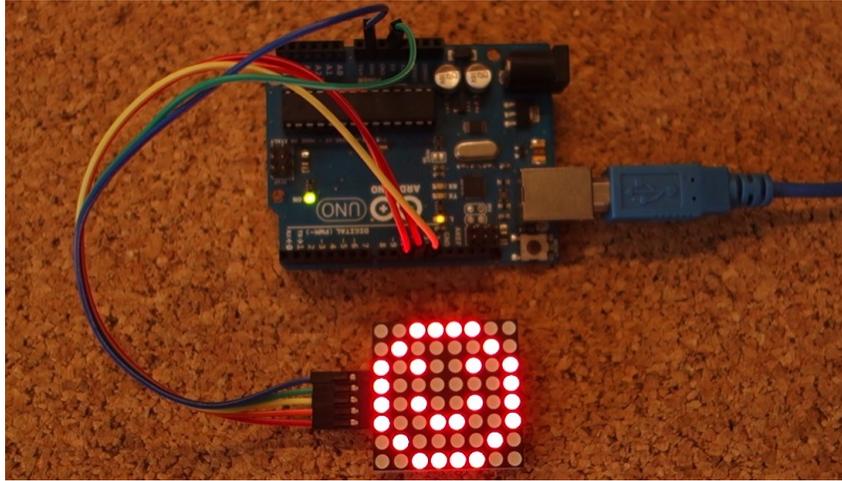




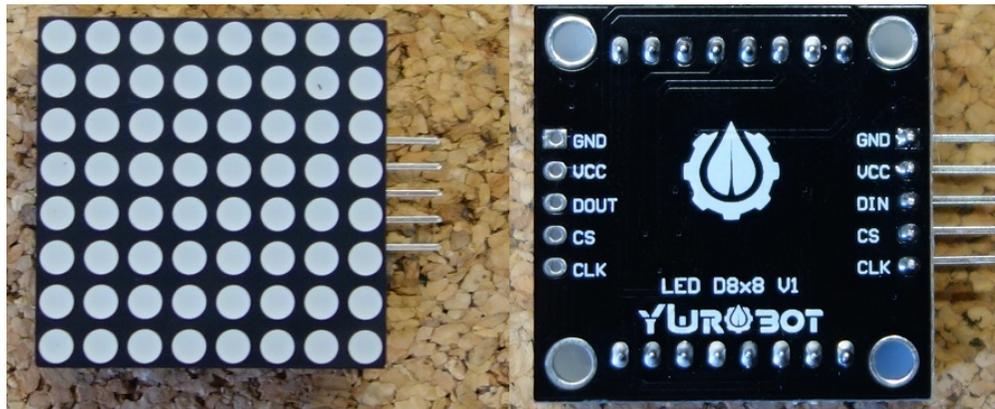
# Guide for 8×8 Dot Matrix MAX7219 with Arduino + Pong Game

The dot matrix that we're going to use in this guide is a 8×8 matrix which means that it has 8 columns and 8 rows, so it contains a total of 64 LEDs.



The MAX7219 chip makes it easier to control the dot matrix, by just using 3 digital pins of the Arduino board.

I think the best option is to buy the dot matrix with the MAX7219 chip as a module, it will simplify the wiring. You can check the [dot matrix at Maker Advisor](#) and find the best price.



You can control more than one matrix at a time. For that you just need to connect them to each other, as they have pins in both sides to extend the dot matrix.

## Parts required

For this guide you'll need:

- [1x 8×8 Dot Matrix with MAX7219](#)
- [Arduino UNO](#) – read [Best Arduino Starter Kits](#)
- [1x 1k ohm Potentiometer](#)
- [Jumper wires](#)

You can use the preceding links or go directly to [MakerAdvisor.com/tools](https://makeradvisor.com/tools) to find all the parts for your projects at the best price!





