

تطبيقات ميكاترونك -1-

Lecture No. 1

General Introduction to the Course
SCH PCB By Eagle 1

روبوت و أنظمة ذكية - سنة ثالثة

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الاختبارات وتوزيع الدرجات وطريقة التقييم

النظري: 50 العملي: 50

%15	اختبار تحريري 1 في الأسبوع السابع
%15	اختبار حاسوبي 2 في الأسبوع الثاني عشر
%20	مشروع تطبيقي بحثي يتضمن عرض تقديمي أمام لجنة حكم في الأسبوع الرابع عشر
%50	امتحان نهائي كتابي

تحتاج للتجريب والتدريب والدراسة بشكل ذاتي منزلي وخلال الجلسات.

الموضوعات الرئيسة التي يغطيها المقرر
القسم الأول
مفردات التي سيعطيها الدكتور فادي

- برامج التصميم الإلكتروني Eagle and Altium Designer.
- المقاطعات والتحكم PID بمحرك تيار مستمر وبدرجة الحرارة
- التايمرات في المتحكمات وتوظيفها
- قيادة روبوت على عجلات تخطيط مسار وتحكم حركة
- ROS2

- منافسة بين روبوتين للوصول إلى آخر المسار
- توزيع النقاط على التصميم وعلى التنفيذ والبرمجة وإنجاز المهام.
- استخدام تقنيات حساسات مركبة على روبوت تفاضلي بعجلات عادية للتعرف على بيئة مجهولة نسبيا.
- الروبوت مقيد بالمشي على مسار مرسوم (خط أسود)
- البيئة عبارة عن حلبة تحوي عوائق تكون موضوع بجانب أو على الخط الأسود بحيث تعيق حركة الروبوت
- العوائق عبارة عن علبة كرتونية لا يجب أن يصطدم الروبوت بها.
- عندما يصادف الروبوت عائق عليه العودة إلى تقاطع ليحرب مسار آخر حتى الوصول للأخير
- يجب على الروبوت تجاوز شرط فجائي معين.

الغاية من هذه المحاضرة:

تعليم استخدام برنامج EAGLE لتصميم دارة الكترونية مطبوعة.

• تعلم Schematic

• تعلم PCB

• قواعد التصميم الإلكتروني

• فحص الأخطاء

الغاية النهائية تصميم دارة المشروع لمادة تطبيقات 1 باستخدام هذا البرنامج.

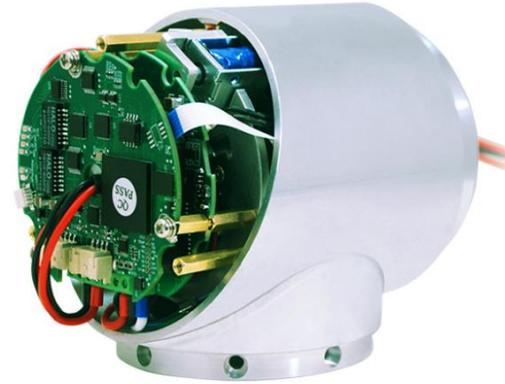
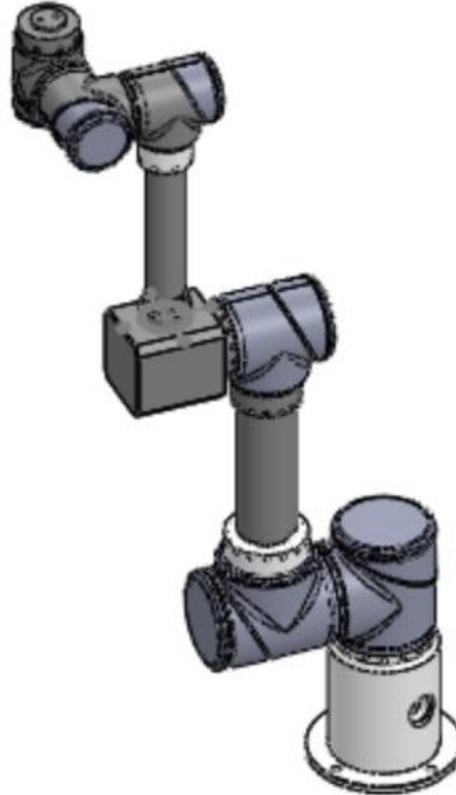
PCB Technology

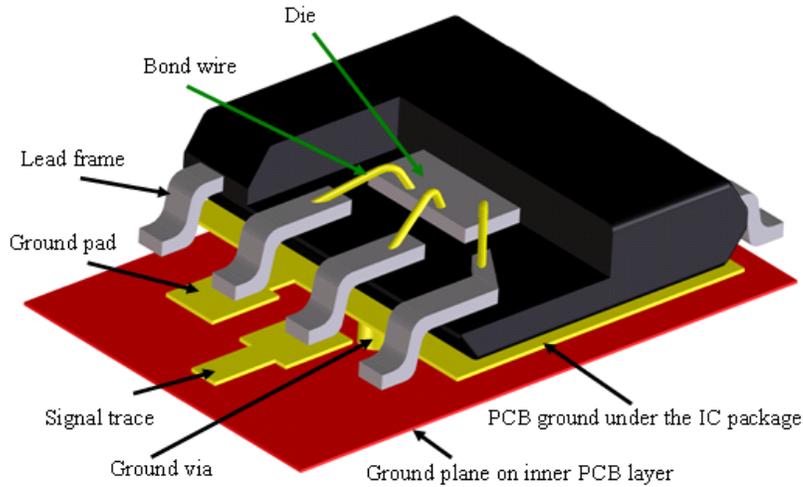
PCB Assembly services are a fundamental part of the manufacturing of electronic devices to ensure their utility and competence.

A PCB is an electronic part used to assemble electrical components into various machines and hardware.

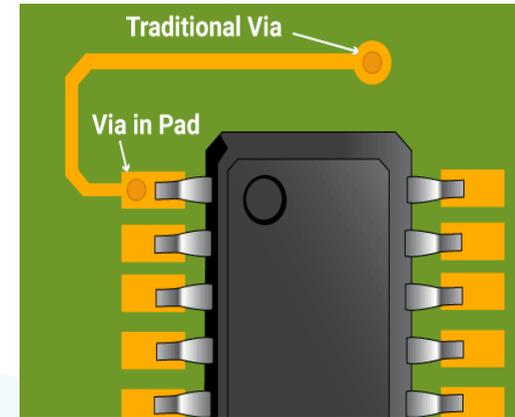
These machines are commonly found in the advanced gadgets on which we are vigorously reliant today, like Television, Drivers, motors, Games, PCs, phones, and laptops.

- **Low Cost Overall With PCB Assembly**
- **Human Error Is Reduced**
- **Product Development Cycle Has Been Reduced**
- **Reliable Quality**
- **Fit For Mass Production** الانتاج الشامل

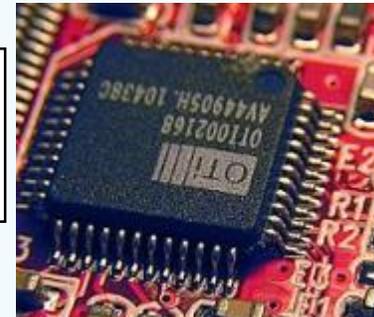




1. In electronics, a **lead** is an electrical connection consisting of a length of wire or a metal pad.
2. A **die**, in the context of integrated circuits, is a small block of semiconducting material on which a given functional circuit is fabricated.
3. **Black plastic housing.**

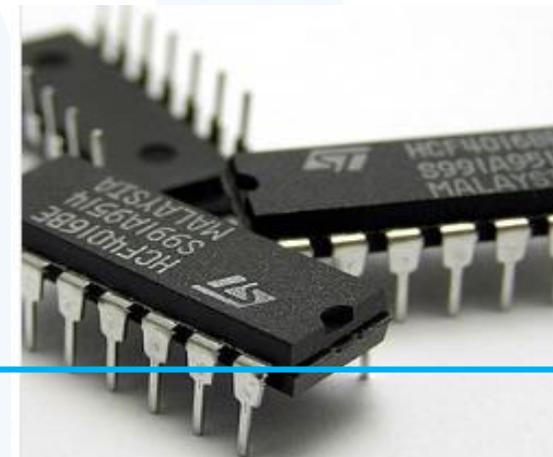


1. **Surface-mount technology (SMT)** is a method in which the electrical components are mounted directly onto the surface of a printed circuit board (PCB). An electrical component mounted in this manner is referred to as a **surface-mount device (SMD)**. In industry, this approach has largely replaced the through-hole technology



2. **Through-hole technology** (also spelled "**thru-hole**"), refers to the mounting scheme used for electronic components that involves the use of **leads** on the components that are inserted into **holes** drilled in **printed circuit boards (PCB)** and **soldered** to **pads** on the opposite side either by manual assembly (**hand placement**) or by the use of **automated insertion mount machines**.

In microelectronics, a **dual in-line package (DIP or DIL)**, is an **electronic component package** with a **rectangular housing** and **two parallel rows of electrical connecting pins**. The package may be **through-hole mounted** to a printed circuit board (PCB) or inserted in a socket.

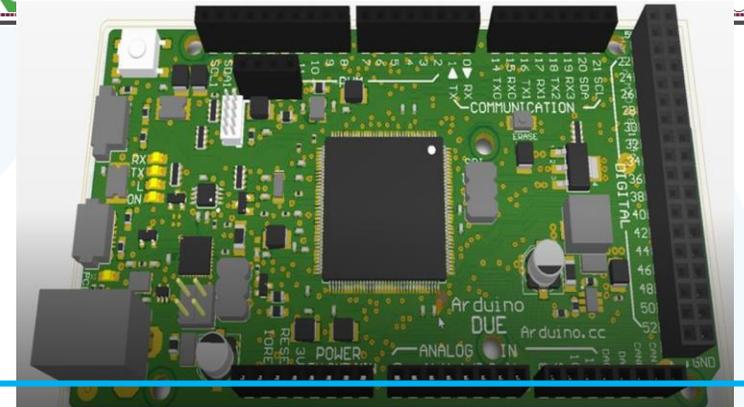
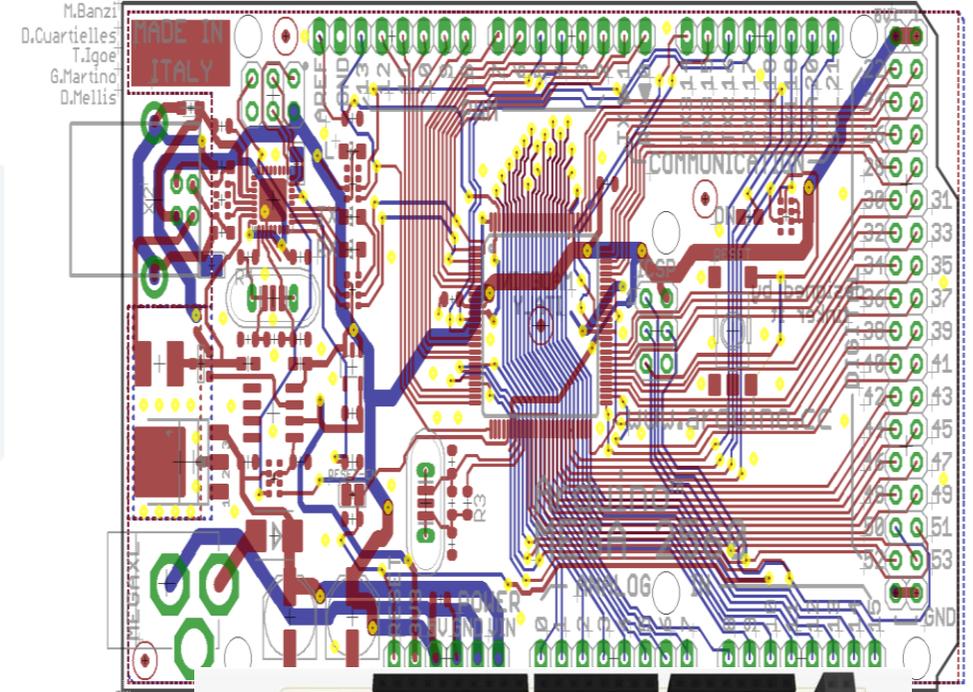
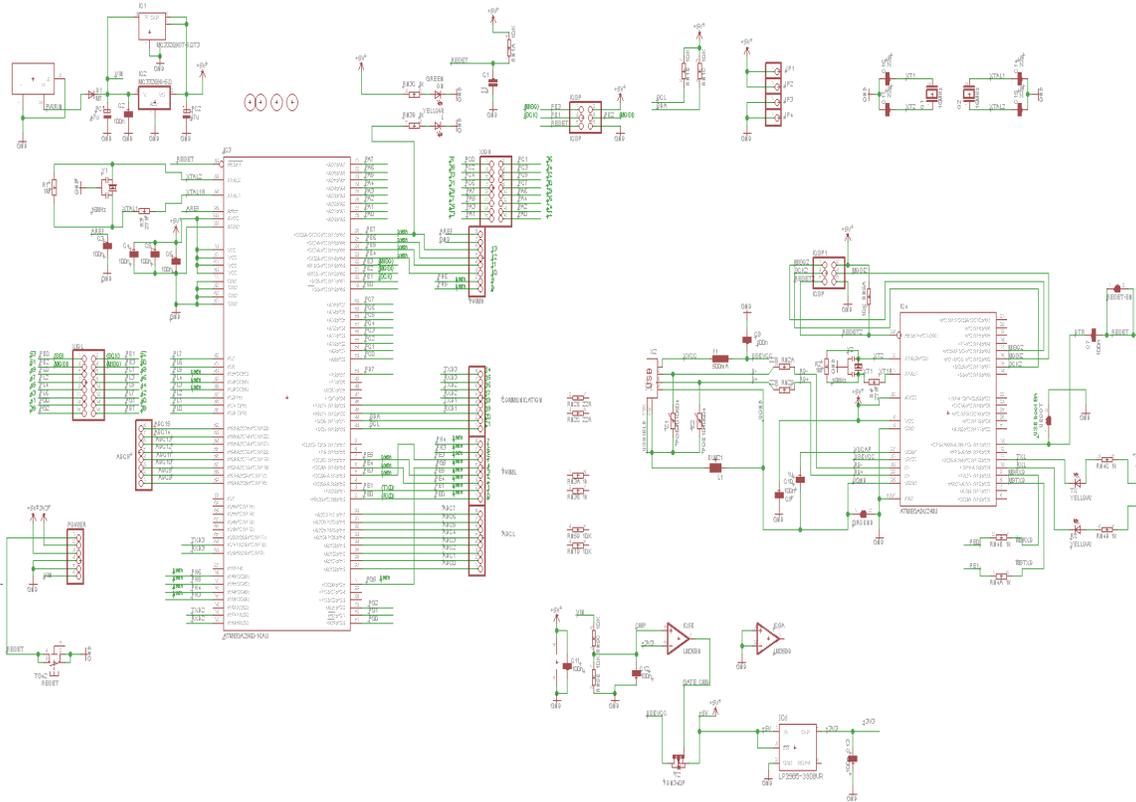


What is SCH and PCB?

