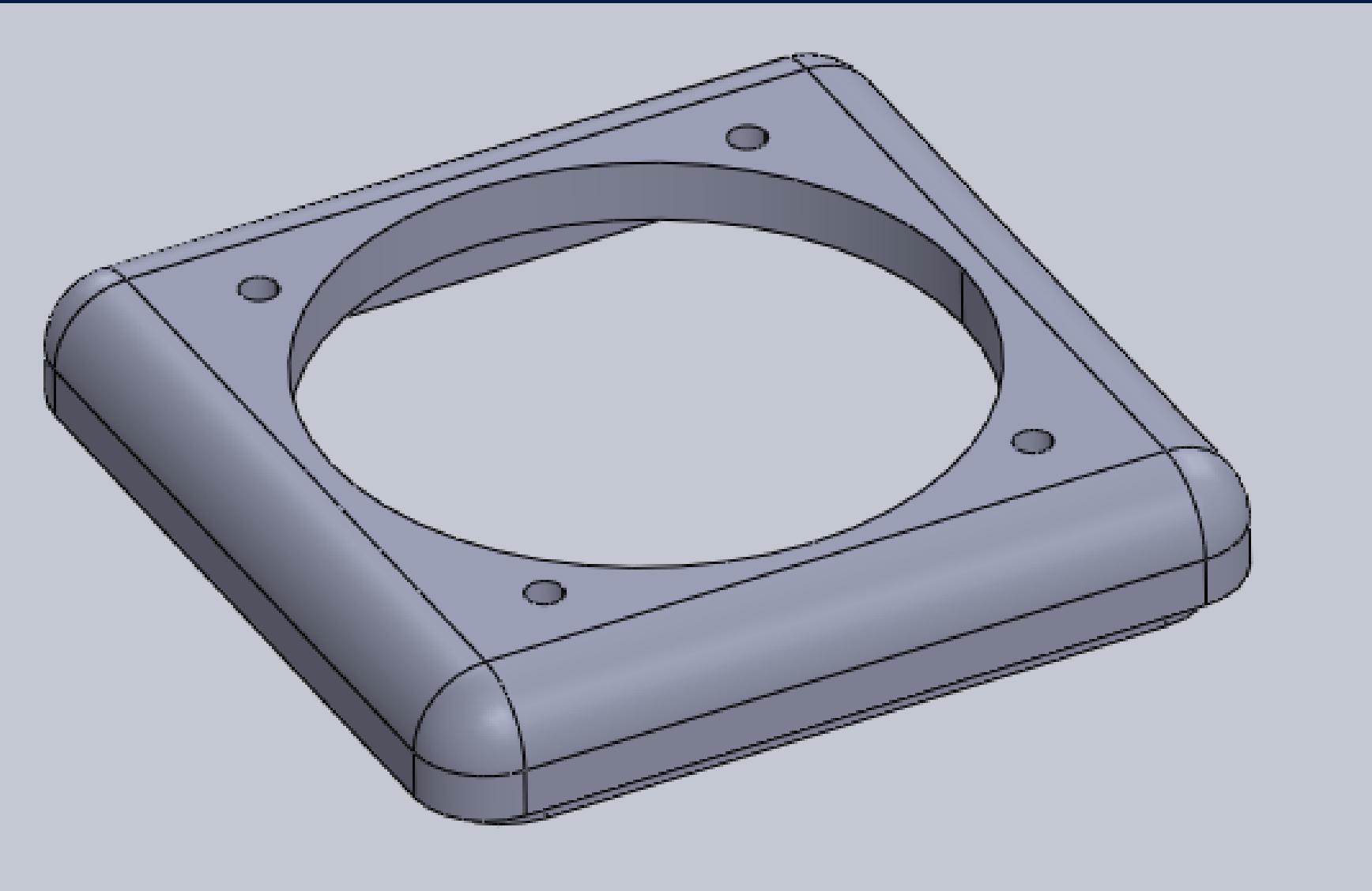
**BOTTOM
PART**



**BOTTOM
PART**



LID



OUR TEAM



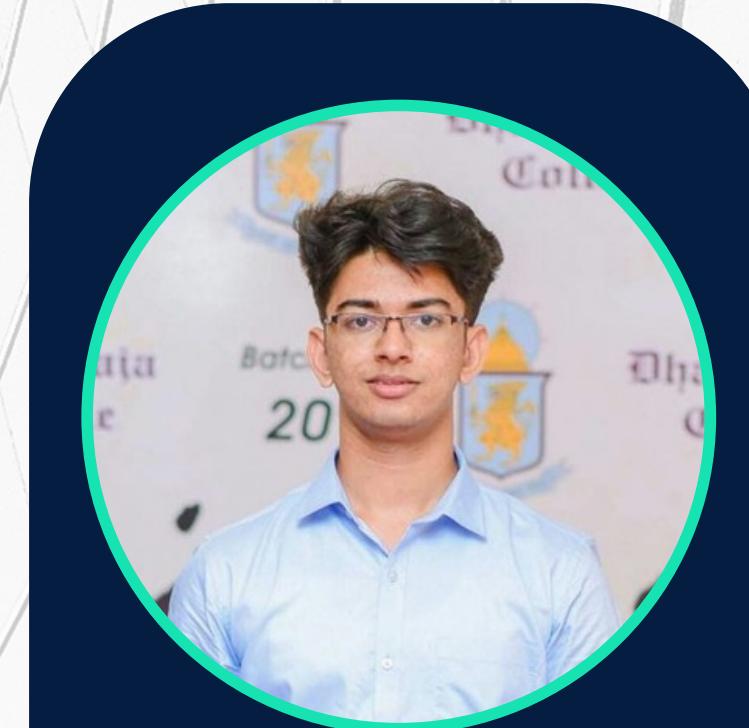
**MIHIRAN
WICKRAMARATHNE**

210703V



**DANINDU
DABARE**

210089P



**LASITHA
AMARASINGHE**

210031H

THANK YOU