You only need to connect 5 pins from the dot matrix to your Arduino board. The wiring is pretty straightforward:

Dot matrix pin	Wiring to Arduino Uno
GND	GND
VCC	5V
DIN	Digital pin
CS	Digital pin
CLK	Digital pin

## How to control the dot matrix with Arduino

For making it easier to control the dot matrix, you need to download and install in your Arduino IDE the LedControl library. To install the library follow these steps:

1. [Click here to download the LedControl library](#). You should have a .zip folder in your Downloads
2. Unzip the .zip folder and you should get **LedControl-master** folder
3. Rename your folder from **LedControl-master** to **LedControl**
4. Move the **LedControl** folder to your Arduino IDE installation **libraries** folder
5. Finally, re-open your Arduino IDE

## Using the LedControl library functions

The easiest way to display something on the dot matrix is by using the functions `setLed()`, `setRow()` or `setColumn()`. These functions allow you to control one single led, one row or one column at a time.

Here's the parameters for each function:

### ***setLed(addr, row, col, state)***

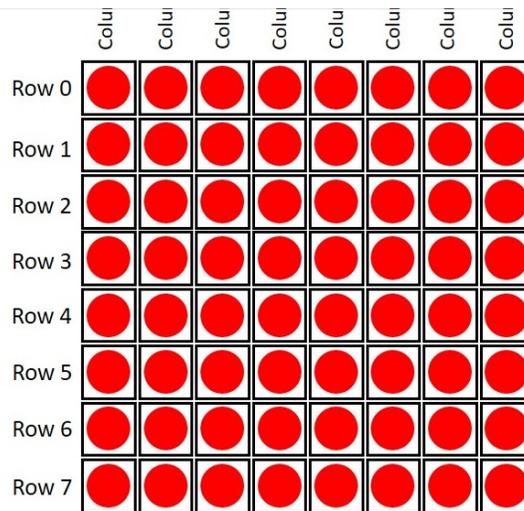
- **addr** is the address of your matrix, for example, if you have just 1 matrix, the int addr will be zero.
- **row** is the row where the led is located
- **col** is the column where the led is located
- **state**
  - It's true or 1 if you want to turn the led on
  - It's false or 0 if you want to switch it off

### ***setRow(addr, row, value)***

### ***setCol(addr, column, value)***

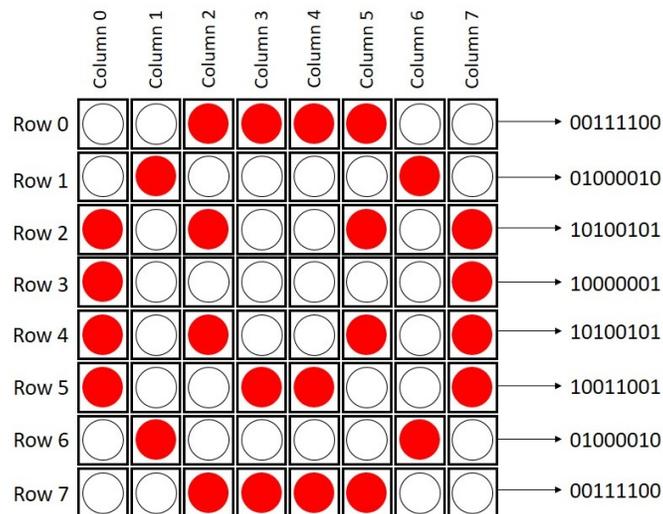
## Index

As previously stated, this matrix has 8 columns and 8 rows. Each one is indexed from 0 to 7. Here's a figure for better understanding:



If you want to display something in the matrix, you just need to know if in a determined row or column, the LEDs that are on or off.