- SCH file is an electronic circuit's schematic created with electronics design/simulation programs.
- PCB (printed circuit board)

Arduino Mega 2560 Reference Design

Reference design and PCB files provided with this kit. These files include all layers and components. Components are not included in this kit. They are available for purchase from the manufacturer. The reference design is provided for informational purposes only. It is not intended to be used as a basis for a commercial product. The manufacturer is not responsible for any damage or loss resulting from the use of this reference design. The manufacturer is not responsible for any damage or loss resulting from the use of this reference design.



Different SCH-PCB CAD software

Altium

Altium Designer:

single, unified application that incorporates **all the technologies and capabilities necessary for electronic product development.**

Altium Designer integrates within a single design environment:

- board- and FPGA-level system design,
- embedded software development,
- PCB layout, editing and manufacturing

Autodesk

EAGLE

The name EAGLE is an acronym, which stands for: **Easily Applicable Graphical Layout Editor.**

The program consists of three main modules: **Layout Editor, Schematic Editor, and Autorouter,** which are embedded in a single user interface.

Fusion 360

Fusion 360, in addition to EAGLE's capabilities within its Electronics Workspace, unifies tools for MCAD **mechanical computer aided design, true 3D modelling,** collaboration, documentation, **simulation** and **manufacturing,** all in one application built from the ground up.

Proteus

simulator

Design Schematic
printed circuit
board (PCB)
editor

Kicad

KiCad EDA
A Cross Platform and
Open Source
Electronics Design
Automation Suite

OrCAD

**mixed-signal
simulator**
Design
Schematic
printed circuit
board (PCB)
editor.

Altium

Australian multinational software company



The screenshot shows a web browser window with the URL altium.com/circuitmaker/download/b. The browser's address bar and tabs are visible. The website's navigation bar includes the Altium logo, a 'PCB Design' dropdown menu, and a 'Solutions' dropdown menu. The 'PCB Design' menu is open, displaying three options: 'Altium Designer' (World's Most Popular PCB Design Software), 'CircuitStudio' (Entry Level, Professional PCB Design Tool), and 'CircuitMaker' (Free PCB design for makers, open source and non-profits). A large orange banner on the left side of the page features the text 'Powerful Free EC with Online Co...' and 'with Online Co...'. Two blue arrows point from the 'Altium Designer' and 'CircuitMaker' menu items to the banner.

Autodesk, Inc. is an American multinational software corporation



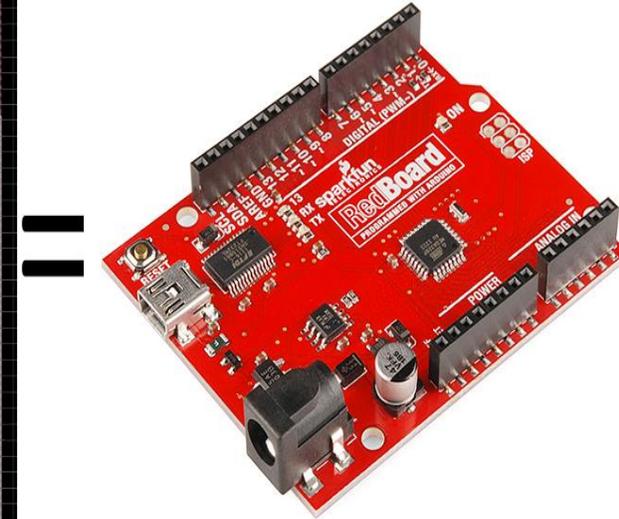
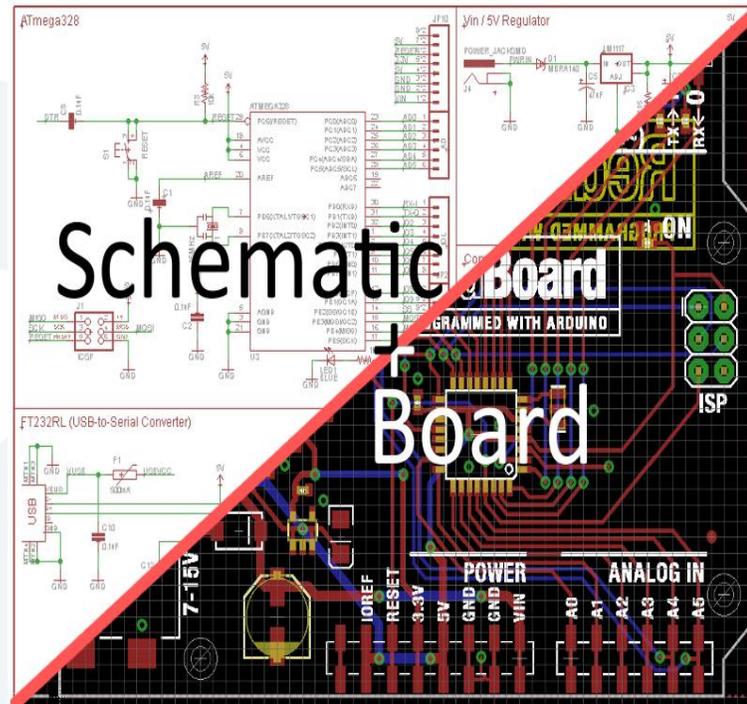
The screenshot shows the Autodesk website interface. At the top, there is a navigation bar with the Autodesk logo and a search bar. Below the navigation bar, there are three main product categories: Architecture, Engineering & Construction; Product Design & Manufacturing; and Media & Entertainment. Each category has a corresponding icon and a brief description. Below each category, there is a list of top products. Blue arrows point to the first two products in each list: Revit and AutoCAD in the first list; Inventor and AutoCAD in the second list; and 3ds Max and Maya in the third list. At the bottom of the page, there is a 'View all products' button with a right-pointing arrow. On the right side of the page, there are several links and buttons: 'Start a trial', 'Download your software', 'Download file viewers', 'Discover', 'Industry solutions', 'Educational access', 'How to buy', 'Choose your plan', 'Buying with Autodesk', 'Special offers', and 'Purchase by phone 000-800-040-2543 (TATA Toll Free)'.

Why EAGLE?

EAGLE is one of many PCB CAD softwares out there.

1. **Cross-platform** -- EAGLE can run on anything: Windows, Mac, even Linux.
2. **Lightweight** -- It requires anywhere from 50-200MB of disk space (compared to the 10+GB more advanced tools might require). The installer is about 25MB. So you can go from download to install to making a PCB in minutes.
3. **Free/Low-Cost** -- The freeware version of EAGLE provides enough utility to design almost any PCB in the SparkFun catalog.
4. **Community support**

Whether you want to study the design of an Arduino board or import a popular sensor into your design, somebody has probably already made it in EAGLE and shared it.



Exploring the Control Panel



The first time you open up EAGLE, you should be presented with the **Control Panel** view. The Control Panel is the "homebase" for Eagle, it links together all of the other modules in the software.

E Control Panel

File View Options Window Help

Name	Description
▶ Libraries	
▶ Design Blocks	
▶ Design Rules	
▶ User Language Programs	
▶ Scripts	
▶ CAM Jobs	
▶ SPICE Models	
▶ Projects	

Home Preview

Essa Alghannam

F Fusion 360

Integrated CAD, CAM, CAE, and PCB software.

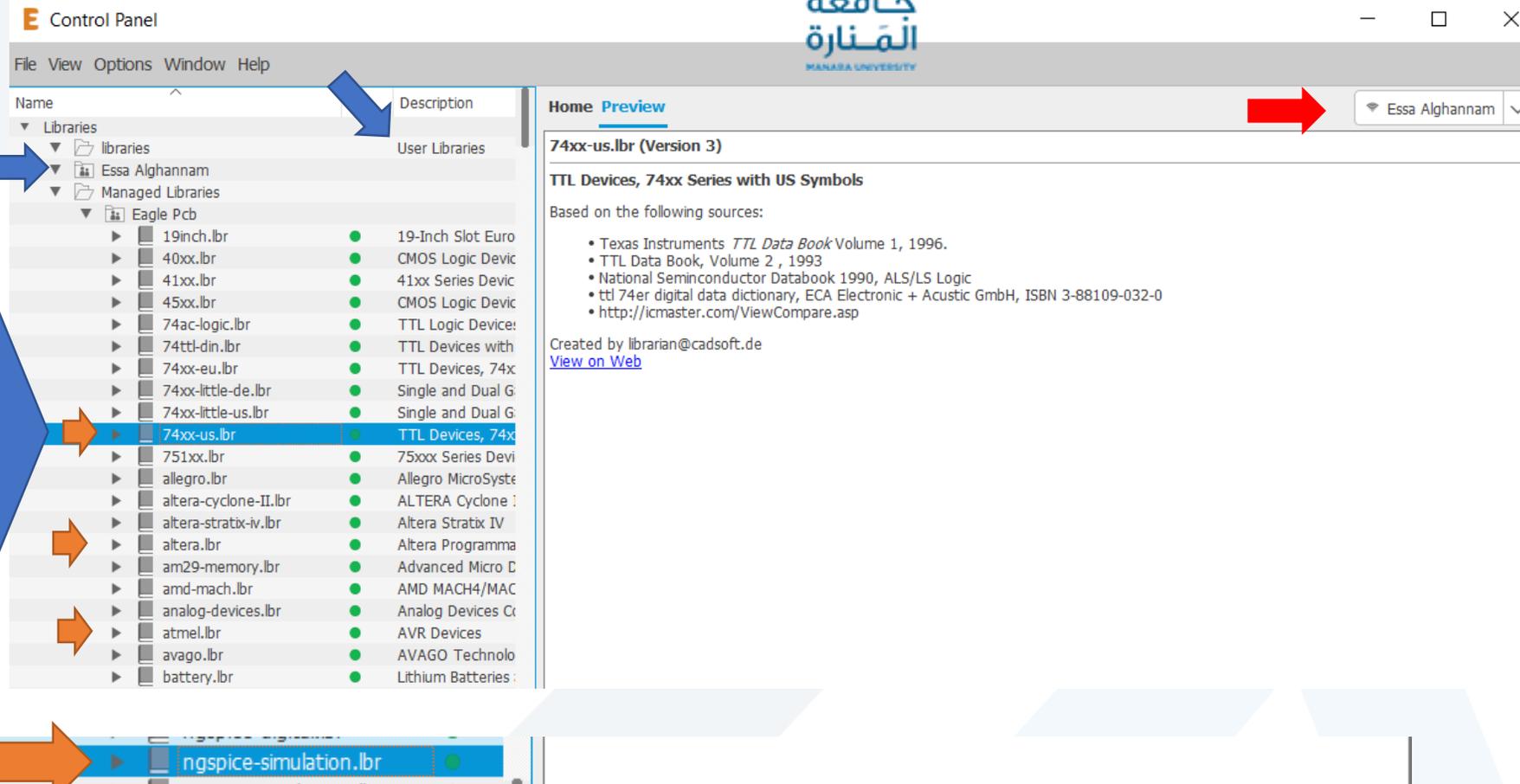
Fusion 360 unifies design, engineering, electronics, and manufacturing into a single software platform.

Fusion 360 works with EAGLE.

