

PRESENTATION ON

# ARDUINO BASED MP3 PLAYER

BACHELOR OF TECHNOLOGY  
IN  
ELECTRONICS & COMMUNICATION ENGINEERING



**B.Tech. 3<sup>rd</sup> Year (Semester - 6<sup>th</sup>)**  
**Session : 2023 - 2024**

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**KALYANI GOVERNMENT ENGINEERING COLLEGE**

# PRESENTATION FLOW



**Project objective**



**Why MP3 Players ?**



**Features of the Prototype**



**Problems & Solutions**



**Components Selected**



**Descriptions of components**



**Basic Diagram & Working of the System**



**Circuit Simulation step by step**



**Physical Diagram**



**Work Plan & Cost table**



**Softwares used**



**Programming languages used**



**Pros. & Cons.**



**Applications**



**Future Enhancements**



**Conclusion**

# Key Objectives

The main objective of our project is to make Arduino based mini Digital MP3 Player. This player should fulfill all the needs of the users so that it will be a good alternative all the other MP3 players available in the commercial market.



## User Friendly

This prototype should be user friendly so that any kind of user can operate this player very easily in his / her daily life.

01

## Cost efficient

This mp3 player should be cost efficient enough so that it seems that this product is the best within this price point.

02

## Customizable

The product should be fully customizable so that if any programmer want to upgrade something he / she can easily do it.

03

## Sustainable

The product should be used in long run. Because the damaged part should be easily replaceable as to reuse it again.

04



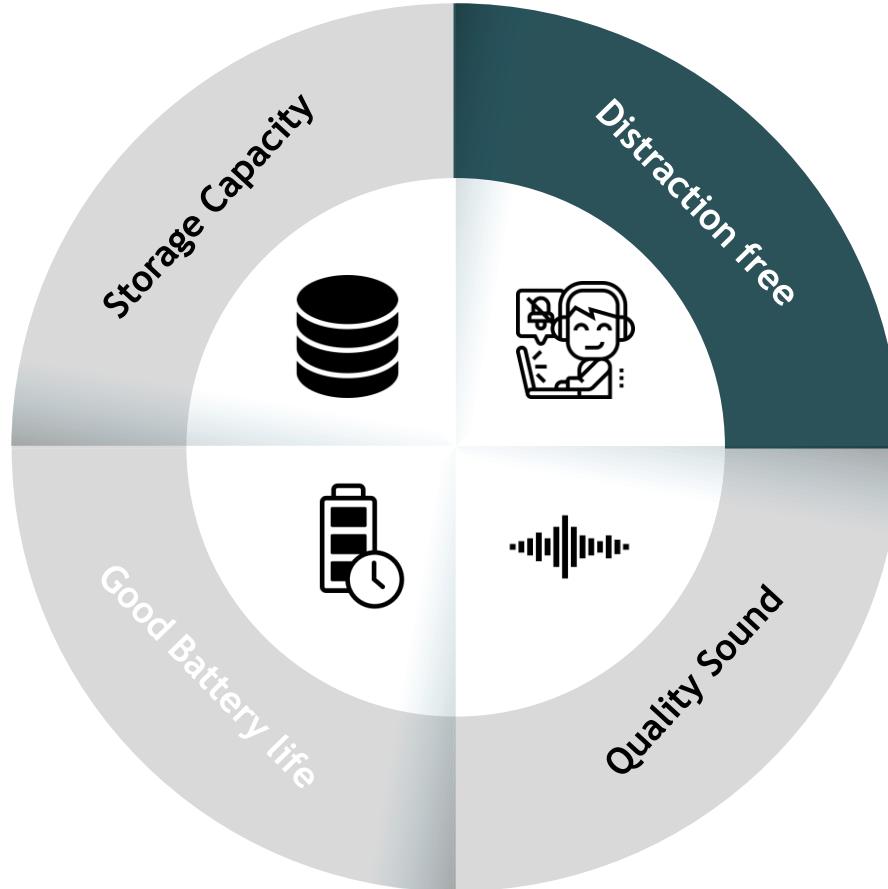
# Why MP3 Players?



# Smartphone v/s MP3 Players



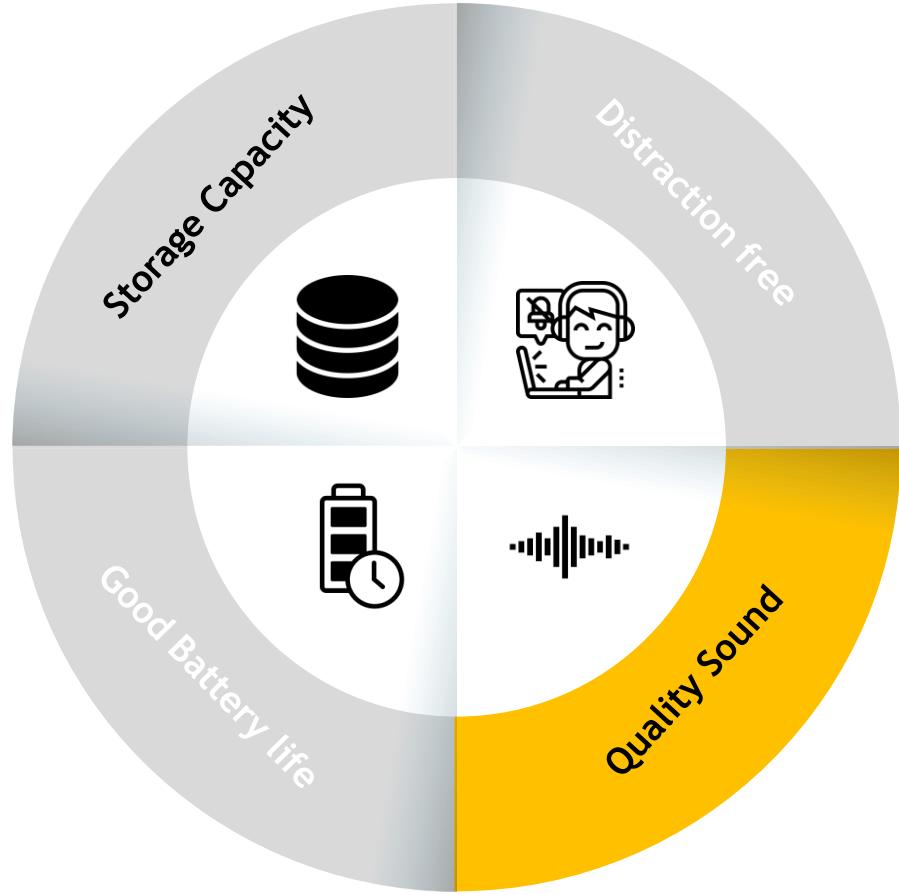
# Smartphone v/s MP3 Players



## Distraction free

Smartphones are multi-purpose devices that can be a source of distractions with constant notifications, calls, and app temptations. On the other hand, MP3 players are dedicated devices solely focused on providing a seamless and uninterrupted music experience.

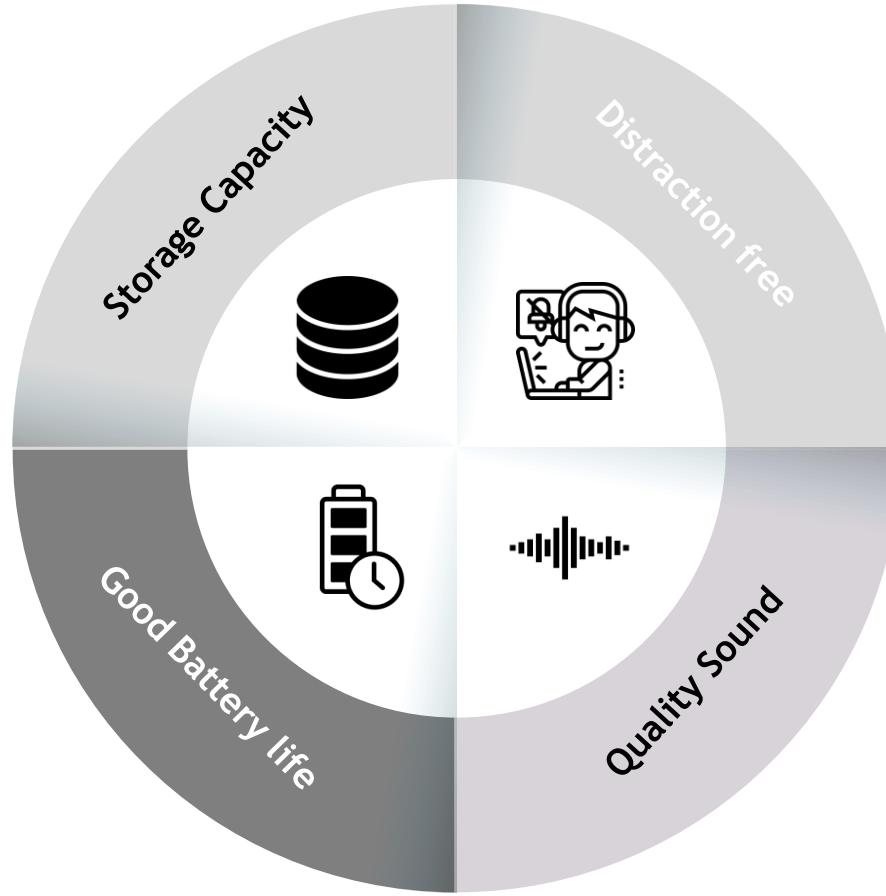
# Smartphone v/s MP3 Players



## Quality Sound

When it comes to sound quality, MP3 players have the upper hand over smartphones. The reason behind this lies in their dedicated audio hardware and software optimizations. Additionally, many MP3 players offer customizable equalizer settings that allow users to fine-tune the sound according to their preferences.