For example, if you want to display a happy face, here's what you need to do:



## Code

Here's a simple sketch that displays three types of faces: a sad face, a neutral face and a happy face. Upload the following code to your board:

```

/*
  Created by Rui Santos

  All the resources for this project:
  https://randomnerdtutorials.com/
  */

#include "LedControl.h"
#include "binary.h"

/*
  DIN connects to pin 12
  CLK connects to pin 11

```



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```
LedControl lc=LedControl(12,11,10,1);
```

```
// delay time between faces
unsigned long delaytime=1000;
```

```
// happy face
```

```
byte hf[8]= {B00111100,B01000010,B10100101,B10000001,B10100101,B10011001,B01000010,B00111100};
```

```
// neutral face
```

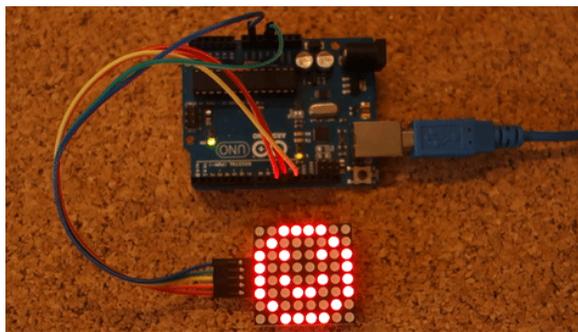
```
byte nf[8]={B00111100, B01000010,B10100101,B10000001,B10111101,B10000001,B01000010,B00111100};
```

```
// sad face
```

```
byte sf[8]= {B00111100,B01000010,B10100101,B10000001,B10011001,B10100101,B01000010,B00111100};
```

[View raw code](#)

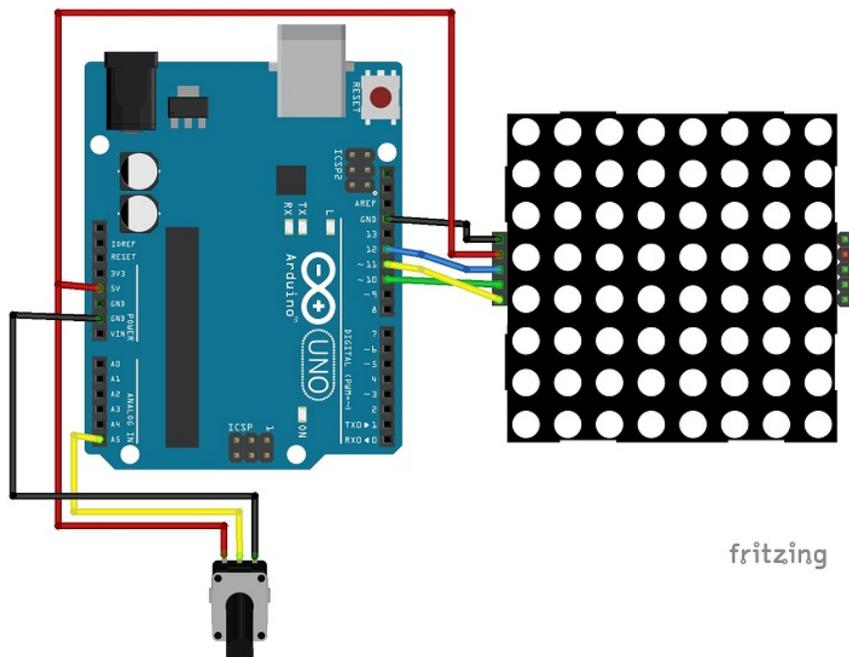
In the end, you'll have something like this:



## Pong Game

The pong game that you're about to try was created by [Alessandro Pasotti](#).

For the pong game, you just need to add a 1k ohm potentiometer to the previous schematic. Assemble the new circuit as shown below:



## Code

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```
/*
 * Play pong on an 8x8 matrix - project from itopen.it
 */

#include "LedControl.h"
#include "Timer.h"

#define POTPIN A5 // Potentiometer
#define PADSIZ 3
#define BALL_DELAY 200
#define GAME_DELAY 10
#define BOUNCE_VERTICAL 1
#define BOUNCE_HORIZONTAL -1
#define NEW_GAME_ANIMATION_SPEED 50
#define HIT_NONE 0
#define HIT_CENTER 1
#define HIT_LEFT 2
#define HIT_RIGHT 3

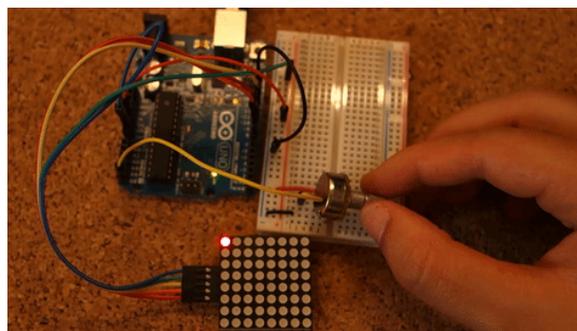
// #define DEBUG 1

byte sad[] = {
  B00000000,
  B01000100,
  B00010000,
  B00010000,
  B00000000,
  -----
}
```