DOWNLOAD NOW >

The control panel

You can explore the 8 separate trees in the control panel, which highlight separate functions of the software:

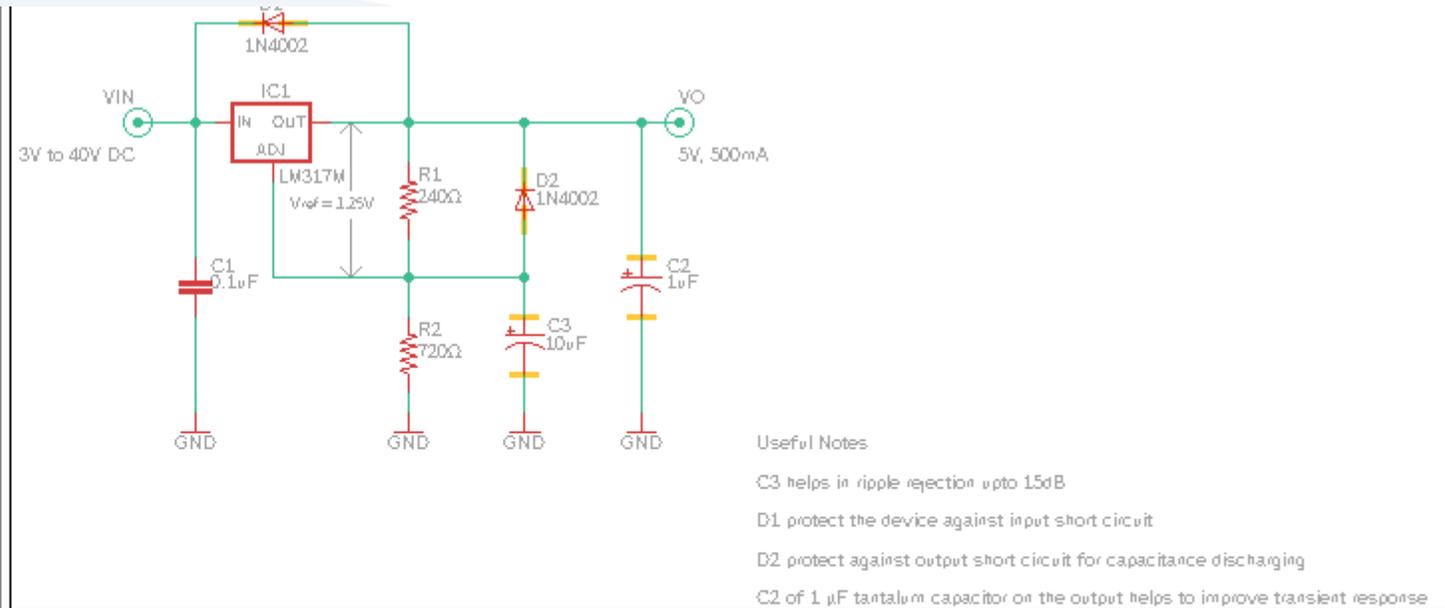


1. **Libraries** -- Libraries store parts, which are a **combination** of schematic symbol and **PCB footprint**.
 - Libraries usually contain a group of related parts,
 - e.g. the **atmel.lbr** stores a good amount of Atmel AVR devices,
 - while the **74xx-us.lbr** library has just about every TTL 74xx series IC.

The control panel

Design Blocks

- design blocks
 - examples
 - Adafruit
 - Nordic
 - SparkFun
 - Spk_EasyMotorDriver.dbl Contributed by Spa... 5/19/20
 - Spk_ESP32Thing.dbl Contributed by Spa... 5/19/20
 - Spk_HX711_Load_Cell_... Contributed by Spa... 5/19/20
 - Spk_Lilypad.dbl Contributed by Spa... 5/19/20
 - Spk_LiPo_Charger_Basic... Contributed by Spa... 5/19/20
 - Spk_LSM9DS1.dbl Contributed by Spa... 5/19/20
 - Spk_nRF52832_breako... Contributed by Spa... 5/19/20
 - Spk_OpenLog.dbl Contributed by Spa... 5/19/20
 - Spk_VenusGPS.dbl Contributed by Spa... 5/19/20
 - Spk_XBEE_Explorer.dbl Contributed by Spa... 5/19/20
 - Timer
 - USB to UART
 - 2N3904 NPN Transistor.dbl General Purpose NP... 5/19/20
 - 3V3-Voltage-Regulator_LM3... 3-Terminal, 3.3V p... 5/19/20
 - 5V-Voltage-Regulator_LM31... 3-Terminal, 5V posi... 5/19/20**
 - 12V-Voltage-Regulator_LM3... 3-Terminal, 12V po... 5/19/20
 - 24V-Voltage-Regulator_LM3... 3-Terminal, 24V po... 5/19/20
- User Design Blocks
 - Example Design Blo...



Sheet	Size	Description
Sheet 1	7.407 x 3.389 inch	

The control panel

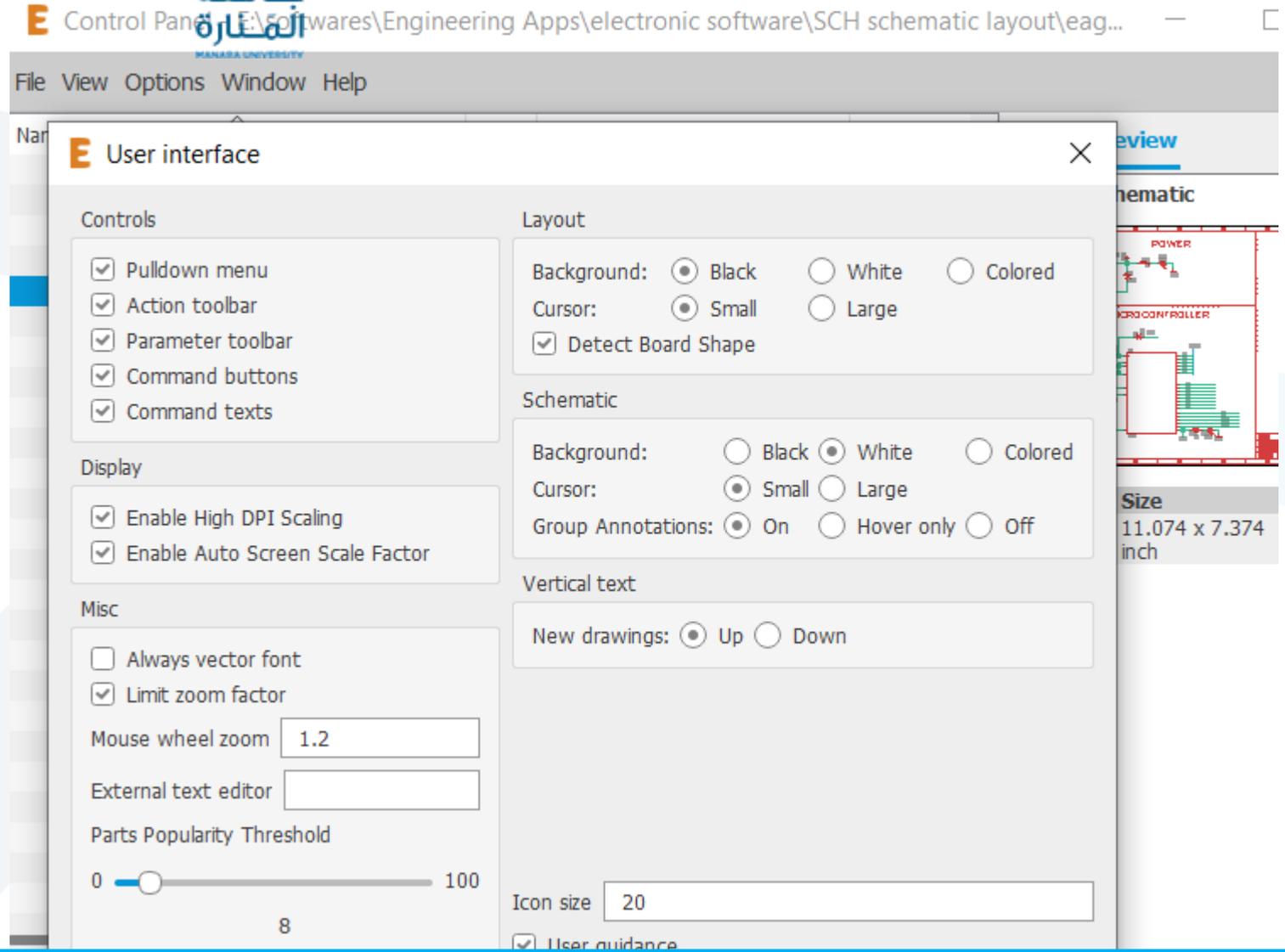
3. **Design Rules (DRU)** -- Design rules are a set of rules your board design must meet before you can send it off to the fab house. In this tree you'll find DRU files, which are a pre-defined set of rules.
4. **User Language Programs (ULPs)** -- ULPs are scripts written in EAGLE's User Language. They can be used to automate processes like generating bill of materials (bom.ulp), or importing a graphic (import-bmp.ulp).
5. **Scripts (SCR)** -- Script files can be used to customize the EAGLE user interface. In one click you can set the color scheme and assign key bindings.
6. **CAM Jobs (CAM)** -- CAM jobs can be opened up by the CAM processor to aid in the creation of gerber files.
7. **Spice models: programming components**
8. **Projects** -- This is where each of your projects are organized into a single project folder. Projects will include schematic, board design, and possibly gerber files.

Setting the Background Color



جامعة
المنارة
MANARA UNIVERSITY

- To change the background color, go up to the "Options" menu and select "User interface".
- Inside the "Layout" box you can set the background to black, white, or a specific color.



E Control Panel



Add new library

Project path

<https://github.com/sparkfun/SparkFun-Eagle-Libraries>

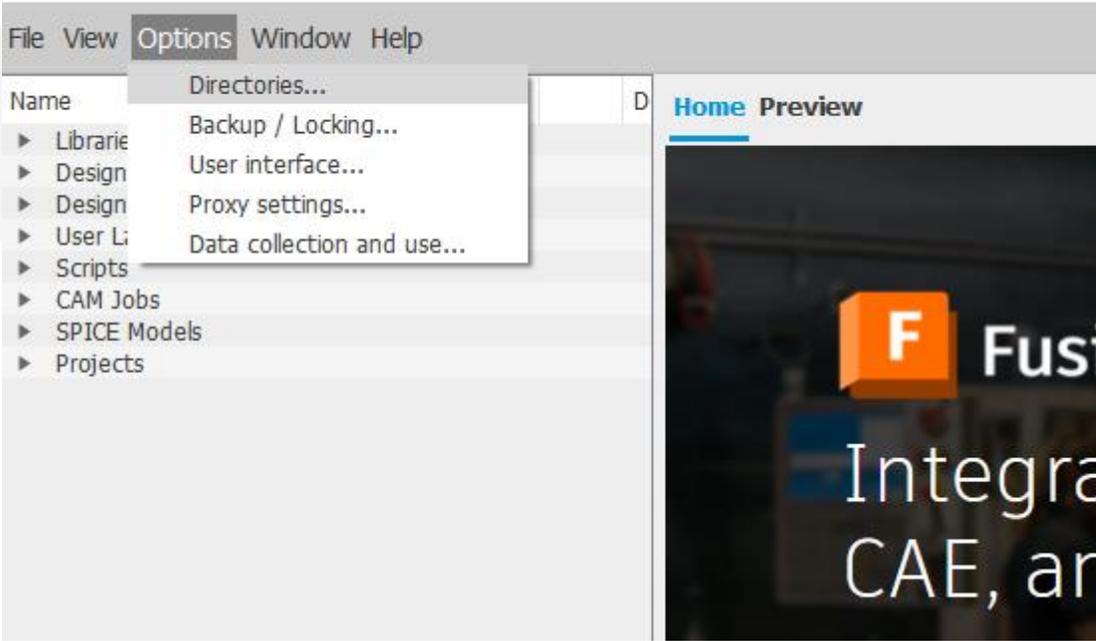
<https://github.com/adafruit/Adafruit-Eagle-Library>

E Control Panel

File View Options Window Help

Name

- Libraries
 - libraries
 - SparkFun-Eagle-Libraries-main
 - Essa Alghannam
 - Managed Libraries
- Design Blocks
- Design Rules
- User Language Programs
- Scripts
- CAM Jobs
- SPICE Models
- Projects



E Directories

Libraries	<code>\$HOME\EAGLE\libraries; E:\softwares\Engineering Apps\electronic software\SCH schematic layout\eagle\0.install\eagle libraries\SparkFun-Eagle-Libraries-main</code>
Design Blocks	<code>\$HOME\EAGLE\design blocks</code>
Design Rules	<code>\$HOME\EAGLE\design rules</code>
User Language Programs	<code>\$HOME\EAGLE\ulps</code>
Scripts	<code>\$HOME\EAGLE\scripts</code>
CAM Jobs	<code>\$HOME\EAGLE\cam</code>

Projects `$HOME\EAGLE\projects; E:\softwares\Engineering Apps\electronic software\SCH schematic layout\eagle\MYexamples`

Simulator Path `$EAGLEDIR\ngspice\bin`

SPICE Models `$HOME\EAGLE\spice`

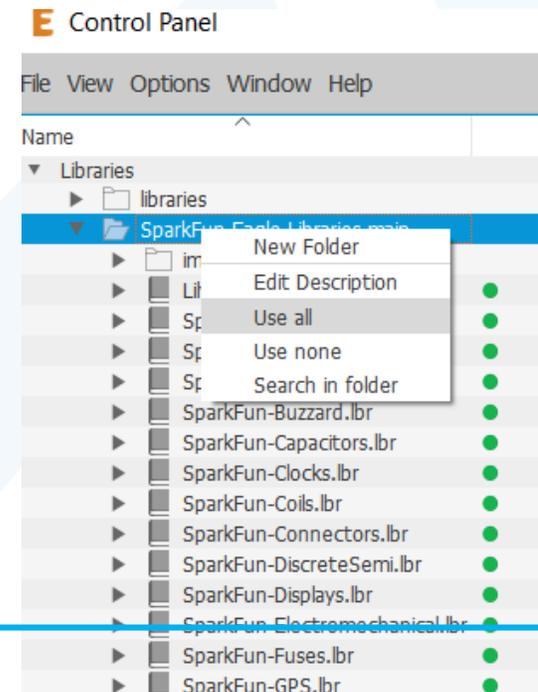
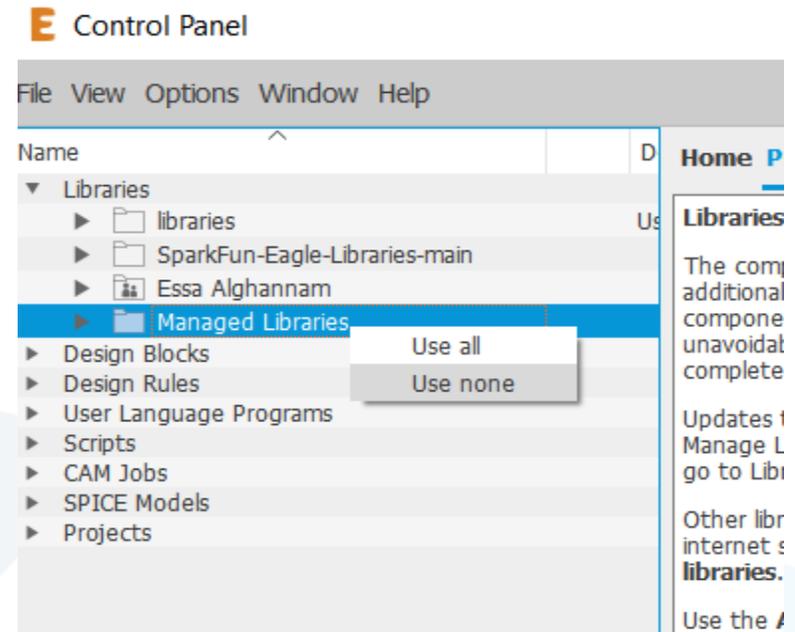
Include EAGLE examples

Using Libraries



- Now, when you go back and look at the "Libraries" tree, there should be two folders included, one of which should be our SparkFun Eagle Libraries.
- The last step is to tell EAGLE that, for now at least, we don't want to use the default libraries. To do this, right click on the "lbr" folder, and select "Use none".