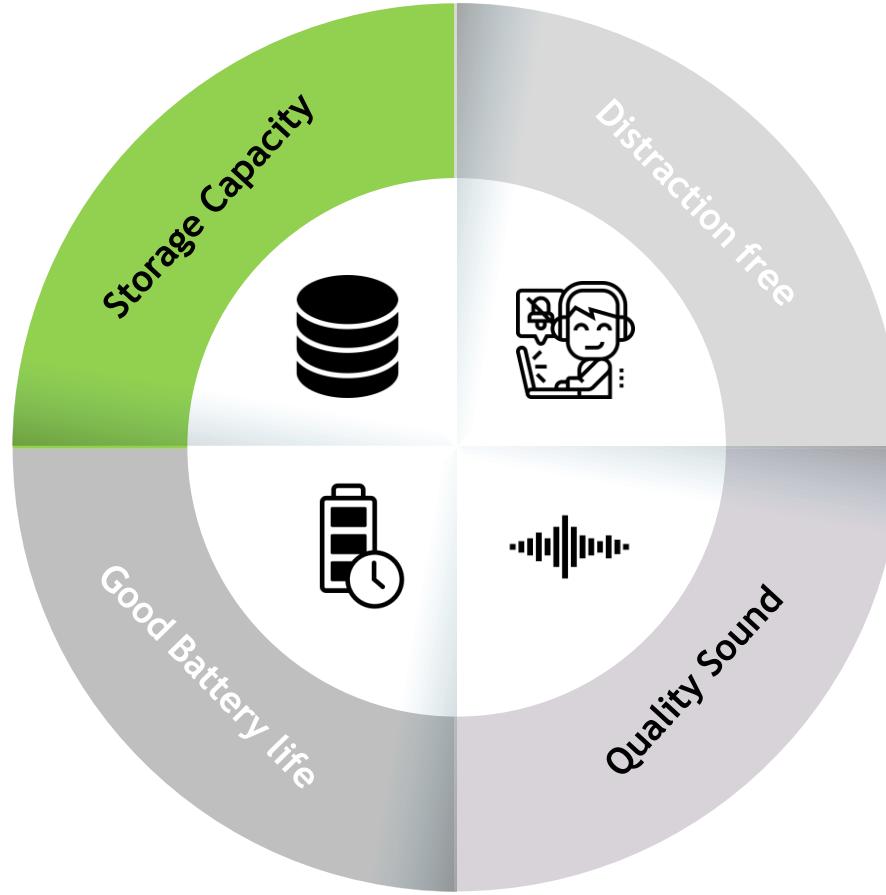
# Smartphone v/s MP3 Players



## Good Battery life

Smartphones are notorious for draining their batteries quickly when used for media consumption purposes like playing music or streaming videos. MP3 players are specifically designed to optimize battery usage and provide extended playback time.

# Smartphone v/s MP3 Players



## Storage Capacity

While smartphones offer a range of storage options, they are often limited and can quickly fill up with various apps, photos, and videos. MP3 players, on the other hand, are specifically designed to accommodate large music collections. They come with generous internal storage capacities and often have expandable memory options through microSD cards.

# Features of Prototype



1

## OLED Display

Easy navigation is here with 1.3 inch OLED display

2

## Expandable Storage

Supports micro SD card from 2 GB up to 32 GB

3

## Digital battery monitor

Digital Voltmeter for real time battery monitoring

4

## Reprogrammable

Completely customizable & reprogrammable UI

5

## Equalizer

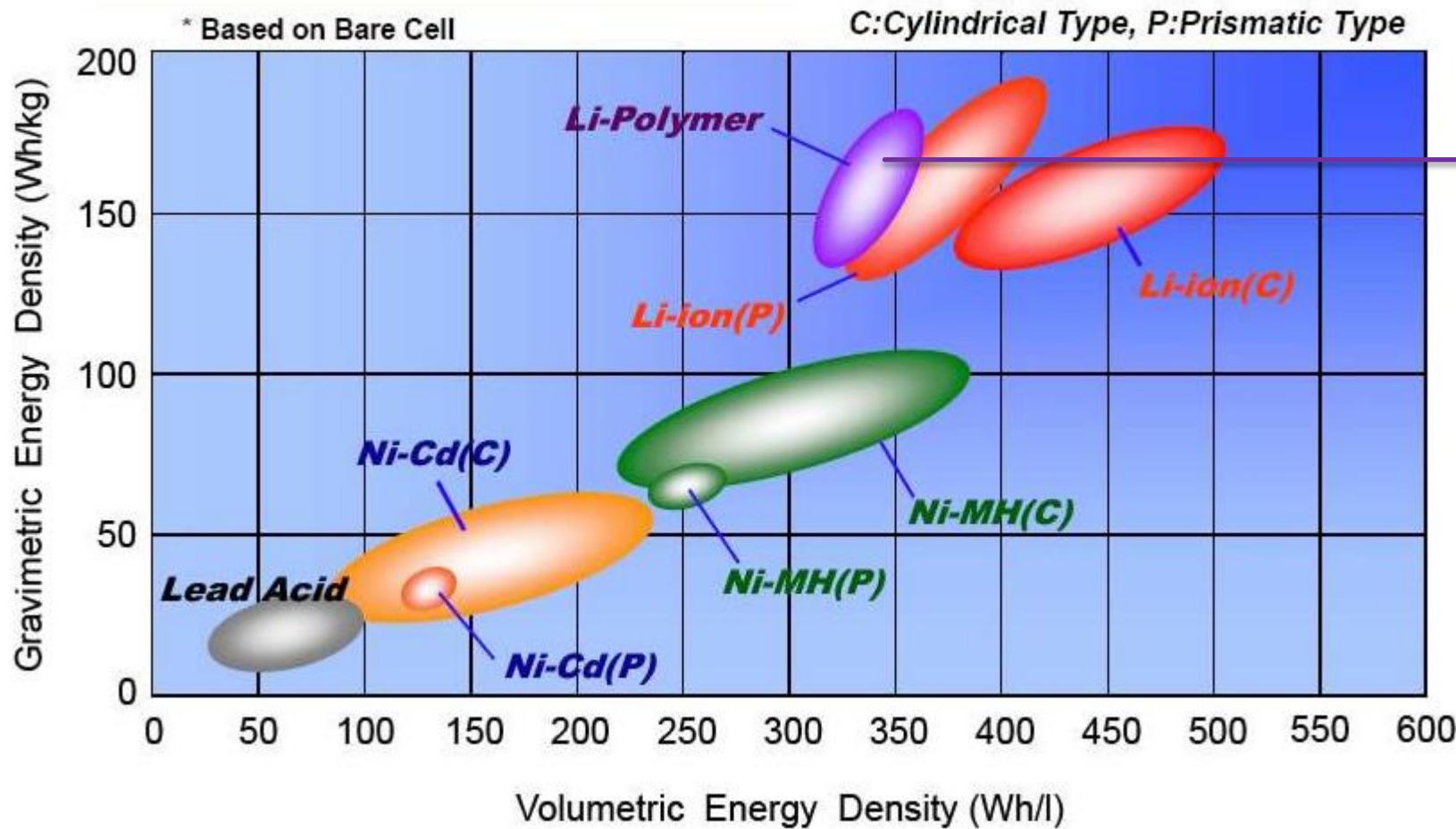
6 EQ modes : Normal, Pop, Rock, Jazz, Classic, Bass



# Selection of Proper Board

Board Type - Arduino	Mega	Uno	Nano	Pro Mini
Low Cost	✗	✓	✓	✓
Portable / Small F/F	✗	✗	✗	✓
Memory Size	✓	✓	✓	✗
Sufficient Power supply	✓	✓	✓	✗

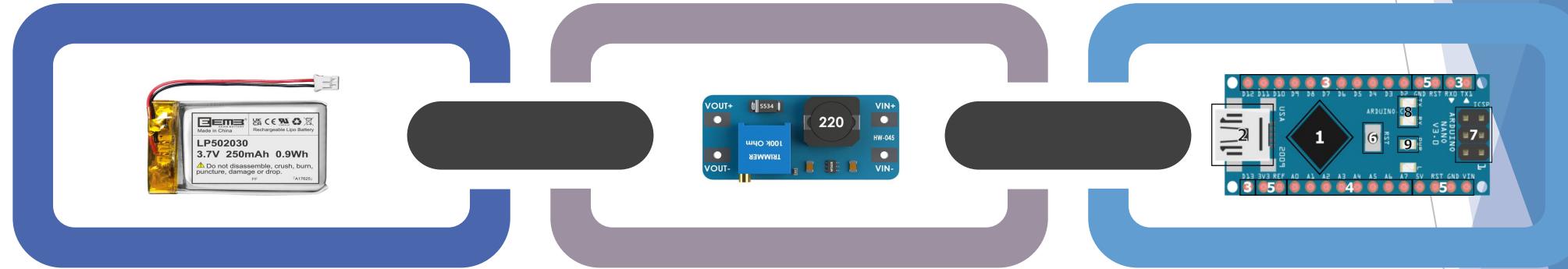
# Type of Battery



3.7V Lithium  
Polymer Battery



# Supply voltage of Arduino Nano



## 3.7v Battery

A 3.7V LiPo battery has a nominal voltage of 3.7V and a full-charge voltage of 4.2V. The capacity of a 3.7V LiPo battery can range from a few hundred to a few thousand mAh.

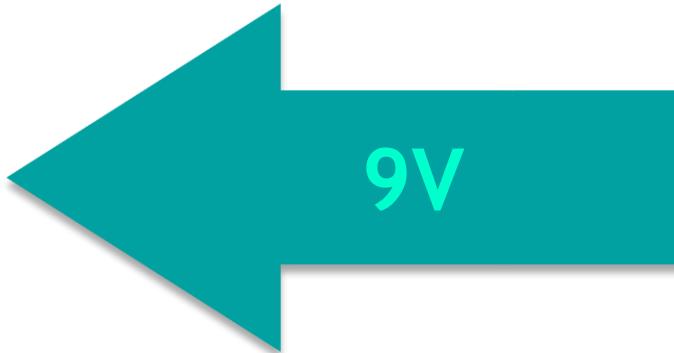
## MT3608 Module

It's a DC-DC boost converter that can step up a 2-24V input voltage to a 5-28V output at up to 2A. The MT3608 is adjustable and can output a voltage of 5-28V at a continuous current of up to 1.5A, depending on the input/output voltage settings.