[View raw code](#)

## Demonstration

Here's the final demonstration of me playing the pong game. Have fun!



## Wrapping up

Have you ever used the dot matrix in your Arduino Projects?

Let me know by leaving a comment below.

If you like this post probably you might like my next ones ([click here to subscribe my blog](#)). Thanks for reading,

Rui

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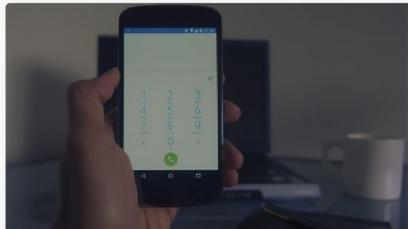
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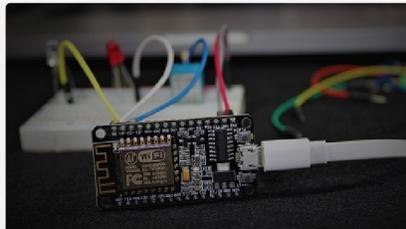
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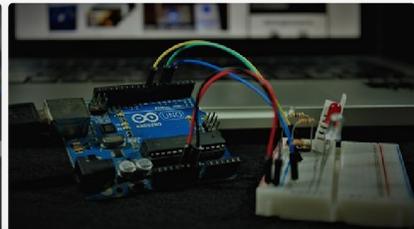
## Recommended Resources



[Build a Home Automation System from Scratch »](#) With Raspberry Pi, ESP8266, Arduino, and Node-RED.



[Home Automation using ESP8266 eBook and video course »](#) Build IoT and home automation projects.



[Arduino Step-by-Step Projects »](#) Build 25 Arduino projects with our course, even with no prior experience!

## What to Read Next...

[Flash/Upload MicroPython Firmware to ESP32 and ESP8266](#)

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[ESP32 Send Emails using an SMTP Server: HTML, Text, and Attachments \(Arduino IDE\)](#)

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## 44 thoughts on “Guide for 8×8 Dot Matrix MAX7219 with Arduino + Pong Game”



**Roger**

July 28, 2016 at 5:50 am

GREAT JOB ! I will build one 😊  
Thank you very much for sharing !

[Reply](#)



**Rui Santos**

July 28, 2016 at 5:52 am

You're welcome Roger! Thanks for reading,  
Rui

[Reply](#)



**Muhammad Ali**

July 28, 2016 at 8:29 am

awesome project but one thing i wanna mention is that instead of writing binary codes to turn on a specific led i would prefer to define every led by name and declare it as the binary code of that led. this will just make it a little bit user friendly

[Reply](#)



**Rui Santos**

July 29, 2016 at 10:40 am

Yes, that's also a good alternative. Thanks for the suggestion,  
Rui

[Reply](#)

**Robert L. Pendergast**

July 28, 2016 at 11:54 am

Very clear and detailed. Easy to implement for a beginner and fun for more advanced user.

[Reply](#)**Rui Santos**

July 29, 2016 at 10:40 am

Thanks for reading Robert! I'm glad you liked it

[Reply](#)**Víctor Emanuel Pozo Cuevas**

July 29, 2016 at 5:03 am

thank you!!!! master!!