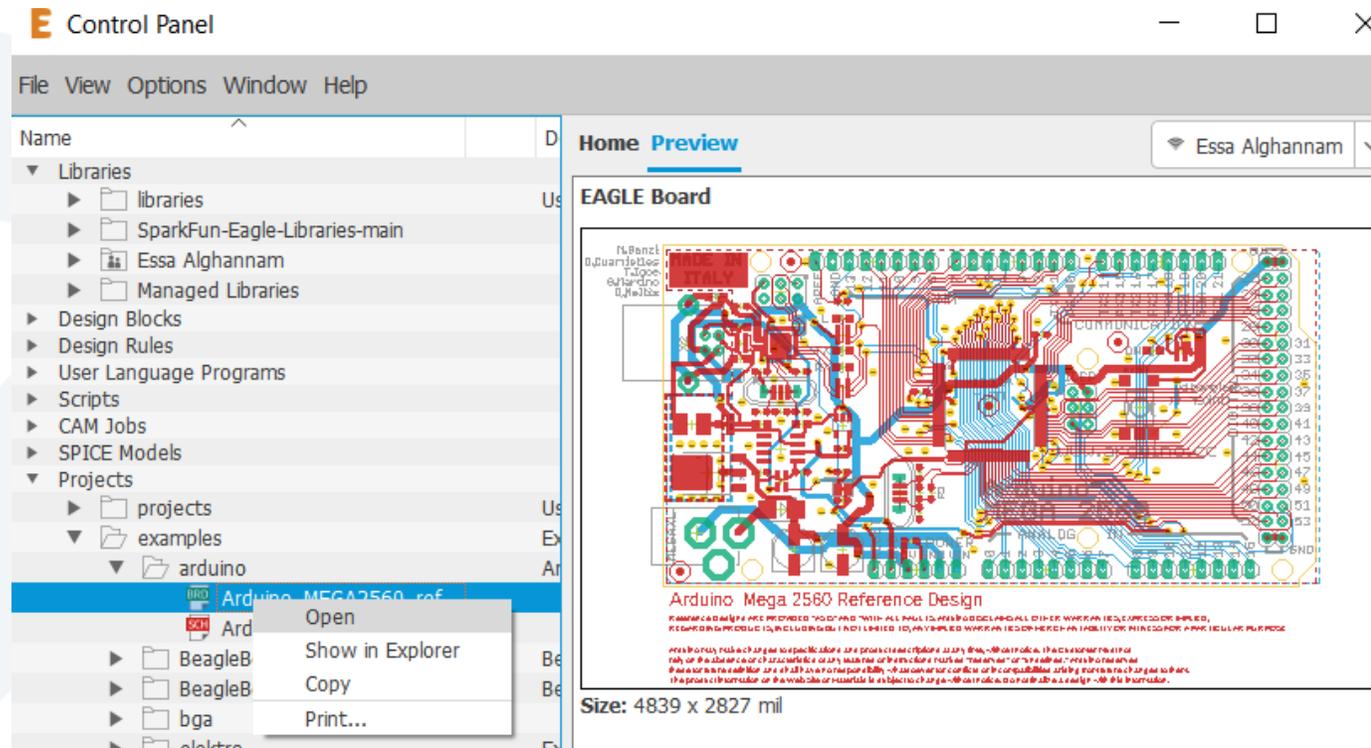
Then, right-click on the "SparkFun-Eagle-Libraries-master" folder, and select "Use all". Then check the libraries in each of the two folders. Next to them should be either a grey or green dot. A green dot next to a library means it's in use, a grey dot means it's not. Your libraries tree should look a little something like this:



Opening a Project and Explore



EAGLE is packaged with a handful of nifty example PCB designs. Open one up by expanding the "Projects" tree. From there, under the "examples" folder open up the "arduino" project by double-clicking the red folder (or right-clicking and selecting "Open project"). Note that, in this view, project folders are red and regular folders are the standard yellow.

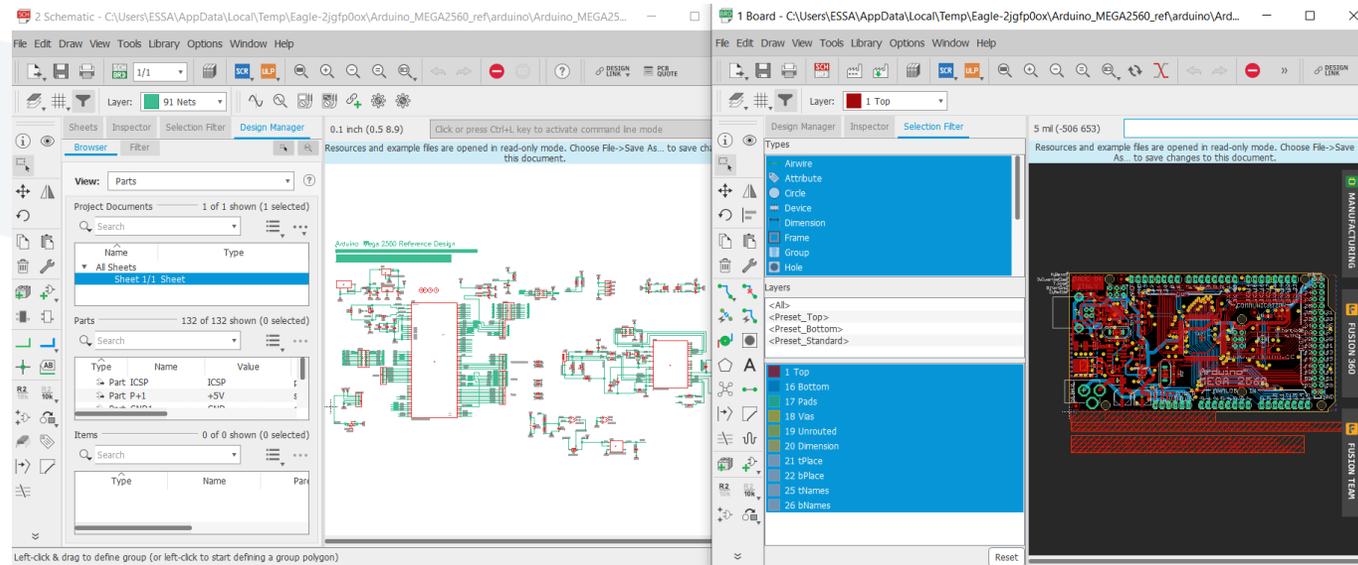


Opening a Project and Explore



Opening the project should cause two more EAGLE windows to spawn: the board and schematic editors. These are the yin and the yang of EAGLE. They should be used together to create the finished product that is a functional PCB design.

Keep Both
Windows Open!



- The **schematic editor** (on the left above) is a collection of red circuit symbols which are interconnected with green nets (or wires).
- A project's schematic is like the comments in a program's code.
- It helps tell the story of what the board design actually does, but it doesn't have much influence on the end product.
- Parts in a schematic aren't precisely measured, they're laid out and connected in a way that's easy to read, to help you and others understand what's going on with the board design.

The **board editor** is where the real magic happens. Here colorful layers overlap and intersect to create a precisely measured PCB design.

Two copper layers -- red on top, blue on the bottom -- are strategically routed to make sure different signals don't intersect and short out.

Yellow circles (on this design, but they're more often green) called "vias" pass a signal from one side to the other.

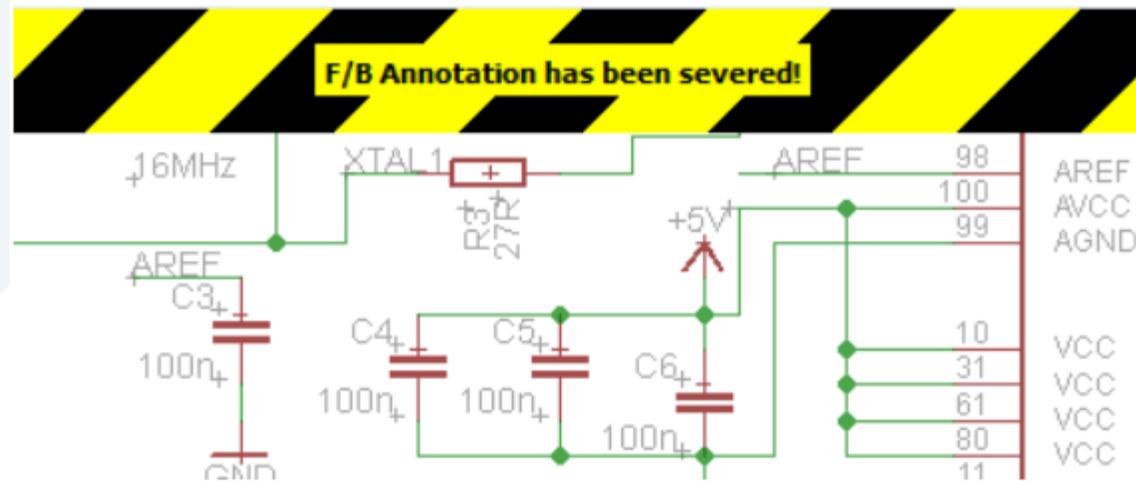
Bigger vias allow for through-hole parts to be inserted and soldered to the board.

Other, currently hidden, layers expose copper so components can be soldered to it.

Opening a Project and Explore

- If the dot is green, everything is groovy. If the dot is magenta, a window's probably closed that shouldn't be.
- Second, and more obvious, if you close either of the two windows a big, huge warning should pop up in the other:

"Switch to board/schematic" icon



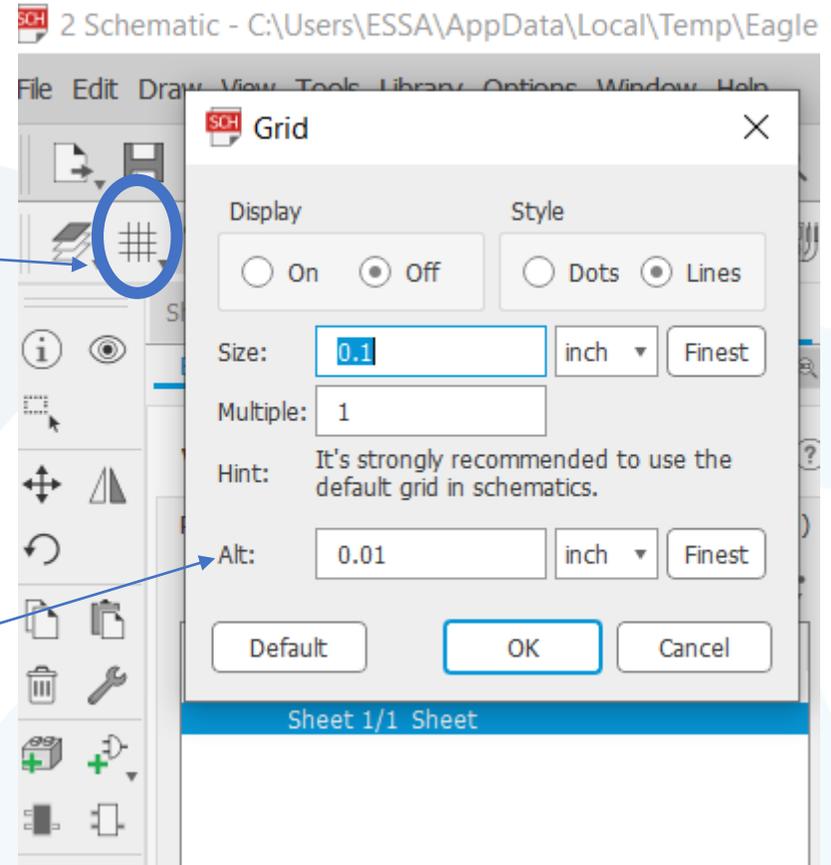
Adjusting the Grid



To turn the grid view on, click the  icon near the top-left corner of the board window (or go to the "View" menu and select "Grid").