## Arduino Nano

The Arduino Nano has an operating voltage of 5 volts, and an input voltage of 5 to 20 volts. The recommended input voltage is 7 to 12 volts.

# Problem with MT3608 boost converter



# Problem with MT3608 boost converter

28V



< 2.5V

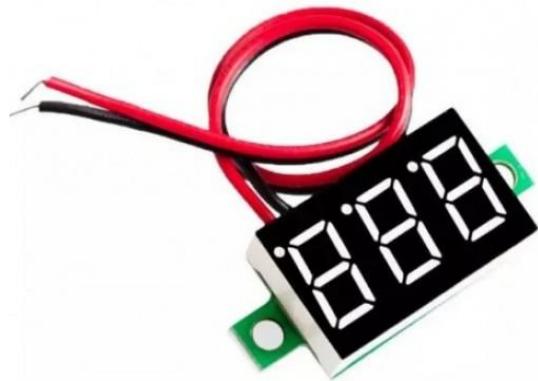




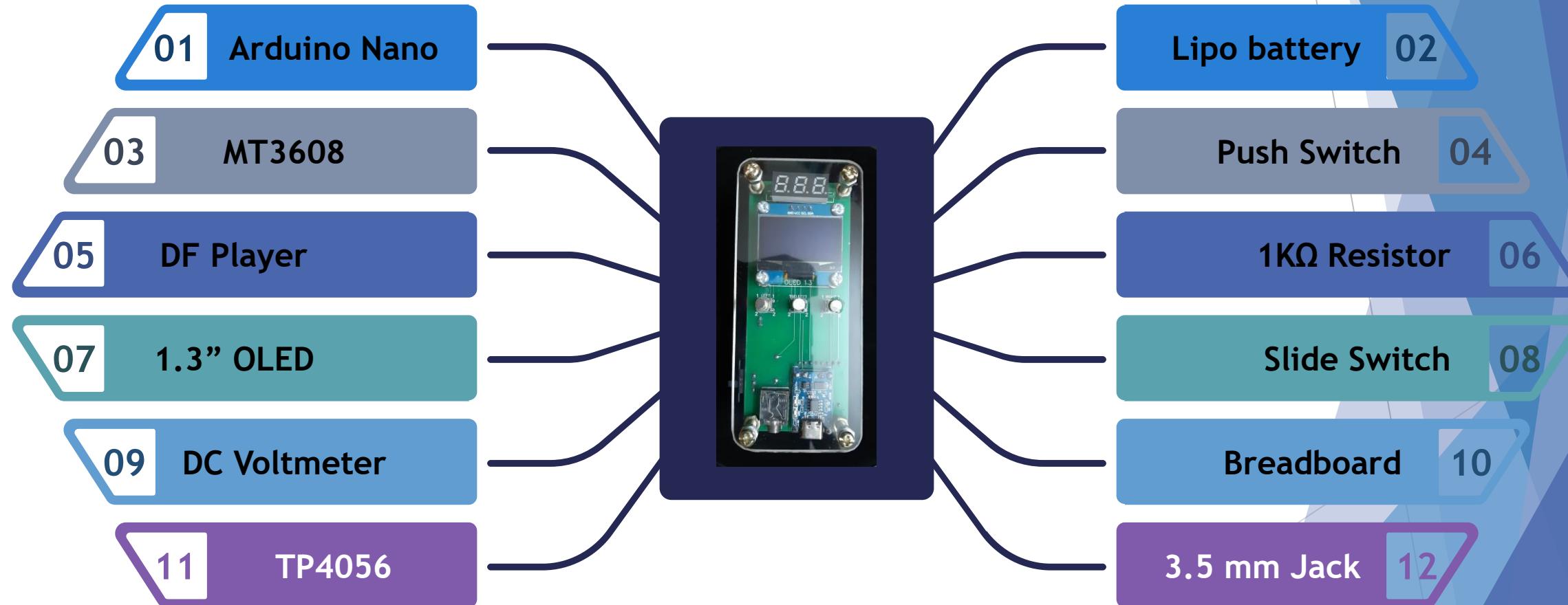
# Solution



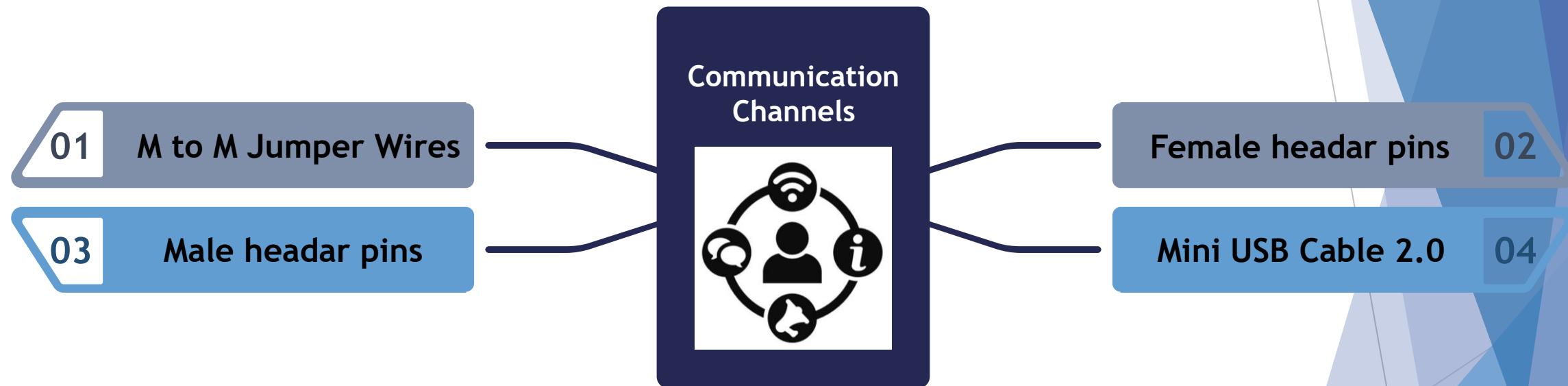
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# Components selected