[Reply](#)**Rui Santos**

July 29, 2016 at 10:39 am

Thanks for reading!

[Reply](#)**Steve Tripoli**

July 30, 2016 at 9:03 pm

Hello, I copied the code for the 8x8 LED game, but I keep getting this error. Any ideas why?  
Error compiling for board Arduino/Genuino Uno.

I also copied it to Codebender and I get 1 sketch error and 2 library errors, can you help?

[Reply](#)**Targui**

September 18, 2016 at 11:48 am

[github.com/JChristensen/Timer](https://github.com/JChristensen/Timer)

[Free eBooks](#)[About](#)[Contact](#)[Courses Login](#)[Get Courses](#) ▾[Reply](#)**Shehu Bello**

October 1, 2016 at 12:32 am

what a wonderful job! I have been searching for guide on how to control led matrix using Arduino but this is the best guide I have ever have.  
Thanks

[Reply](#)**Rui Santos**

October 2, 2016 at 11:25 am

You're welcome!  
Rui

[Reply](#)**Marc**

December 14, 2016 at 5:07 pm

I love those 8x8's 😊

[Reply](#)**Debayan Sarkar**

December 22, 2016 at 8:43 am

Hello sir .... I am an engineering 1st year student and I love to read about Arduino from your tutorials . They are so simple and well written....I just did the pong game on the led matrix module and it worked fine .... Can u post the code for the space invaders game using ledcontrol library .. I could surprise all my friends then

[Reply](#)**Rui Santos**

December 22, 2016 at 11:54 am

Thanks for the request, but right now I need to finish other projects.

I'm glad you found this tutorial useful.

Have a great day,  
Rui

**Stein Charlier**

January 3, 2017 at 12:53 pm

I'm very new to arduino's, but when I try to compile it can not find the Timer.h library, where can I find this one?  
The first one worked really good.

[Reply](#)**Rui Santos**

January 9, 2017 at 5:38 pm

Simply search for the Arduino Timer library: [playground.arduino.cc/Code/Timer](https://playground.arduino.cc/Code/Timer)

[Reply](#)**Stein Charlier**

January 16, 2017 at 1:12 pm

Could you make a tutorial for an 8x8 Dot Matrix without MAX7219?

[Reply](#)**Yan**

February 22, 2018 at 4:23 pm

Hello sir;  
Pls,  
give me a library file called ' binary.h ' file.  
I need only this file(binary.h).  
and I am learning in holeNight.  
thanks sir.

[Reply](#)**Rui Santos**

March 14, 2018 at 6:13 pm

I don't know what you're talking about.  
The library that I show in this blog post should have everything that you need to use the Dot Matrix.  
Regards,  
Rui

[Reply](#)

**sudheer**

April 17, 2018 at 9:19 am

very good for learning

[Reply](#)**Sara Santos**

April 17, 2018 at 5:03 pm

Thanks 😊

[Reply](#)**Meh.**

May 3, 2018 at 12:23 pm

Would love it if ppl cared to really comment their codes if they share them for newbies to learn 😊  
Pro coders wont probably be interested in checking at all how someone coded a pong.  
Newbies wont benefit much if the comments are like "Check stuff" and then theres tens of lines of code..

[Reply](#)**Sara Santos**

May 13, 2018 at 10:15 am

Hi. I'm sorry for the trouble.  
The pong game was adapted from itopen.it website. So, that's why it is not commented as we usually do in our codes.

[Reply](#)**Inês Pires**

May 10, 2018 at 9:22 am

We in class unloaded your program and went looking for libraries, finding everything that is now the arduino in function ball\_timer = timer.every (BALL\_DELAY, moveBall); You do not have to worry about what's wrong with "moveBall". Do you know why or can you help ???  
P:S se fores português, fala em pt, thanks

[Reply](#)**Sara Santos**

May 13, 2018 at 9:55 am

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O código do jogo não foi criado por nós. Foi adaptado do site itopen.it, como dizemos no código.