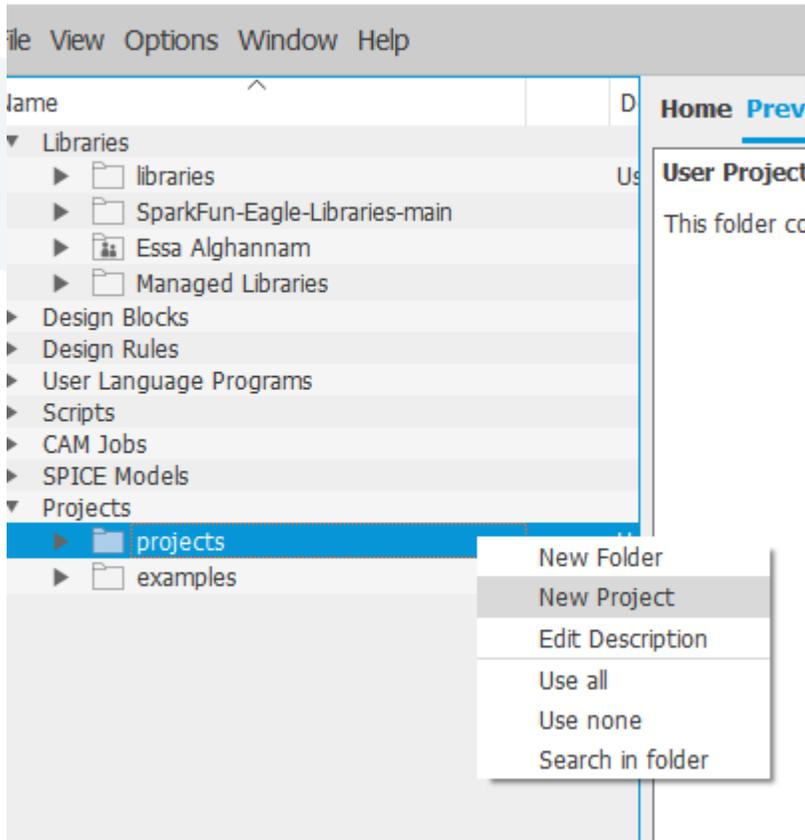
Switch the "Display" radio button over to "On".
We'll also make the grid a bit less fine by setting the "Size" to 100 mil (0.1") and "Alt" to 50 mil (0.05").

Alternate grid أكثر دقة



2.54 mm=0.1 inch=100 mil

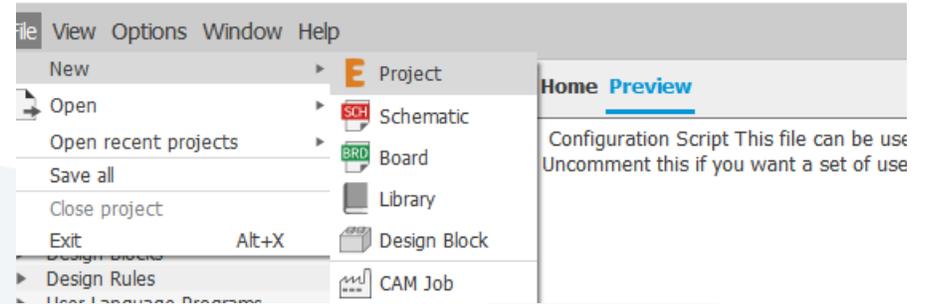
E Control Panel



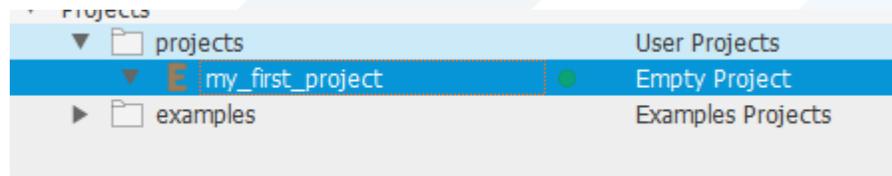
or

Schematic Create a Project

E Control Panel

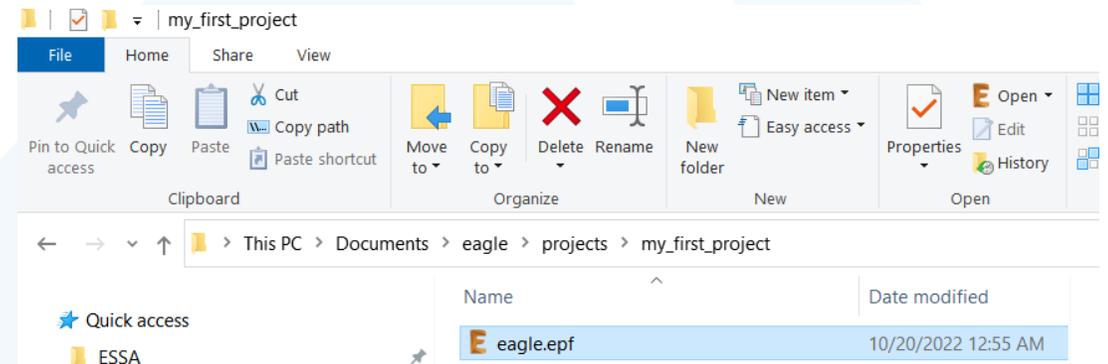


Give the newly created, red project folder a descriptive name. How about "my_first_project".



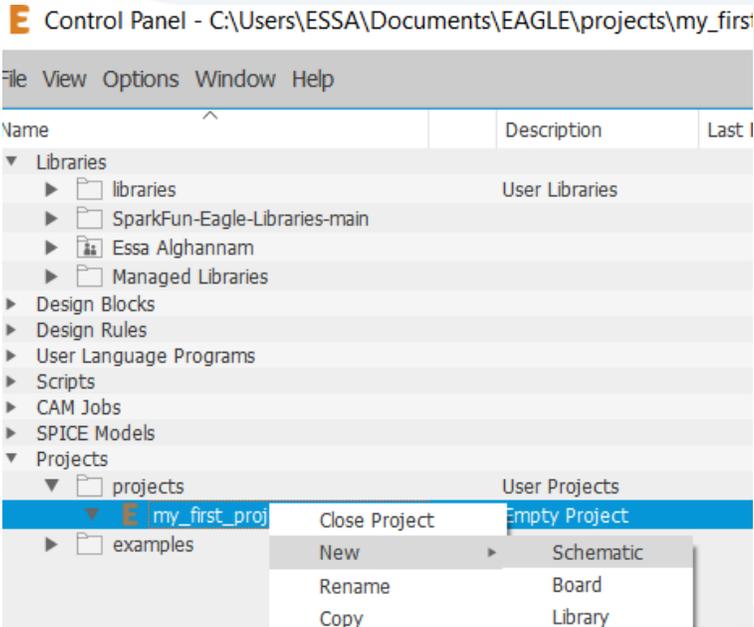
C:\Users\ESSA\Documents\eagle\projects\my_first_project

Project folders are like any regular file system folder, except they contain a file named "**eagle.epf**". The EPF file links your schematic and board design together, and also stores any settings you may have set especially for the project.



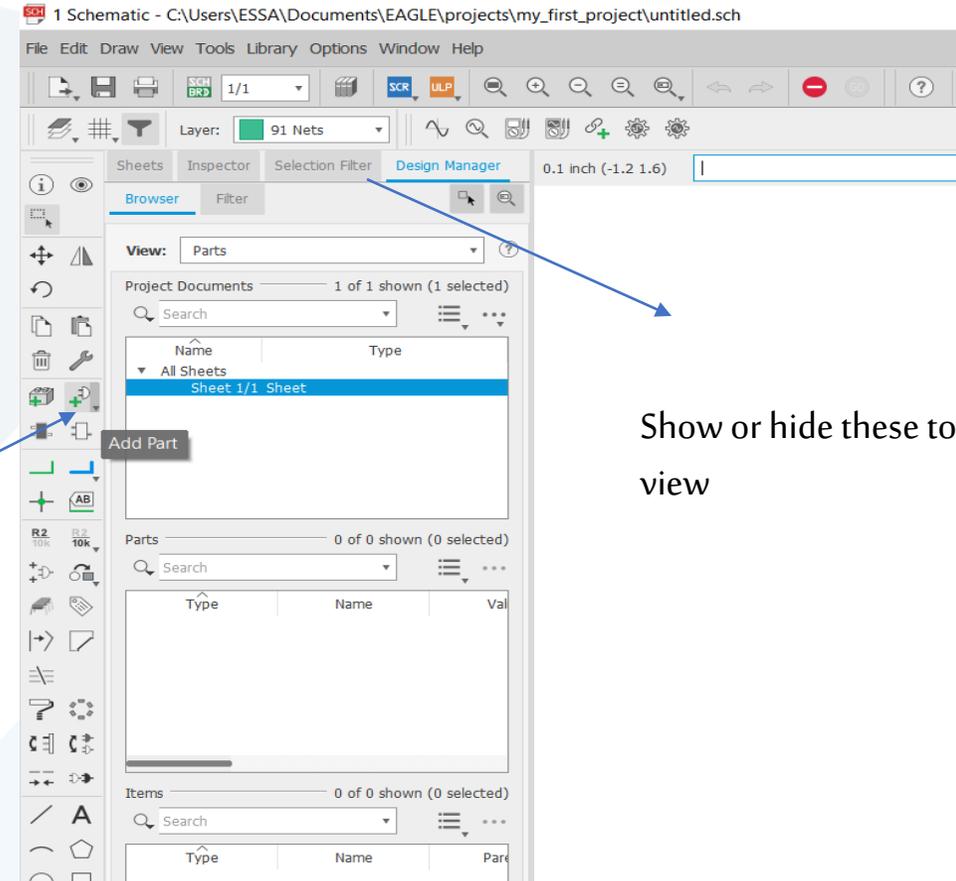
Create a Schematic

The project folder will house both our schematic and board design files (and eventually our gerber files too). To begin the design process, we need to lay out a schematic. To add a schematic to a project folder, right-click the folder, hover over "New" and select "Schematic".



Adding Parts to a Schematic

Using the ADD Tool



Show or hide these toolbars from view

ADD PIC16F877

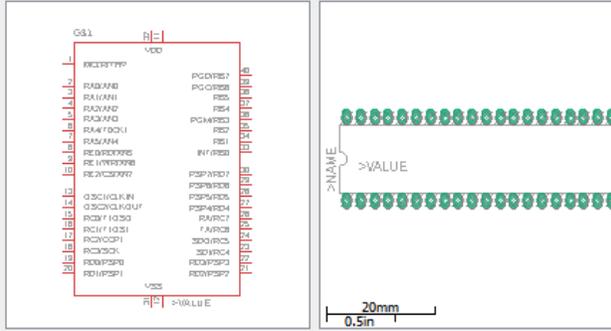
ADD

Name	Managed Folder	Description	Popularity
▶ micro-philips	Eagle Pcb	Philips Microcontroll...	
▶ micro-renesas	Eagle Pcb	RENESAS Micro Con...	
▶ micro-siemens	Eagle Pcb	Siemens Microcontr...	
▶ microchip	Eagle Pcb	Microchip PIC Micro...	
▶ 24*		Serial EEPROM	



ADD

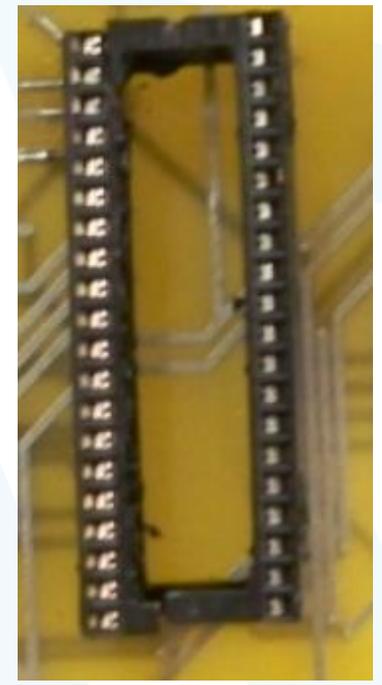
Name	Managed Folder	Description	Popularity
▶ PIC16C*?-28		MICROCONTROLLER	
▶ PIC16C*?-40		MICROCONTROLLER	
▶ PIC16C*?-44		MICROCONTROLLER	
▶ PIC16C5*		MICROCONTROLLER	
▶ PIC16C6*?-40		MICROCONTROLLER	
▶ PIC16C6*?-44		MICROCONTROLLER	
▶ PIC16C9*?-68		MICROCONTROLLER	
▶ PIC16C52		MICROCONTROLLER	
▶ PIC16C56*SS		MICROCONTROLLER	
▶ PIC16C62*		MICROCONTROLLER	
▶ PIC16C64*?-40		MICROCONTROLLER	
▶ PIC16C64*?-44		MICROCONTROLLER	
▶ PIC16C65*?-40		MICROCONTROLLER	
▶ PIC16C65*?-44		MICROCONTROLLER	
▶ PIC16C66		MICROCONTROLLER	
▶ PIC16C73		MICROCONTROLLER	
▶ PIC16C74*-44		MICROCONTROLLER	
▶ PIC16C74P		MICROCONTROLLER	
▶ PIC16C84		MICROCONTROLLER	
▶ PIC16C92*?-64		MICROCONTROLLER	
▶ PIC16F8*		MICROCONTROLLER	
▶ PIC16F19*		Flash-Based, 8-Bit C...	
▶ PIC16F62*		FLASH-Based 8-Bit ...	
▼ PIC16F87*		MICROCONTROLLER	
PIC16F874L		PLCC-44	
PIC16F874P		DIL40	
PIC16F874PQ		MQFP44-2	
PIC16F874PT		TQFP44	
PIC16F877L		PLCC-44	
PIC16F877P		DIL40	
PIC16F877PQ		MQFP44-2	
PIC16F877PT		TQFP44	
PIC16F877SO		S44	



PIC16F87* (Version 4)
MICROCONTROLLER
Footprint: DIL40 (Version 1)
Dual In Line
package type P
3D Package: DIL40 (Version 1)
Dual In Line package type P