# Components selected

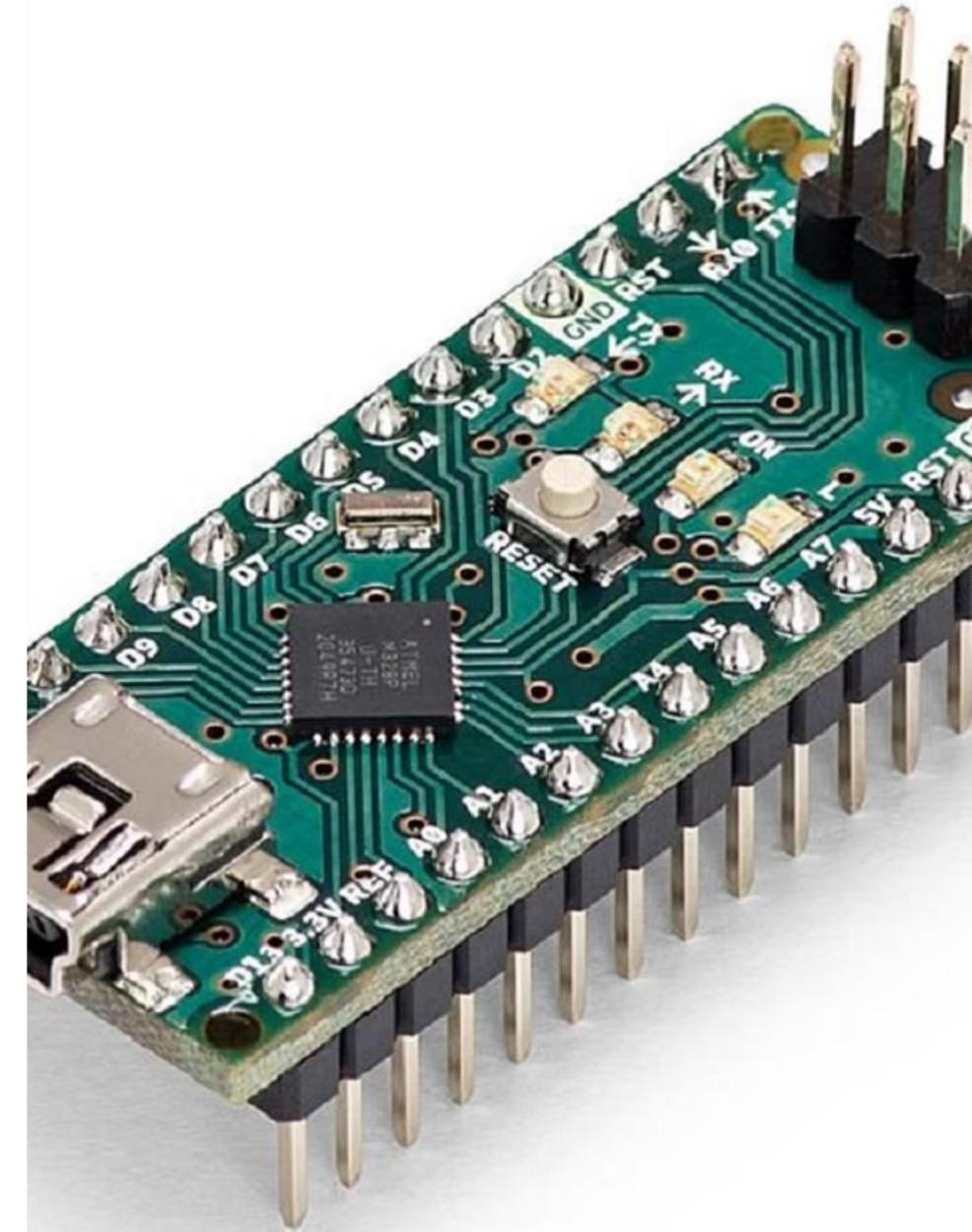


# **Descriptions of Components**



# Arduino Nano

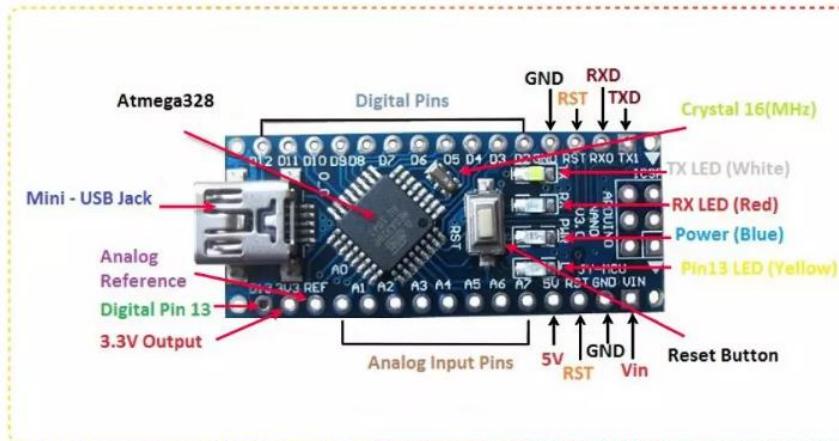
The Arduino Nano is a compact, breadboard-friendly microcontroller board based on the ATmega328P. It offers a powerful, yet accessible platform for a wide range of electronic projects and prototypes, from simple sensors to complex IoT devices.



NO.	Nano Features	Value
01	MicroController	Atmega328p
02	Crystal Oscillator	16MHz
03	Operating Voltage	5V
04	Input Voltage	6V-12V
05	Maximum Current Rating	40mA
06	USB	Type-B Micro USB
07	ICSP Header	Yes
08	DC Power Jack	NO

## Arduino Nano

→ Arduino Nano is a small, complete, flexible and breadboard-friendly Microcontroller board, based on ATmega328p, developed by Arduino.cc in Italy in 2008 and contains 30 male I/O headers, configured in a DIP30 style.



## Arduino Nano Pinout

- 01 Digital Input/Output Pins  
D0 D1 D2 D3 D4 —— D10 D12 D13
- 02 Analog Input/Output Pins  
A0 A1 A2 —— A5 A6 A7
- 03 Pulse With Modulation ( PWM ) Pins.  
Pin# 3 5 6 9 10 11
- 04 Serial Communication Pins.  
Pin # 0 ( RX ), Pin# 1 ( TX )
- 05 SPI Communication Pins.
- Pin # 10 , 11 , 12 , 13
- 06 I2C Communication Pins.  
Pin # A4 , A5
- 07 Built-in LED for Testing.  
Pin# 13
- 08 External Interrupt Pins.  
D2 D3

## Communication Protocols

- 01 Serial Protocol:  
Pin#0 is RX Pin#1 is TX
- 02 I2C Protocol:  
Pin#A4 is SDA Pin#A5 is SCL
- 03 SPI Protocol:  
Pin#10 is SS Pin#11 is MOSI  
Pin#12 is MISO Pin#13 is SCK

## Related Boards

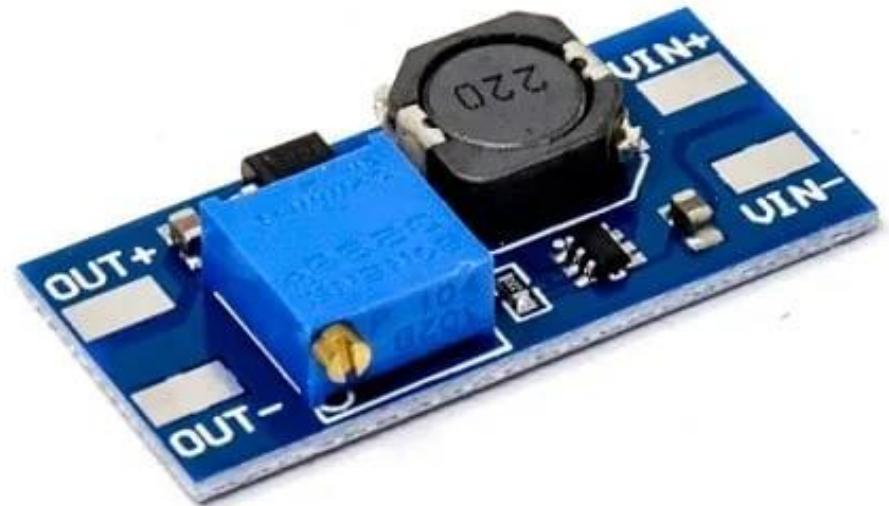


## Memory Types

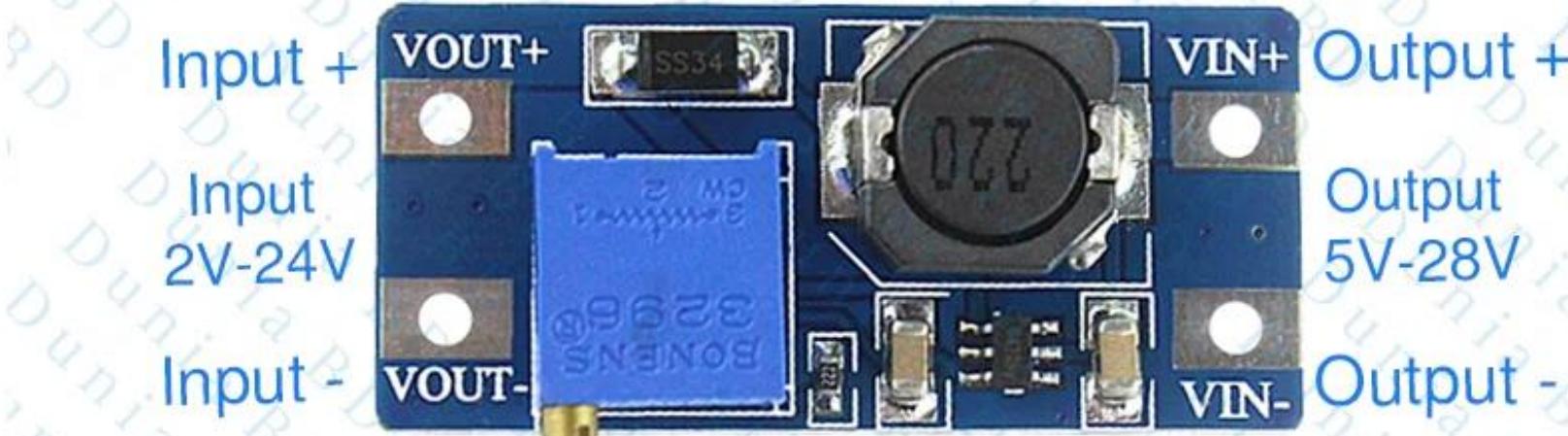
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- The diagram shows a central Microchip MC957A3 memory chip connected to three different memory types, each represented by a colored circle:
- 01 Flash Memory 32KB
  - 02 SRAM Memory 2KB
  - 03 EPROM 1KB

# MT3608 Step-up module

The MT3608 is a 6-pin SOT23 current mode step-up converter that can increase an input voltage of 2-24 V to an output voltage of 5-28 V at up to 2 A. It's a constant frequency, low power application module that switches at 1.2 MHz and can use capacitors and inductors that are 2 mm or less in height. The MT3608 has a multi-turn potentiometer that can be used to adjust the output voltage.



# MT3608 DC to DC BOOSTER



Input voltage : 2V-24V DC

Output voltage : 5V-28V DC

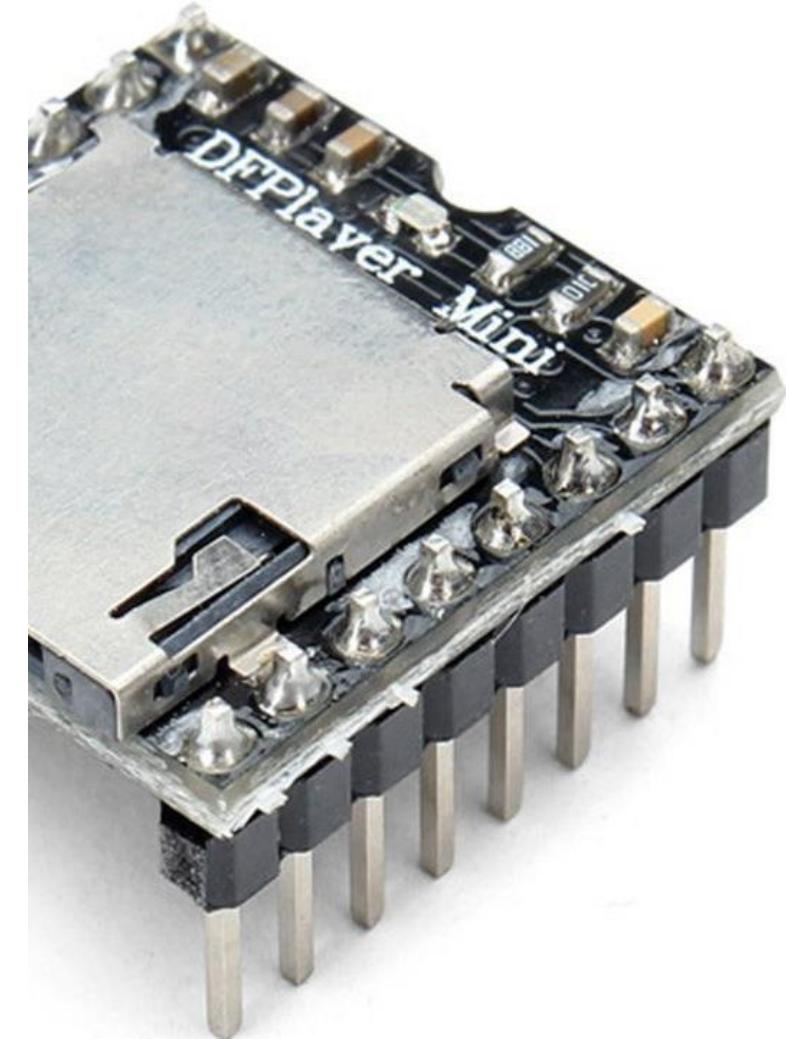
Module type : Non-isolated step-up (boost)

Rectification : Non-synchronous rectification

Output current : 2A (max), 1A (recommended), <100mA (input <4.0V), <50mA (input <3.5V)

# DF Player Mini Module

The DF Player Mini MP3 Player For Arduino is a small and low cost MP3 module with an simplified output directly to the speaker. The module can be used as a stand alone module with attached battery, speaker and push buttons or used in combination with microcontrollers such as Arduino, ESP32, Raspberry Pi and any microcontrollers with UART.