Dá uma olhada no site deles e vê se encontras algo que te possa ajudar.

[Reply](#)**S1999**

July 12, 2018 at 2:23 pm

Hi I tried uploading ,all the leds in the matrix glow at once and nothing happens.Is there a different way of doing it.Is there a difference between common cathode and common anode?

Thanks.

[Reply](#)**Rui Santos**

July 13, 2018 at 3:02 pm

With these exact Matrix modules with MAX7219 chip, it should work regardless of being common cathode/anode. I'm not sure why you're experiencing that problem, because I never encountered that issue.

Regards,  
Rui

[Reply](#)**Moe**

January 13, 2019 at 8:48 am

You probably connected the wires for the DIN CS CLK incorrectly. Found this out while I was working on it and all the LED lit up too

[Reply](#)**Jones**

August 1, 2018 at 3:49 pm

Awesome and easy one.can i make the 32\*32 with this design.and what will be change in code

[Reply](#)**Rui Santos**

August 4, 2018 at 4:16 pm

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January 3, 2019 at 7:05 pm

It gave me an error when I uploaded it. It was saying "no matching function for call to 'Timer::every(int, void (&()))'"

[Reply](#)**Sara Santos**

January 7, 2019 at 11:29 pm

Hi Caleb.

Can you install the following library and see if it works?

<https://github.com/JChristensen/Timer>

Regards,

Sara

[Reply](#)**JJ**

May 9, 2020 at 11:21 pm

The problem seems to be with a newer version of the timer library. The older version you linked works fine though!

[Reply](#)**ddarende**

January 8, 2019 at 3:55 pm

Thank you very much

[Reply](#)**HERB**

June 15, 2019 at 1:37 am

Great job, Very clear and easy to understand. Your code explanation was also great. I have learned a lot from this page. THANK YOU

[Reply](#)



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**Sara Santos**

June 17, 2019 at 10:39 pm

Thank you 😊

[Reply](#)



**Richard Whitehead**

September 26, 2019 at 12:55 pm

Thanks a lot Sara and Rui,

Used the first bit in an university engineering task (this site was referenced). Would have loved to include the pong game as well, but we were being marked on size of the program.

Really made my life a lot easier

[Reply](#)



**HERB**

January 2, 2020 at 2:53 am

Great info, have it running with my Arduino, can I transfer to a "ATTINY85" with same code??.

[Reply](#)



**Sujoy Ghosh**

February 21, 2020 at 6:07 pm

Thanks a lot! Rui Santos... Your

website has really helped me.... Especially while learning about esp32. Keep spreading knowledge like this... Love from India ♥

[Reply](#)



**Sara Santos**

February 22, 2020 at 12:27 pm

Thanks 😊

[Reply](#)



August 18, 2020 at 7:36 am

Hi! When I plugged the matrix, my Arduino can't turn on. Any workaround?

[Reply](#)



**Eberhard Kuehne**

October 14, 2020 at 1:34 pm

Hi! I added the ability to make an ton, when the ball touch the wall.  
It works fine.  
I can send the code.

[Reply](#)



**Mike**

March 2, 2022 at 5:06 pm

Hi, This is great ! I connected it and it works just fine. However I have four of them connected. I can address only the first one. how do i work with 4 of them? Thank you!

[Reply](#)

## Leave a Comment

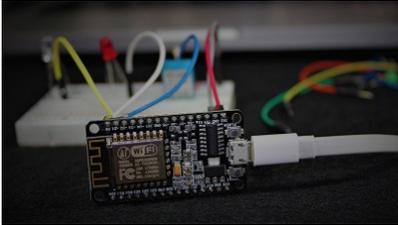
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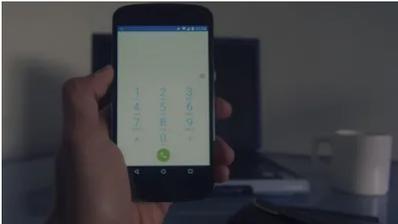
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