Attribute	Value
MF	MICROCHIP
MPN	PIC16F877-04/P
OC_FARNELL	9761349
OC_NEWARK	61K3463
POPULARITY	0

Device: PIC16F877P (PIC16F87*)
Package: DIL40
Library: microchip
 Smashed
MICROCONTROLLER
OK Cancel Apply

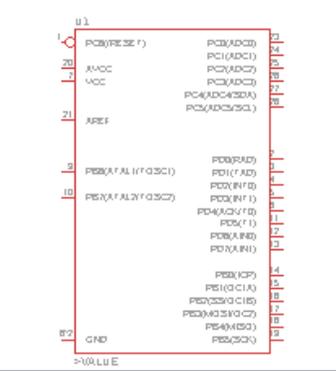
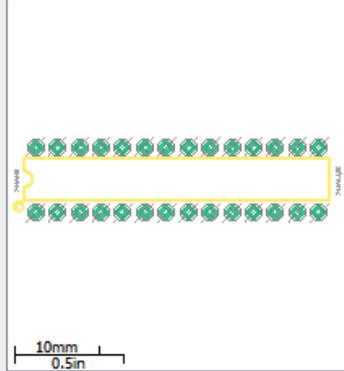


ADD atmega328

SCH ADD

Name	Managed Folder	Description	Popularit
▼ SparkFun-IC-Microcontroller		SparkFun Microcont...	
AMBIQ-APOLLO3KBR			
ARTEMIS_MODULESMD		Description: The Ar...	
AT90CAN128			
AT97SC3204T		Atmel Trusted Platf...	
▶ ATMEGA32U4		Atmel MCU, 32KByte	
▶ ATMEGA32U4-ARDUINO		Atmel MCU, 32KByte	
▶ ATMEGA128		ATmega 128	
ATMEGA168_MLFMLF		ATMEGA 168	
ATMEGA328P_MLFMLF32		Datasheet	
ATMEGA328P_PDIP		Atmel 328P	
ATMEGA328P_PDIP_EZ		Keyed ATMEGA328...	
ATMEGA328P_TQFP		Popular 328P in QFP	
ATMEGA328P_VQFNVQFN		Atmel 328P	
ATMEGA2560AU		Atmel 100-pin 8-bit...	
ATSAMD21E18A-U		SAM D21E 32-Pin Q...	
▶ ATSAMD21G		Atmel SAMD21G S...	
ATSAMD51G19A			

OR

ATMEGA328P_PDIP

Atmel 328P

search functionality

atmega328

Search Pads Smds Description Hide Unpopular Parts Preview

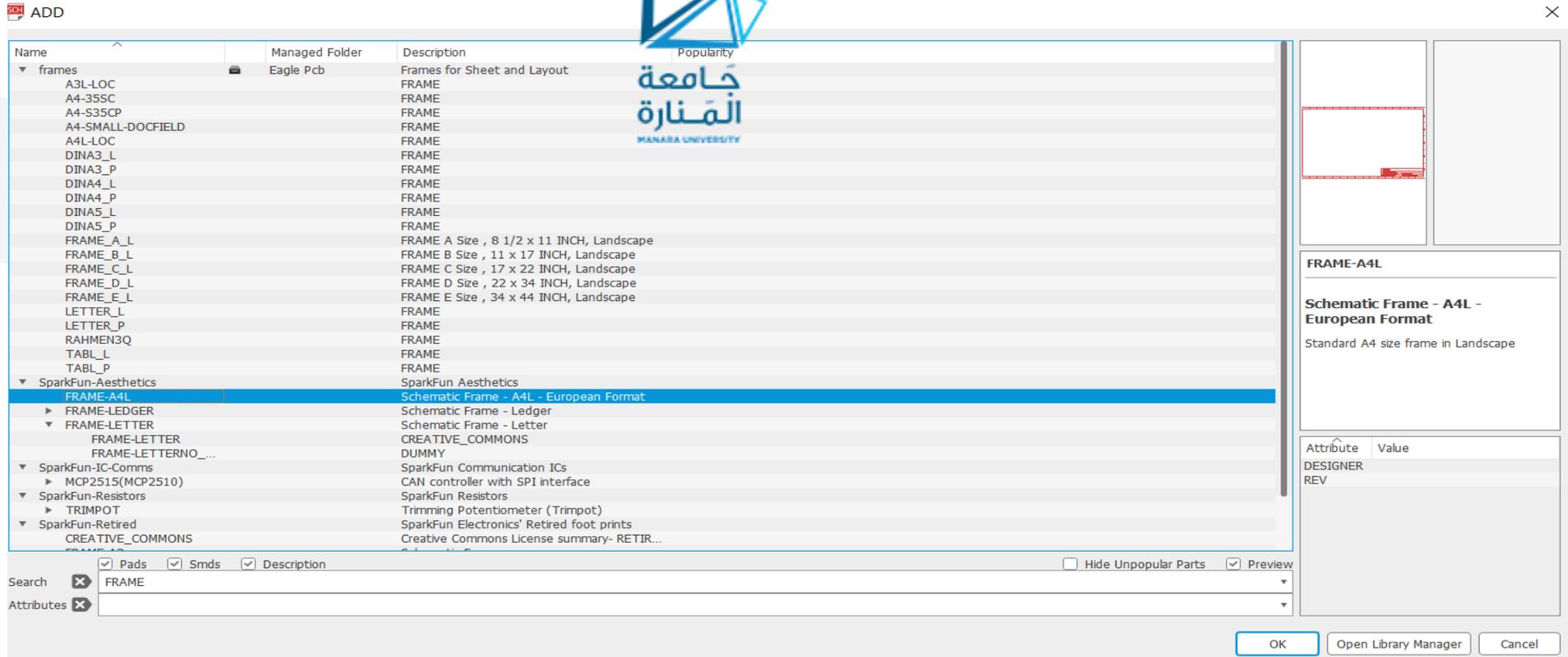
Search

Attributes

OK Open Library Manager Cancel



Add a Frame:

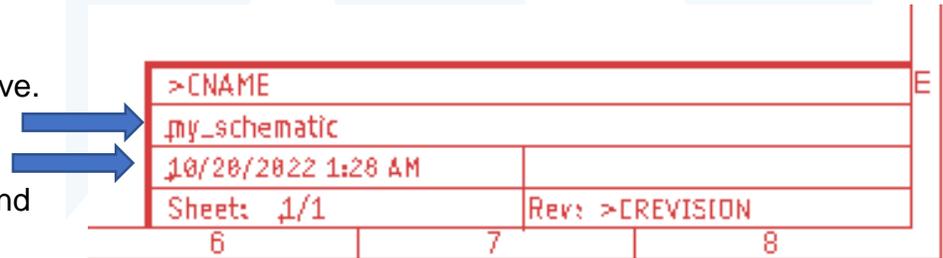


Save (And Save Often)



go to *File* > *Save*, or just click the blue floppy disk icon --Name your schematic something descriptive. "my_schematic.sch" (SCH is the file format for all EAGLE schematics).

As a bonus, after saving, your frame's title should update accordingly (you may have to move around the screen, or go to **View > Redraw**). Or **click F2**



Add LED

SCH ADD

Name	Managed Folder	Description	Popularity
led	Eagle Pcb	LEDs	
LED		LED	
LED5MM		LED5MM	
SparkFun-LED		SparkFun LEDs (E:/softwares/Engineering A...	
LED		LED (Generic)	
LED5MM		LED_5MM	

Search

Attributes

Pads Smds Description

Hide Unpopular Parts Preview



LED (Version 10)

LED

OSRAM:
- **CHIPLED**
LG R971, LG N971, LY N971, LG Q971,
LY Q971, LO R971, LY R971 LH N974,
LH R974
LS Q976, LO Q976, LY Q976
LO Q996
- **Hyper CHIPLED**
LW Q18S
LB Q993, LB Q99A, LB R99A

Attribute	Value
POPULARITY	93

Add Resistor



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SCH ADD

Name

- ▶ p1xtech
- ▶ pot
- ▶ ptc-ntc
- ▼ rcl
 - ▶ C-EU
 - ▶ C-TRIMM
 - ▶ C-US
 - ▶ CPOL-EU
 - ▶ CPOL-US
 - ▶ CX
 - ▶ CY
 - ▶ EL-
 - ▶ L-EU
 - ▶ L-US
 - ▶ POTENTIOMETER_
 - ▶ R-EU_
 - ▶ R-TRIMM
 - ▶ R-US_

>NAME
>VALUE

G\$1
>VALUE

2mm
0.1in

>NAME
>VALUE

G\$1
>VALUE

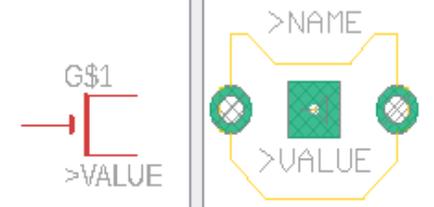
5mm
0.1in

Name	Managed Folder	Description
adafruit		(E:/softw
▼ CR1220		CR1216/C
CR1220SMT		CR1220-S
CR1220THM		CR1220-T
MCP73811/2		MCP7381
MCP73831/OT		MCP7383
▼ battery	Eagle Pcb	Lithium B
10MM_SM_COIN_CELL_C...		Battery c
BATTERY-HOLDER_11.6...		11.6mm l
BK-889		CION CEL
▼ maxim	Eagle Pcb	Maxim Co
DS2726		5-Cell to :
MAX1551		Dual-Inpu
MAX1555		Dual-Inpu
▼ microchip	Eagle Pcb	Microchip
PIC16F676		14-Pin, Fl
▼ photo-elements	Eagle Pcb	Photocell
▶ VT2*		Photocor
▶ VT5*		Photocor
▶ VT8		Photocor
▶ VT9		Photocor
▶ VT43N		Photocor
▼ SparkFun-Batteries		SparkFun
▶ BATTERY		Battery -
▼ SparkFun-Coils		SparkFun
▶ INDUCTOR		Inductors
▼ SparkFun-Connectors		SparkFun
JST_2MM_MALE		JST 2MM
▶ TEST-POINT		SparkFun
▼ SparkFun-IC-Conversion		SparkFun
HX711		AVIA Ser
NAU7802SOIC		24-bit loa
▼ SparkFun-IC-Power		SparkFun
BQ27441-G1		Texas Ins
MAX7302PENC		

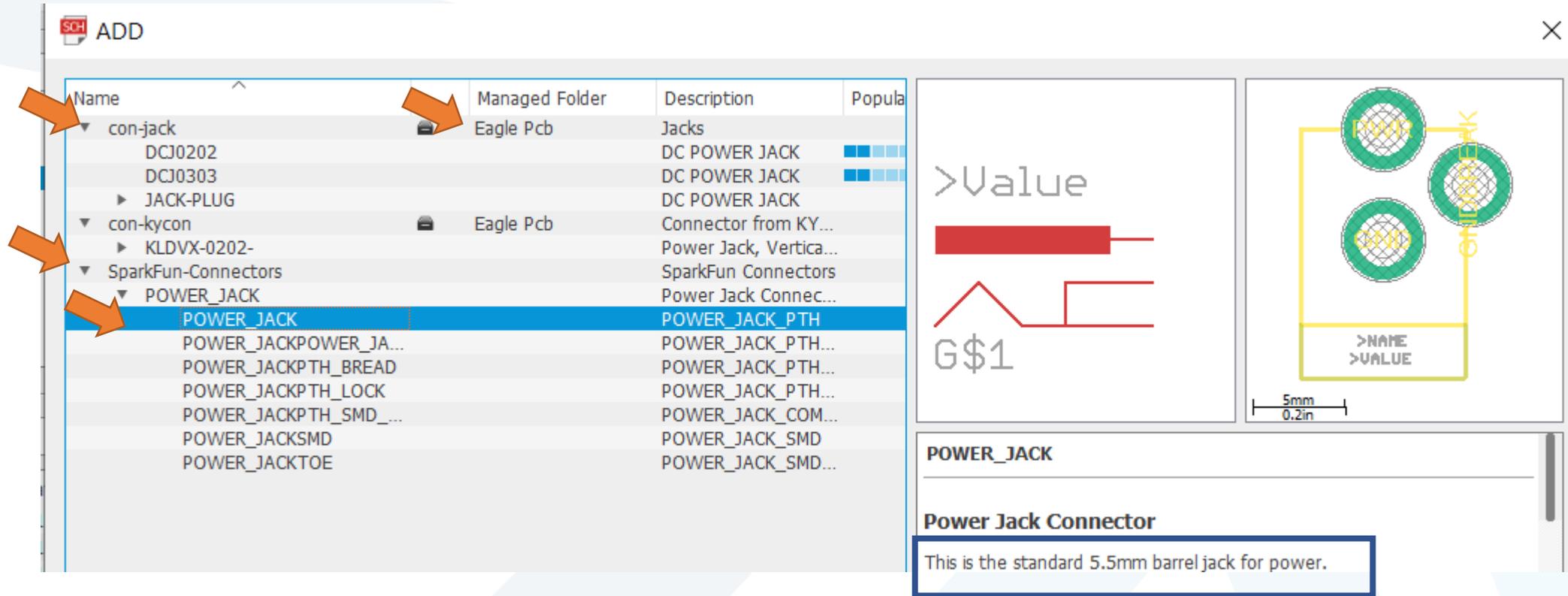
Search

Attributes

Pads Smds Description



Add Power Jack



Name	Managed Folder	Description	Popula
con-jack	Eagle Pcb	Jacks	
DCJ0202		DC POWER JACK	■ ■ ■ ■
DCJ0303		DC POWER JACK	■ ■ ■ ■
JACK-PLUG		DC POWER JACK	
con-kycon	Eagle Pcb	Connector from KY...	
KLDVX-0202-		Power Jack, Vertica...	
SparkFun-Connectors		SparkFun Connectors	
POWER_JACK		Power Jack Connec...	
POWER_JACK		POWER_JACK_PTH	
POWER_JACKPOWER_JA...		POWER_JACK_PTH...	
POWER_JACKPTH_BREAD		POWER_JACK_PTH...	
POWER_JACKPTH_LOCK		POWER_JACK_PTH...	
POWER_JACKPTH_SMD_...		POWER_JACK_COM...	
POWER_JACKSMD		POWER_JACK_SMD	
POWER_JACKTOE		POWER_JACK_SMD...	