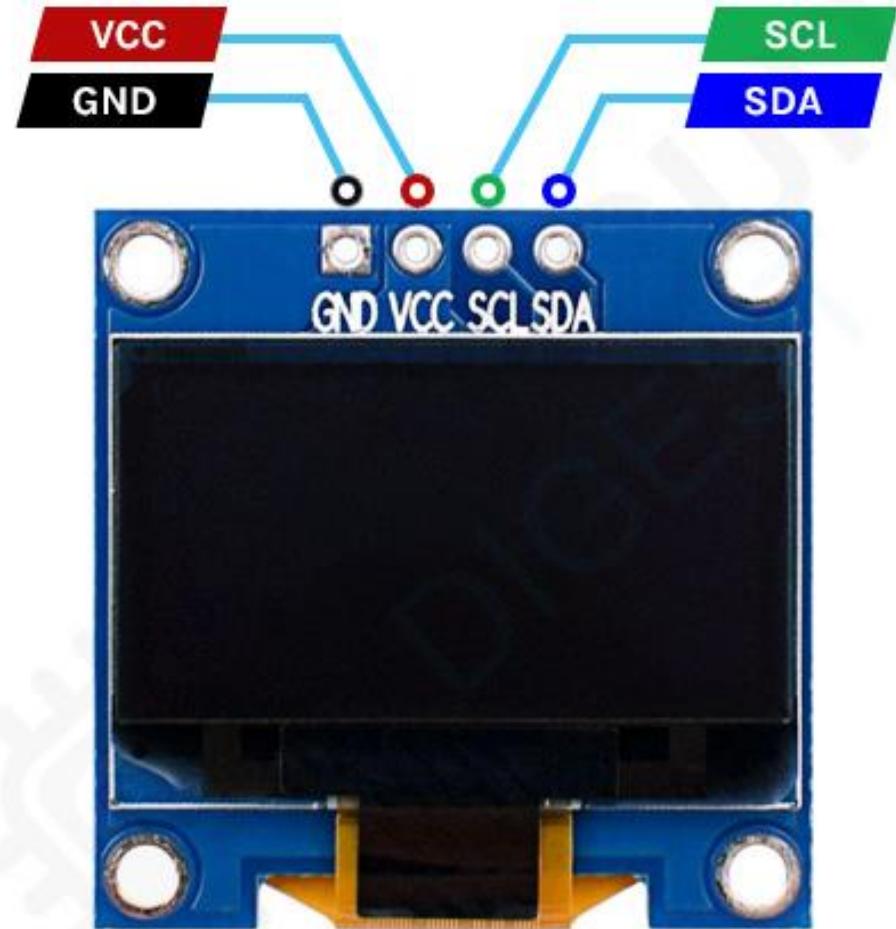


<b>Pin</b>	<b>Description</b>	<b>Note</b>
VCC	Input Voltage	DC3.2~5.0V;Type: DC4.2V
RX	UART serial input	
TX	UART serial output	
DAC_R	Audio output right channel	Drive earphone and amplifier
DAC_L	Audio output left channel	Drive earphone and amplifier
SPK2	Speaker-	Drive speaker less than 3W
GND	Ground	Power GND
SPK1	Speaker+	Drive speaker less than 3W
IO1	Trigger port 1	Short press to play previous (long press to decrease volume)
GND	Ground	Power GND
IO2	Trigger port 2	Short press to play next (long press to increase volume)
ADKEY1	AD Port 1	Trigger play first segment
ADKEY2	AD Port 2	Trigger play fifth segment
USB+	USB+ DP	USB Port
USB-	USB- DM	USB Port
BUSY	Playing Status	Low means playing \High means no

# 1.3 inch OLED Display

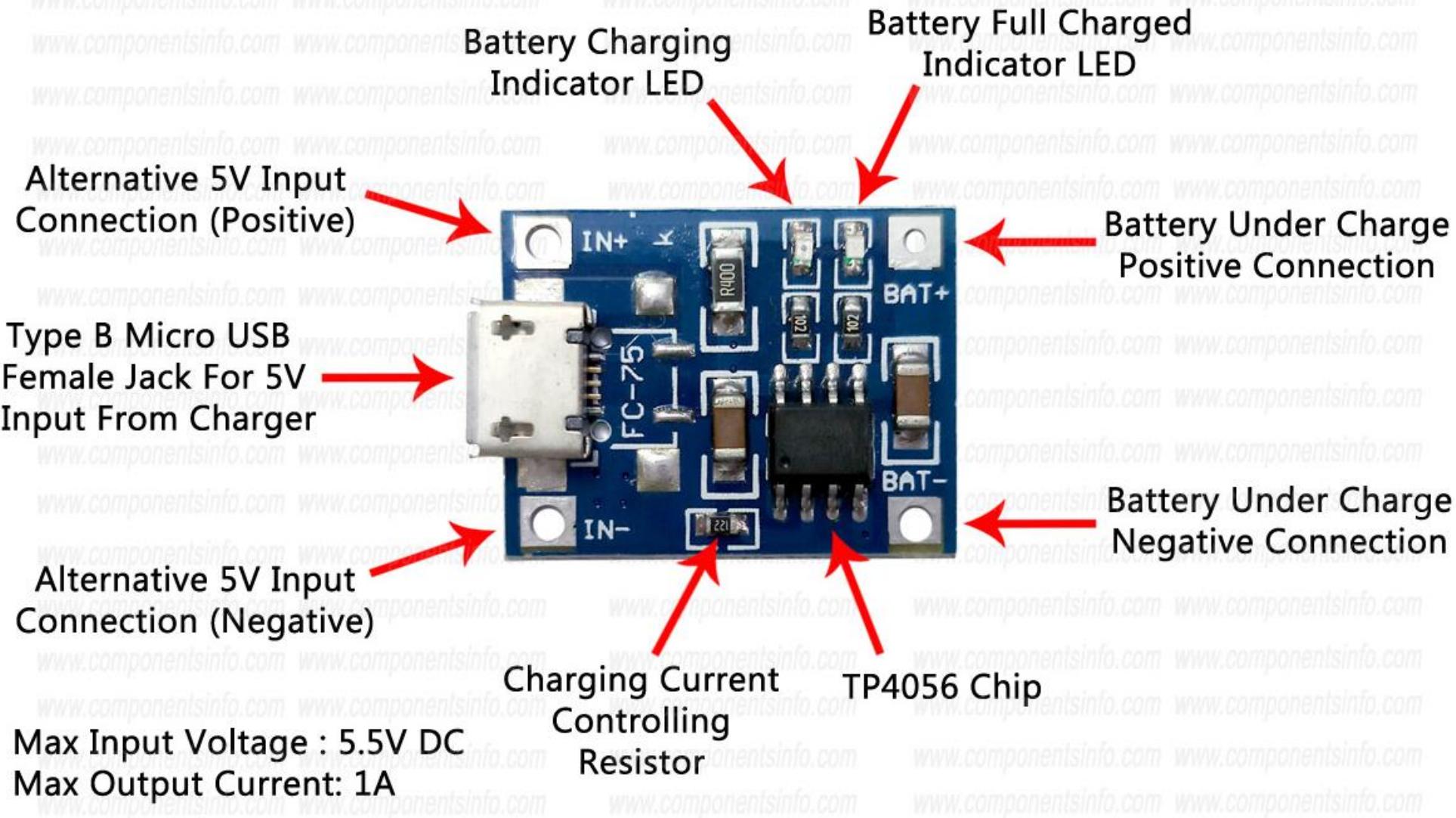
1.3 inch OLED display module with 128x64 resolution. The emissive electroluminescent layer is a film of organic compound that emits light in response to an electric current. Working without backlight, the OLED display module could give out light by itself. The OLED screen can achieve a higher contrast ratio in low ambient light condition. Small dimension, suitable for MP3, function cell phone, smart watch, and smart health device. It comes with SH1106 library



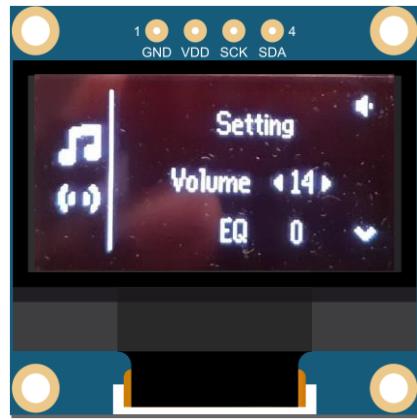


GND  
VCC  
SCL  
SDA

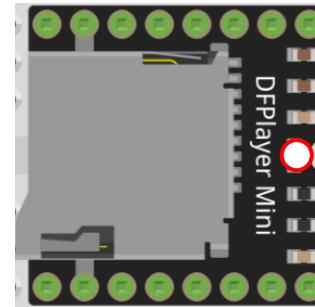
# TP4056 Charging module



# **Basic Diagram & Working of the system**



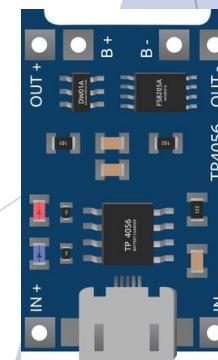
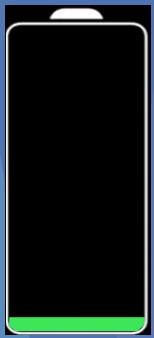
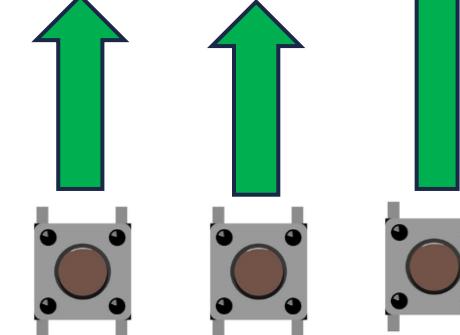
SCL / SDA