>Value

G\$1

5mm
0.2in

POWER_JACK

Power Jack Connector

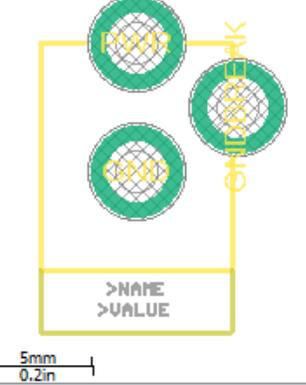
This is the standard 5.5mm barrel jack for power.

Add parts



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>Value



Part Description	Library	Part Name
5.5mm Barrel Jack (PTH)	SparkFun-Connectors	POWER_JACKPTH
0.1µF Ceramic Capacitor	SparkFun-Capacitors	CAPPTH
Voltage Supply Symbol	SparkFun-Aesthetics	VCC
Ground Symbol	SparkFun-Aesthetics	GND

- ▼ SparkFun-Connectors
 - ▶ AUDIO_JACK_2.5MM
 - ▶ AUDIO_JACK_3.5MM
 - AUDIO_JACK_TRRSSMD_RA
 - AUDIO_JACK_TRS_0.25"_PT...
 - BANANA_CONN
 - DIN5
 - ▼ POWER_JACK
 - POWER_JACK**
 - POWER_JACKPOWER_JA...

POWER_JACK

Power Jack Connector

this is the standard 5.5mm barrel jack for power.

- ▼ SparkFun-PowerSymbols
 - VCC**
 - VCCA
 - VCCIO
 - VCC_1
 - VCC_2
 - ▼ SparkFun-Retired
 - 74HC03
 - ▼ supply1
 - VCC
 - ▼ supply2
 - VCC

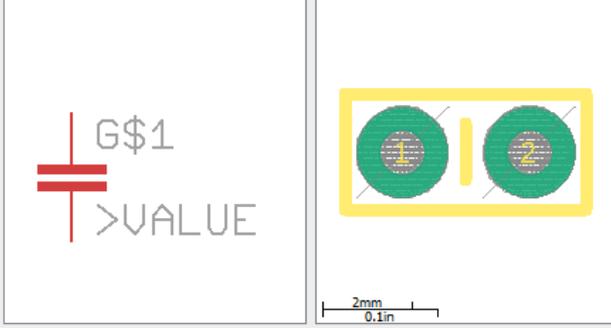
Eagle Pcb

Eagle Pcb

>VALUE

- | Managed Folder | Description | Pop |
|-----------------------|-----------------------------|--------------------------|
| ▼ SparkFun-Capacitors | SparkFun Capacitors | |
| ▼ 0.1UF | 0.1µF ceramic capa... | |
| | 0.1UF-0402-6.3V-10%-X7R | 0402 |
| | 0.1UF-0402-10V-10%-X7R | 0402 |
| | 0.1UF-0402-16V-10% | 0402 |
| | 0.1UF-0402T-6.3V-10%-... | 0402-TIGHT |
| | 0.1UF-0402T-10V-10%-X... | 0402-TIGHT |
| | 0.1UF-0402T-16V-10% | 0402-TIGHT |
| | 0.1UF-0402T-16V-10%-X... | 0402-TIGHT |
| | 0.1UF-0603-25V-(+80/-2... | 0603 |
| | 0.1UF-0603-25V-5% | 0603 |
| | 0.1UF-0603-25V-10%-X7... | 0603 |
| | 0.1UF-0603-50V-10%-X7... | 0603 |
| | 0.1UF-0603-100V-10% | 0603 |
| | 0.1UF-0603-100V-10%-X... | 0603 |
| | 0.1UF-KIT-EZ-50V-20% | CAP-PTH-SMALL-KIT |
| | 0.5PF-0402_TIGHT-50V-PM0... | 0.5pF ceramic capa... |
| | 0.8PF-0402-50V-0.1PF | 0.8pF ceramic capa... |
| | 0.18UF-0603-10V-10% | 0.18µF ceramic cap... |
| | ▶ 0.22UF | 0.22µF ceramic cap... |
| | 0.33UF/330NF-0805-50V-10% | 0.33µF/330nF cera... |
| | 0.68UF-0603-16V-10%-X7R-WE | 0.68µF ceramic cap... |
| | ▶ 1.0NF/1000PF | 1nF/1,000pF ceram... |
| | 1.0PF-0603-50V-25% | 1pF ceramic capacit... |
| | ▶ 1.0UF | 1µF ceramic capacit... |
| | 1.5PF-0603-50V-16.667% | 1.5pF ceramic capa... |
| | 2.2NF/2200PF-0603-50V-10% | 2.2nF/2,200pF cera... |
| | ▶ 2.2UF | 2.2µF ceramic capa... |
| | ▶ 3.0NF | 3.0nF (3nF, 3000p... |
| | ▶ 3.3NF | 3.3nF ceramic capa... |

>VALUE



0.1UF

0.1µF ceramic capacitors

A capacitor is a passive two-terminal electrical component used to store electrical energy temporarily in an electric field.

Footprint: CAP-PTH-SMALL-KIT

CAP-PTH-SMALL-KIT

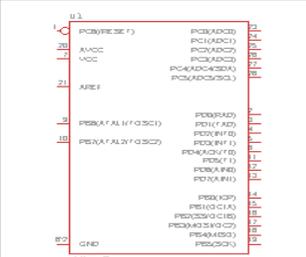
Attribute	Value
PROD_ID	CAP-08370
VALUE	0.1µF

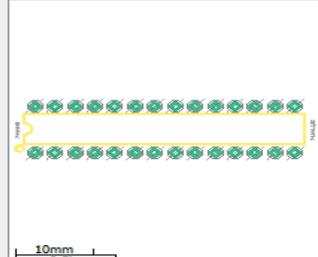
Add Atmega 328p

Part Description	Library	Exact Part Name
ATmega328P (PTH)	SparkFun-DigitalIC	ATMEGA328P_PDIP
1/4W Resistors	SparkFun-Resistors	RESISTORPTH-1/4W
5mm LEDs	SparkFun-LED	LED5MM
0.1µF Ceramic Capacitor	SparkFun-Capacitors	CAPPTH
Voltage Supply Symbol	SparkFun-Aesthetics	VCC
Ground Symbol	SparkFun-Aesthetics	GND

ADD

Name	Managed Folder	Description	Popula
▼ SparkFun-IC-Microcontroller		SparkFun Microcont...	
ATMEGA328P_MLFMLF32		Datasheet	
ATMEGA328P_PDIP		Atmel 328P	
ATMEGA328P_PDIP_EZ		Keyed ATMEGA328...	
ATMEGA328P_TQFP		Popular 328P in QFP	





ATMEGA328P_PDIP

Atmel 328P

Through hole ATMEGA328P uC used in the Arduino
32kb flash, 1k EEPROM, 2k SRAM

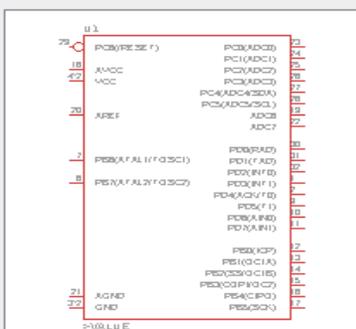
[Datasheet](#)

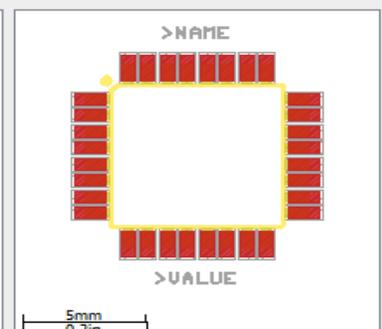
SparkFun Products

- Storefront component: AVR 28 Pin 20MHz 32K 6A/D -

ADD

Name	Managed Folder	Description	Popula
▼ SparkFun-IC-Microcontroller		SparkFun Microcont...	
ATMEGA328P_MLFMLF32		Datasheet	
ATMEGA328P_PDIP		Atmel 328P	
ATMEGA328P_PDIP_EZ		Keyed ATMEGA328...	
ATMEGA328P_TQFP		Popular 328P in QFP	





ATMEGA328P_TQFP

Add header

Part Description	Library	Exact Part Name
8-Pin 0.1" Header	SparkFun-Connectors	M081X08
2x3 AVR Programming Header	SparkFun-Connectors	AVR_SPI_PRG_6PTH
6-Pin Serial Programming Header	SparkFun-Connectors	ARDUINO_SERIAL_PROGRAMPTH
Voltage Supply Symbol	SparkFun-Aesthetics	VCC
Ground Symbol	SparkFun-Aesthetics	GND



ADD

Name	Managed Folder	Description	Pop
SparkFun-Connectors		SparkFun Connectors	
6_PIN_SERIAL_CABLEPTH		6-pin header conne...	
6_PIN_SERIAL_TARGET		6-pin header conne...	
ATX24RH		ATX24 Pin Power S...	
AUDIO_JACK_2.5MM		Audio Jack	
AUDIO_JACK_3.5MM		Audio Jack	
AUDIO_JACK_TRRSSMD_RA		Audio Jack - 3.5mm...	
AUDIO_JACK_TRS_0.25"_PT...		Audio Jack, 1/4" T...	
AVR_SPI_PROG_3X2		AVR ISP 6 Pin	
AVR_SPI_PROG_5X2		AVR 10-pin ICSP H...	
BANANA_CONN		Through-hole Bana...	
BARCODE_ENGINE_CONN			
BATTERY_CONN_DEANS		Battery Connectors	
BC9VPC		9V Battery Holder ...	
BINDING_POST		Binding Post	
BNCPTH		BNC Right Angle Co...	
CAMERA-HIMAX			
COMPUTER_PERIPHERAL_PO...		ATX 4-Pin Power S...	
CONN_01		Single connection p...	
CONN_02		Multi connection po...	
CONN_03		Multi connection po...	
CONN_03X2		Multi connection po...	
CONN_04		Multi connection po...	
CONN_04X2		Multi connection po...	
CONN_05		Multi connection po...	
CONN_05X2		Multi connection po...	
CONN_06		Multi connection po...	
CONN_06X2		Multi connection po...	
CONN_07		Multi connection po...	
CONN_08		Multi connection po...	
CONN_08"		1X08	
CONN_08BM08B-SRSS-TB		BM08B-SRSS-TB	

CONN_08

Multi connection point. Often used as Generic Header-pin footprint for 0.1 inch spaced/style header connections

On any of the 0.1 inch spaced packages, you can populate with these:

- Break Away Headers - Straight (PRT-00116)
- Break Away Male Headers - Right Angle (PRT-00553)
- Female Headers (PRT-00115)

Attribute	Value
PROD_ID	CONN-08438

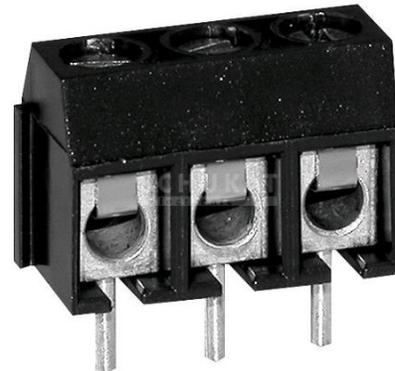
CON PTR 500

ADD

Name	Managed Folder	Description	Pop
con-phoenix-350	Eagle Pcb	Phoenix Connector...	
con-phoenix-500	Eagle Pcb	Phoenix Connectors	
con-phoenix-508	Eagle Pcb	Phoenix Connector...	
con-phoenix-762	Eagle Pcb	Phoenix Connector...	
con-phoenix-mkds_5	Eagle Pcb	PHOENIX CONTAC...	
con-phoenix-smkdsp	Eagle Pcb	Phoenix Connector...	
con-ptr500	Eagle Pcb	PTR Connectors	
AK300/2		CONNECTOR	
AK300/3		CONNECTOR	
AK300/4		CONNECTOR	
AK300/5		CONNECTOR	
AK300/6		CONNECTOR	
AK300/7		CONNECTOR	
AK300/8		CONNECTOR	
AK300/9		CONNECTOR	
AK300/10		CONNECTOR	
AK300/11		CONNECTOR	

AK300/3 (Version 3)

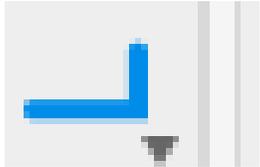
CONNECTOR



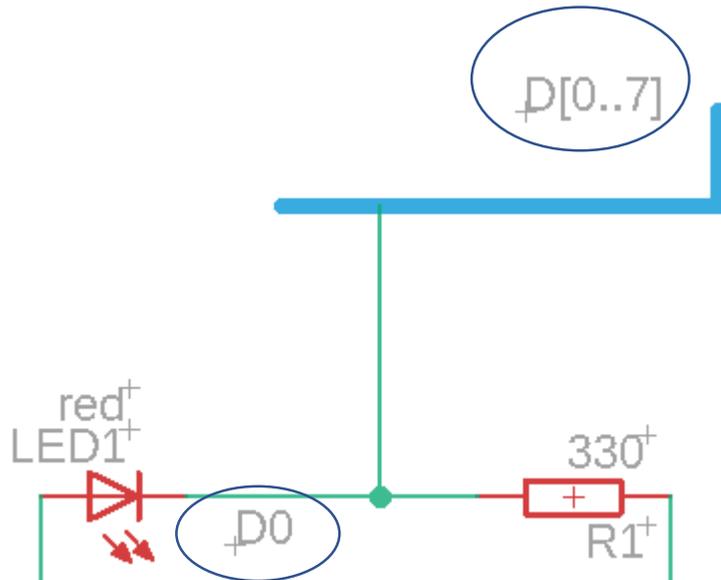
Wiring Up the Schematic



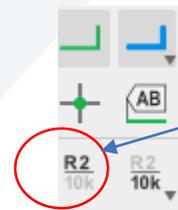
NET does a better job of connecting components.