TX / RX

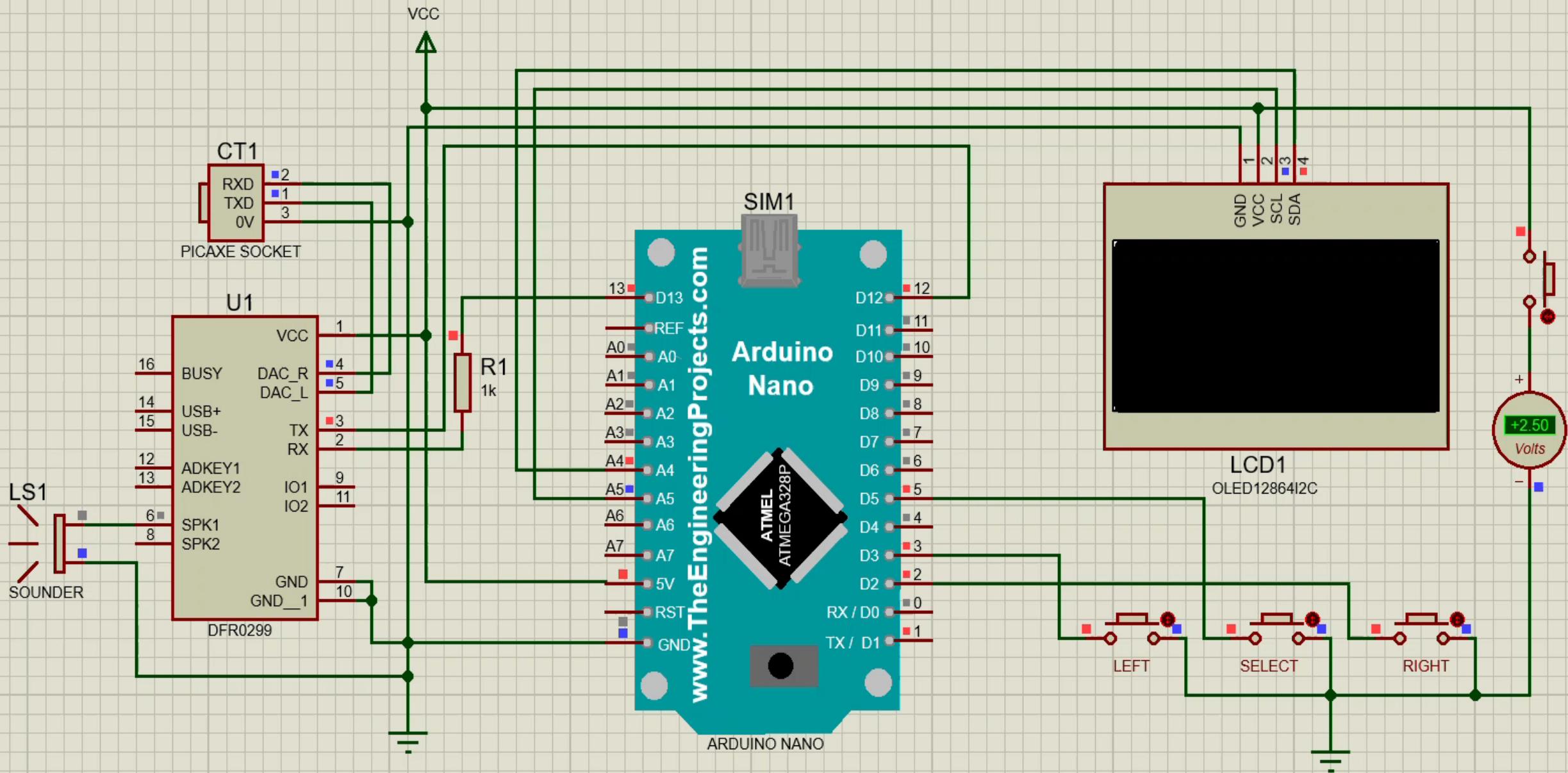


LEFT      SELECT      RIGHT

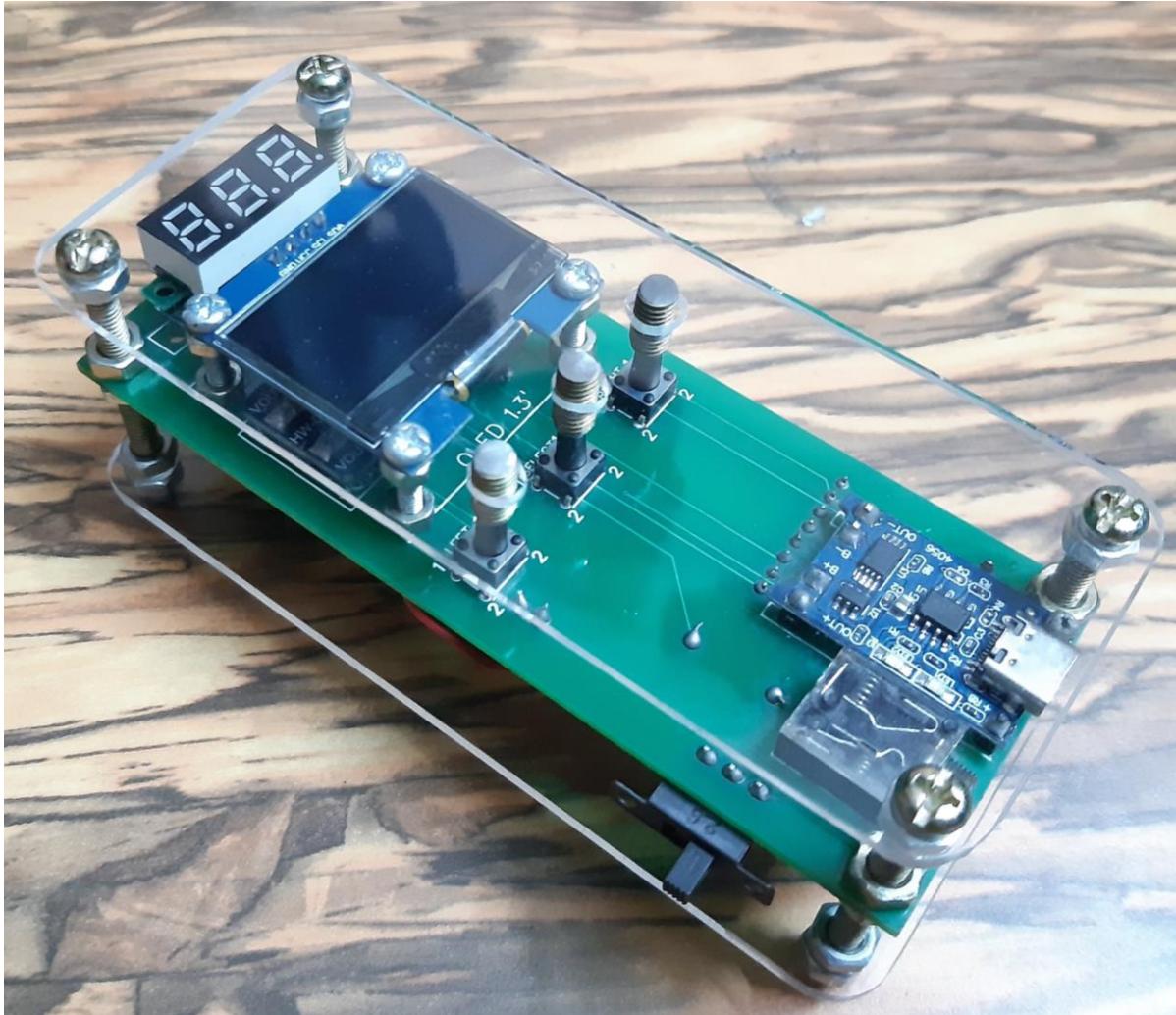


# Circuit Simulation (In Proteus 8.11)

# ARDUINO BASED MP3 PLAYER



# Physical Structure



# **Work Plan & Cost Table**



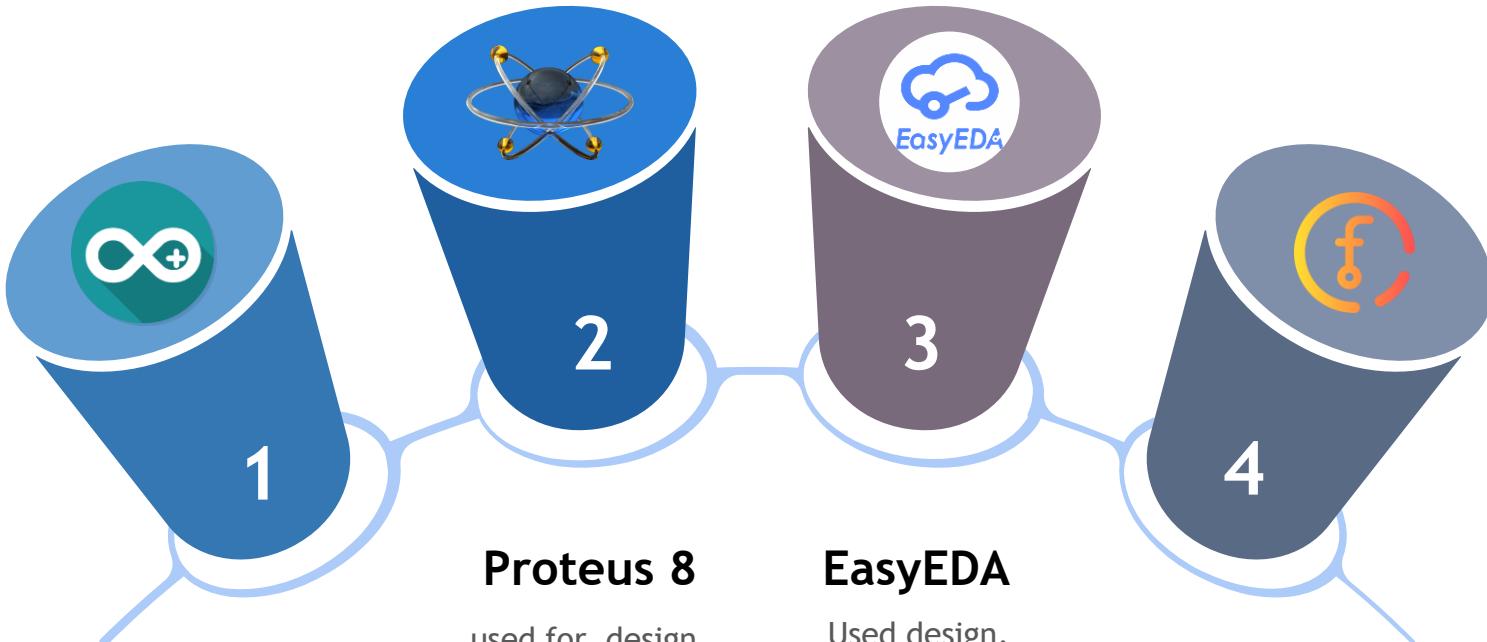
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Work processes step by step	Months																			
	January				February				March				April				May			
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Choosing Platform	●																			
Selection of Project		●																		
Background research			●																	
Designing in software					●	●														
Purchasing components						●	●													
Test & Study of the parts							●													
Assembly in breadboard								●												
Coding									●	●										
Testing										●										
Design PCB in EasyEDA											●		●							
Ordering PCB												●		●						
Assembly on PCB													●		●		●			
Enclosure making														●						
Final Testing															●					
Preparing project report																●				
Preparing presentation																	●			
Presenting the Prototype																		●		

# Component List (with predictable Prices)

SL. No.	Component Names	Quantity	Prices	
			Predicted	Actual
1	Arduino Pro Mini (5v - 16Mhz)	x 1	400	200
2	FTDI USB to TTL Module	x 1	150	130
3	MT3608 / XL6009 Step Up Module	x 1	60	50
4	DF Player Mini MP3 player	x 1	200	100
5	1.3 inch Oled Display	x 1	400	230
6	DC Voltmeter	x 1	90	70
7	TP 4056 charging Module - Type C	x 1	50	25
8	3.7V Mini Lipo Battery	x 1	90	80
9	M to M Jumper Wire Set	x 1	40	40
10	Both side Vero Board (Medium)	x 1	60	100
11	Earphone	x 1	50	100
12	16 GB Memory TF Card	x 1	400	375
13	Acrylic Sheet Transparent	x 1	100	60
14	ECOMS PCB	x 1	1310	1310
15	Push Button - Micro Switch (Long Nose)	x 3	30	15
16	Wooden box for carrying	x 1	350	340
Total Price =			3780	3225

# Softwares used



## Arduino IDE

used to write and upload computer code to Arduino boards

## Proteus 8

used for design, simulating, and testing electronic circuits..

## EasyEDA

Used design, simulate, schematics&printed circuit boards

## Fritzing

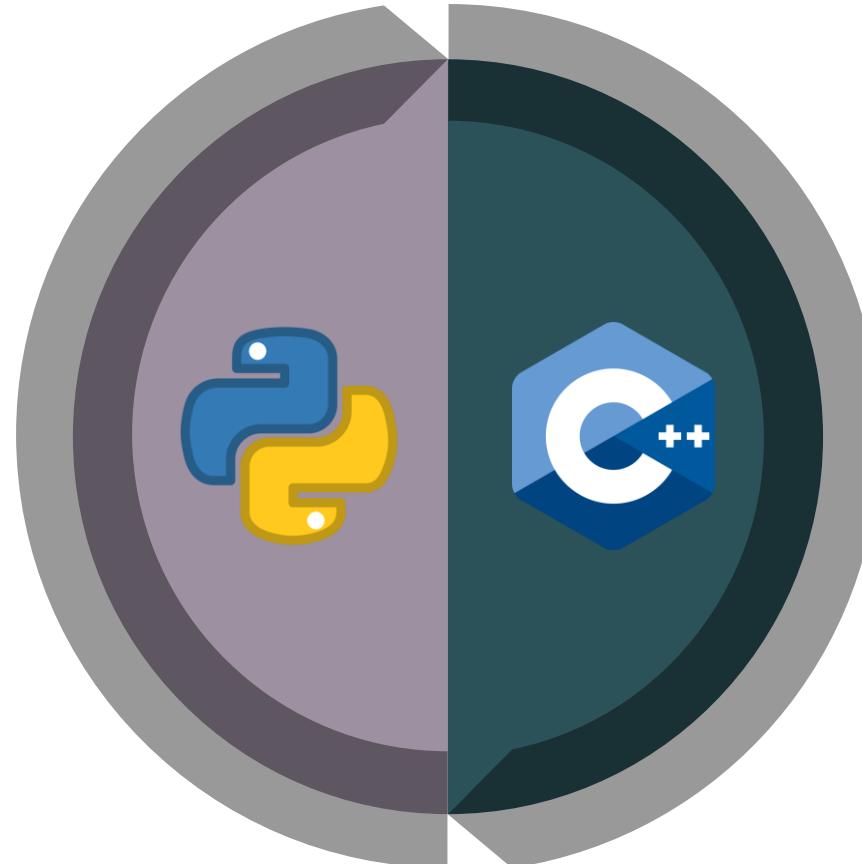
Used for designing electronics hardware, such as schematics, parts, and PCBs.

# Programming Languages used

## PYTHON

Python is a general-purpose, interpreted, high-level programming language. It is designed to be easy to read and write, and its syntax allows developers to express their ideas in a clear and concise way.

In this project we have made a application using python so as to avoid the ambiguity about the naming of the mp3 files on the SD card before inserting it into DF Player.



## C++

C++ is a general-purpose programming language created by Bjarne Stroustrup as an extension to the C language. It is a statically typed, compiled, general-purpose, object-oriented programming language.

In Arduino IDE (Integrated Development Environment) software we have used C++ so as to code our Arduino Nano microcontroller to behave as a MP3 player.



Arduino MP3 Player

# PROS & CONS



# Pros

## OLED Display

A OLED display of 128 × 64 resolution is introduced for visual navigation

## Compact design

The dimension of the prototype is 110mm × 55 mm × 40mm which makes it portable.

## Large Storage

The DF Player supports up to micro SD card of capacity starting from 2 GB - 32GB.

## Customizable

A programmer can easily customize the hardware & UI of the Prototype.

# Cons

## Poor Battery

A single 3.7V 430 mAh Lipo battery is used which lasts for 2 hours only

## Fragile

The body is made of 3 mm transparent acrylic sheet which may be easily damaged

## Single option

In this mp3 player there is only one option for listen to music i.e. wired earphone only

## Average audio

Though the audio is crystal clear but the frequencies overlapped each other

# Applications

## 08 - Ipod / Audio Player

Developing a custom portable MP3 player with unique features tailored to the user's needs.

## 07 - Custom greetings

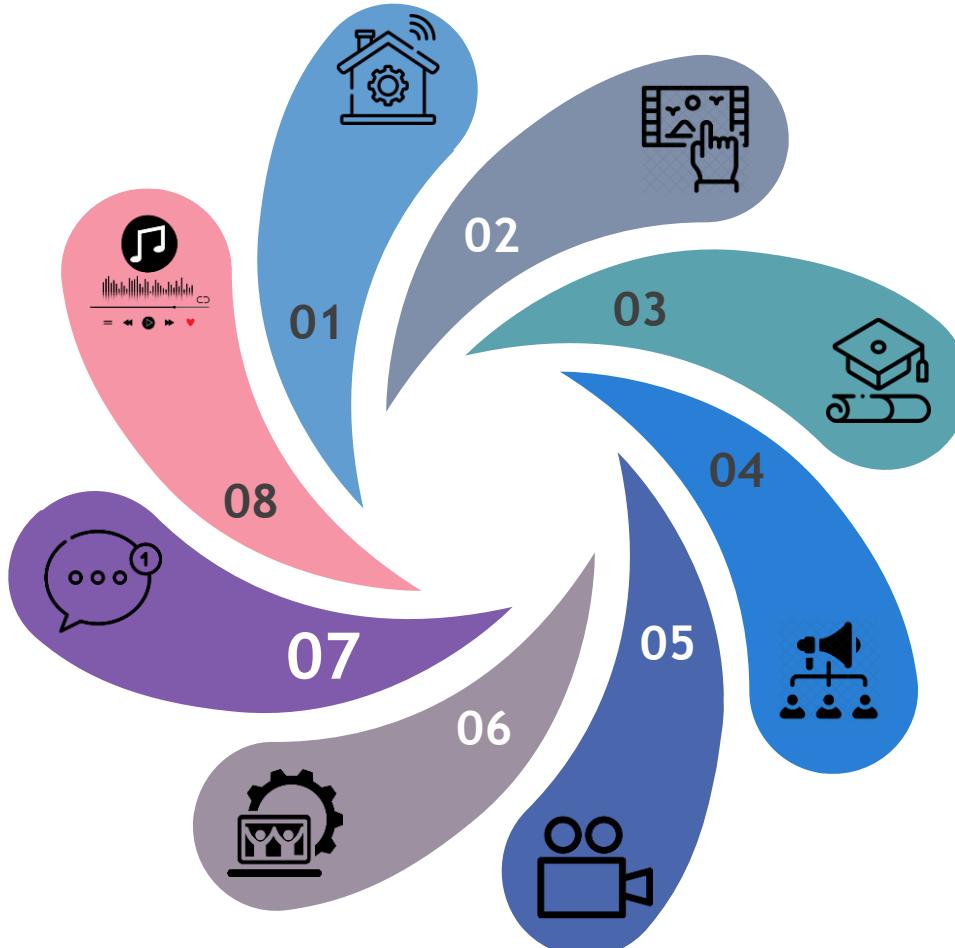
Creating personalized greeting cards or gifts that play a specific message or song when opened.

## 06 - Assistive Technology

Such MP3 players can assist individuals with disabilities by providing audio cues and instructions.

## 05 - Entertainment

Arduino-based MP3 players can be integrated into toys or entertainment devices to add sound effects or music.



## 01 - Home Automation

An Arduino-based MP3 player can be integrated into a home automation system to provide audible notifications, alerts, and reminders.

## 02 - Interactive Art

Artists can use an Arduino-based MP3 player to enhance interactive installations with sound.

## 03 - Educational Tools

MP3 players can be used in educational contexts to provide audio aids, making learning more interactive and engaging.

## 04 - Announcements

In public spaces, an Arduino-based MP3 player can be used to deliver announcements.

# Future Enhancements

## 01 - Spotify Player

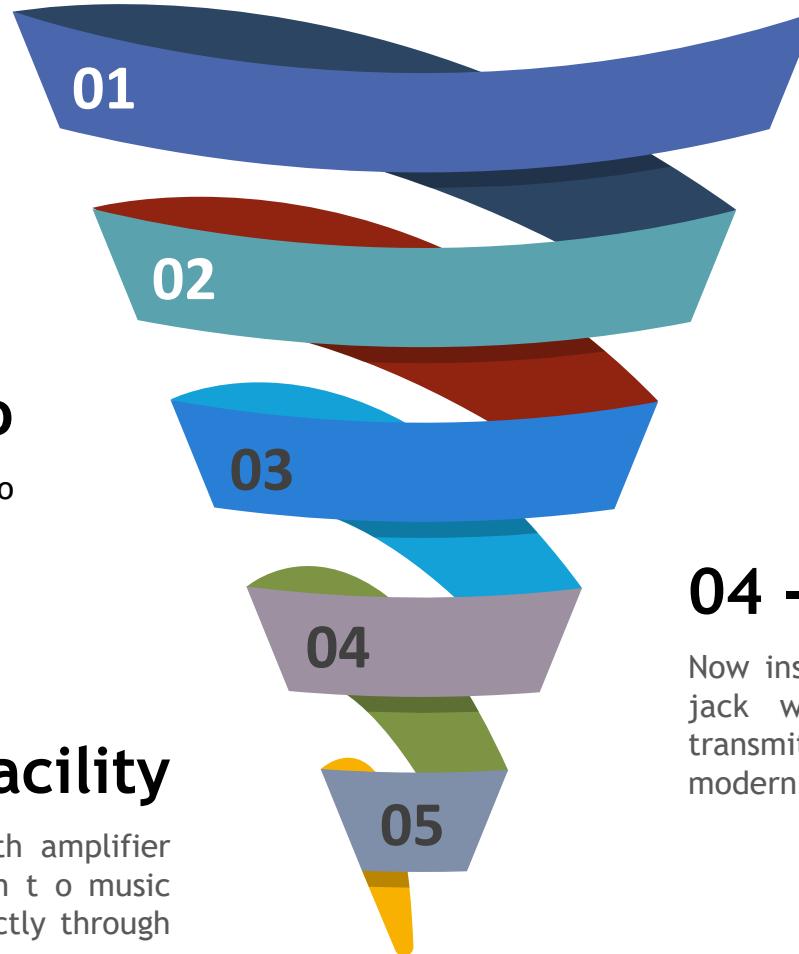
By using ESP8266 module we can build an online mp3 player through which we will be able to control and use online music platforms like Spotify.

## 03 - MP3 + Radio

Only using ESP32 we can make web radio along with mp3 player.

## 05 - Speaker Facility

We can attach a speaker with amplifier facility so that one can listen to music without any earphone or directly through speaker.



## 02 - MP3 + Clock

But if we want to go with the Arduino only then using Arduino mega we can build a mp3 player + clock system together.

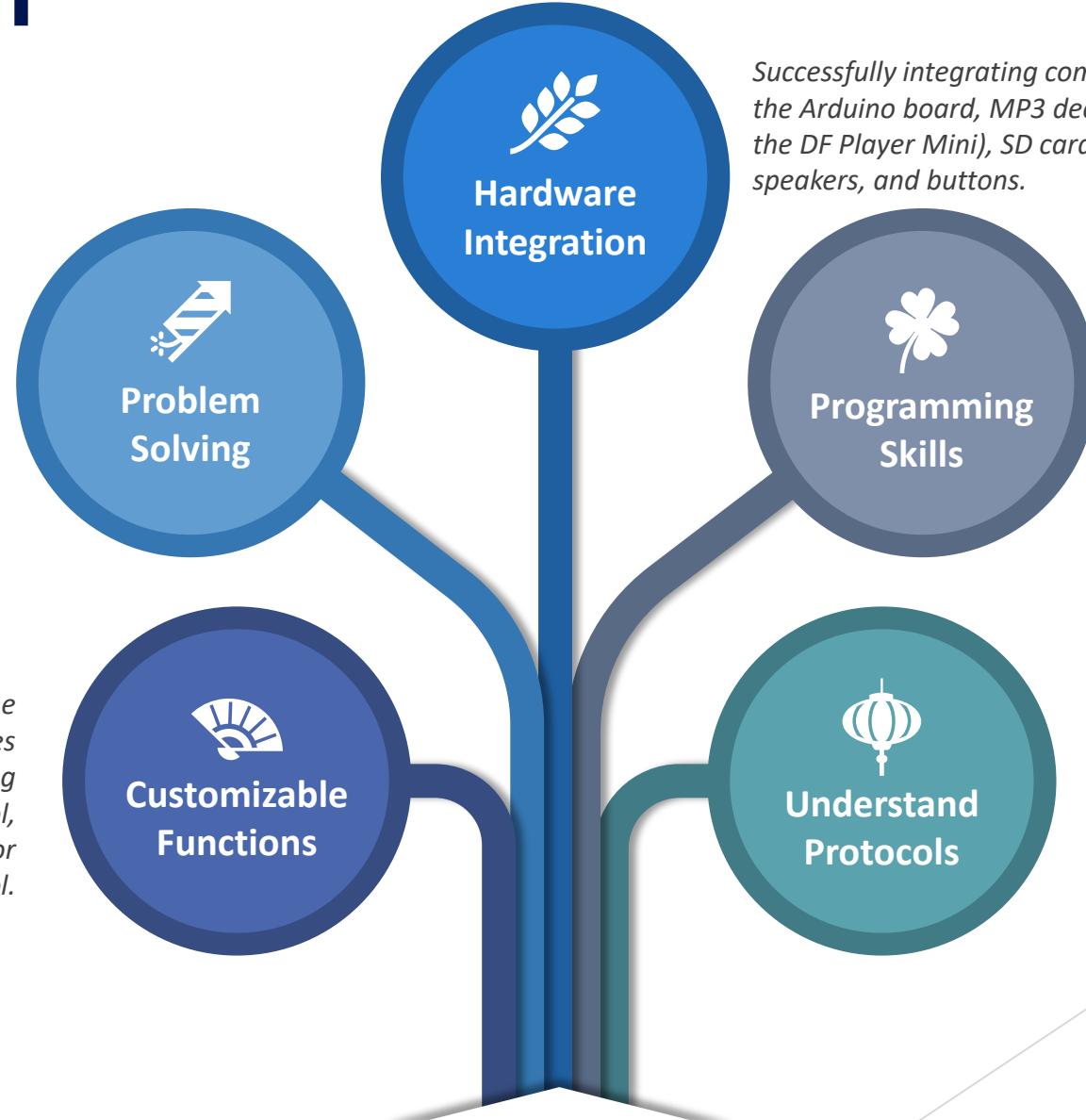
## 04 - BT Connectivity

Now instead of using 3.5 mm headphone jack we can attach Bluetooth audio transmitter so that we can complete with modern Bluetooth earphones.

# Conclusion

*Tackling and resolving challenges related to power supply, signal integrity, and user interface design.*

*The ability to extend the functionality with features such as a display for song information, remote control, or Bluetooth connectivity for wireless control.*



# REFERENCES

- 1 <https://www.arduino.cc/>
- 2 <https://www.scribd.com/>
- 3 <https://www.slideshare.net/>
- 4 [https://wiki.dfrobot.com/DFPlayer\\_Mini\\_SKU\\_DFR0299](https://wiki.dfrobot.com/DFPlayer_Mini_SKU_DFR0299)
- 5 <https://www.labcenter.com/>
- 6 <https://easyeda.com/editor>
- 7 <https://in.pinterest.com/>

# Thank You



## Feedback Form

<https://forms.gle/rXRaPCH14ouNRv1Y9>



## Contact Number

9123381217



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