Draw a bus



استخدام اختصار label و name لوصل نقطتين:



• نرسم خط اول

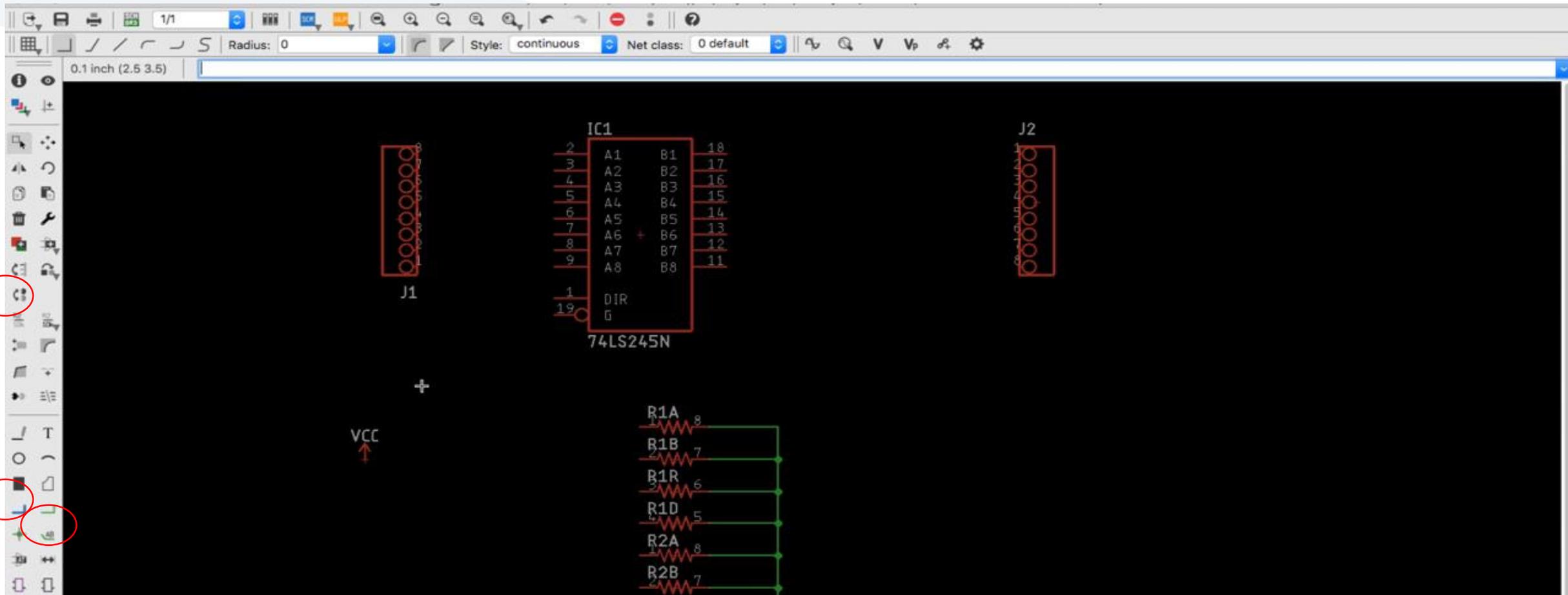
• نرسم خط ثاني

• نستخدم ايقونة لابل لظهار اسم الاثنين

• نستخدم ايقونة الاسم لمنحهما و لجعل اسم احدهما مطابقا للثاني و نضغط اوكي على

الرسالة الظاهرة

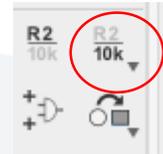
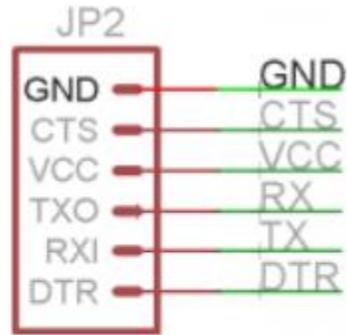
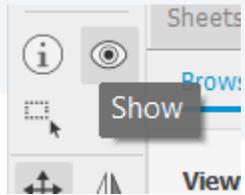
Using Bus Wires and Labels



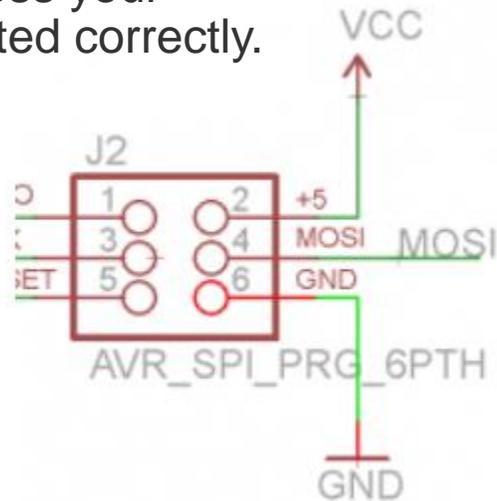
Show Function and Value Function



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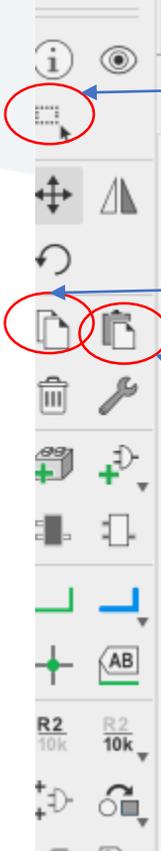


The SHOW tool is very useful for verifying that pins across your schematic are connected correctly.



A part's **value** allows you to define unique characteristics of that part. For example, you can set a resistor's resistance, or a capacitor's capacitance.

• GROUP COPY PASTE



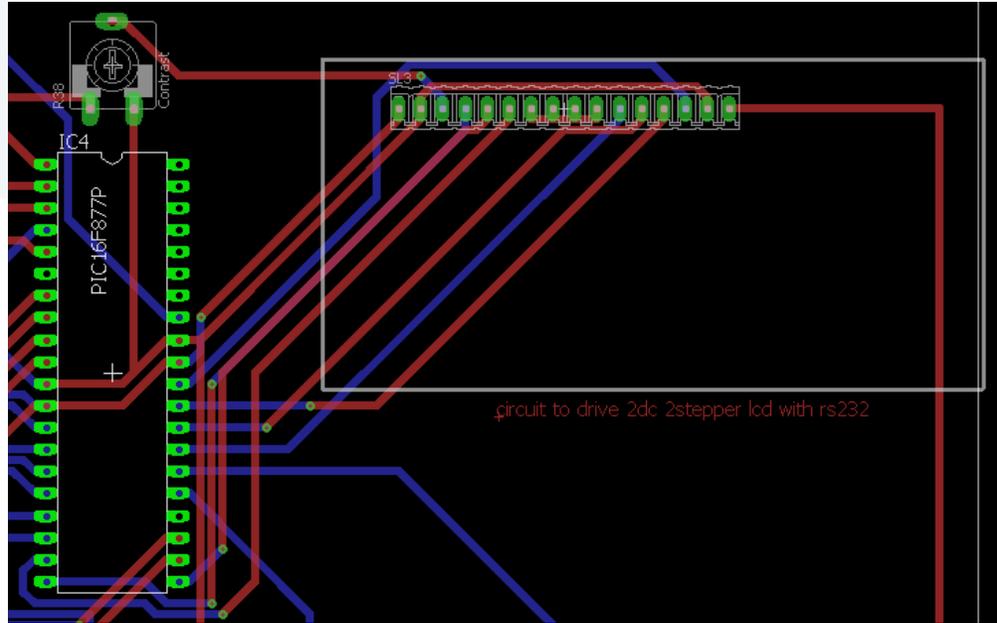
النسخ و اللصق لنفس الملف:

- باختيار ايقونة الغروب داخل الدائرة الحمراء
- ثم تحديد مجموعة من العناصر المطلوب نسخها
- اختيار ايقونة نسخ
- في اي منطقة بيضاء ضمن مساحة العمل كبس الزر اليميني للفارة و اختيار خيار نسخ مجموعة
- أو اختيار ايقونة لصق و من ثم بتحريك الفارة اختيار مكان اللصق و النقر لإنهاء المهمة

النسخ و اللصق من ملف لملف:

- باختيار ايقونة الغروب داخل الدائرة الحمراء
- ثم تحديد مجموعة من العناصر المطلوب نسخها
- اختيار ايقونة نسخ
- فتح الملف الجديد
- اختيار ايقونة لصق و من ثم بتحريك الفارة اختيار مكان اللصق و النقر لإنهاء المهمة

• CON AMP QUICK

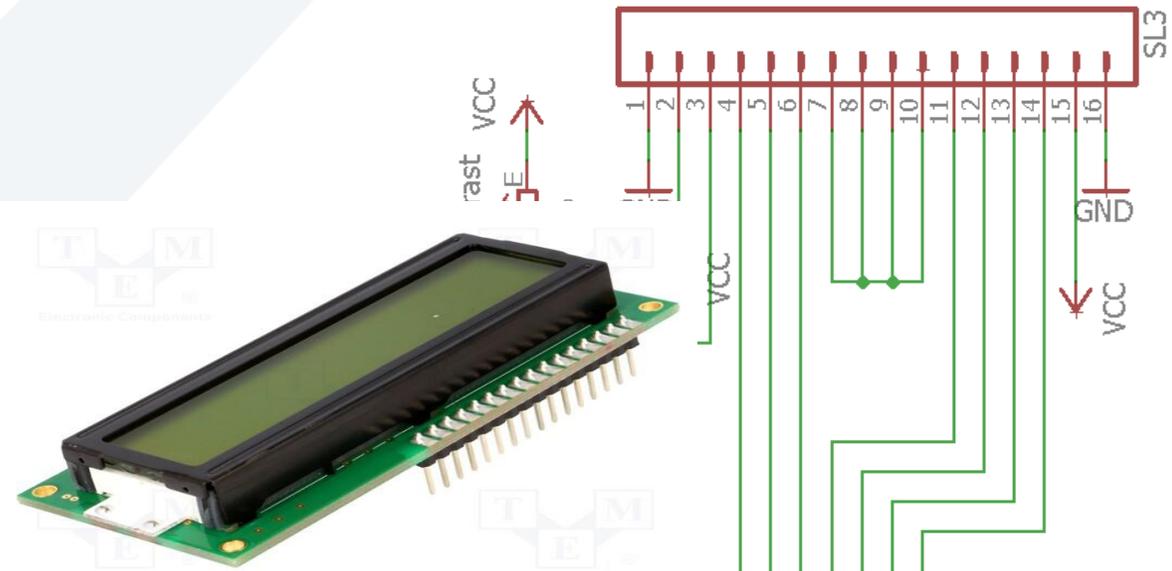


ADD

Name	Managed Folder	Description	Popularity
con-amp-quick	Eagle Pcb	AMP Connectors, T...	
M02		AMP QUICK CONNE...	■■■■■■■■■■
M02S		AMP QUICK CONNE...	■■■■■■■■■■
M03		AMP QUICK CONNE...	■■■■■■■■■■
M03S		AMP QUICK CONNE...	■■■■■■■■■■
M04		AMP QUICK CONNE...	■■■■■■■■■■
M04S		AMP QUICK CONNE...	■■■■■■■■■■
M05		AMP QUICK CONNE...	■■■■■■■■■■
M05S		AMP QUICK CONNE...	■■■■■■■■■■
M06		AMP QUICK CONNE...	■■■■■■■■■■
M06S		AMP QUICK CONNE...	■■■■■■■■■■
M07		AMP QUICK CONNE...	■■■■■■■■■■
M07S		AMP QUICK CONNE...	■■■■■■■■■■
M08		AMP QUICK CONNE...	■■■■■■■■■■
M08S		AMP QUICK CONNE...	■■■■■■■■■■
M09		AMP QUICK CONNE...	■■■■■■■■■■
M09S		AMP QUICK CONNE...	■■■■■■■■■■
M10		AMP QUICK CONNE...	■■■■■■■■■■
M10S		AMP QUICK CONNE...	■■■■■■■■■■
M11		AMP QUICK CONNE...	■■■■■■■■■■
M11S		AMP QUICK CONNE...	■■■■■■■■■■
M12		AMP QUICK CONNE...	■■■■■■■■■■
M12S		AMP QUICK CONNE...	■■■■■■■■■■
M13		AMP QUICK CONNE...	■■■■■■■■■■
M13S		AMP QUICK CONNE...	■■■■■■■■■■
M14		AMP QUICK CONNE...	■■■■■■■■■■
M14S		AMP QUICK CONNE...	■■■■■■■■■■
M15		AMP QUICK CONNE...	■■■■■■■■■■
M15S		AMP QUICK CONNE...	■■■■■■■■■■
M16		AMP QUICK CONNE...	■■■■■■■■■■
M16S		AMP QUICK CONNE...	■■■■■■■■■■

M16 (Version 2)
AMP QUICK CONNECTOR
Footprint: 16P (Version 1)
AMP QUICK CONNECTOR
3D Package: 16P (Version 1)
AMP QUICK CONNECTOR

Attribute	Value
MF	
MPN	
OC_FARNELL	unknown

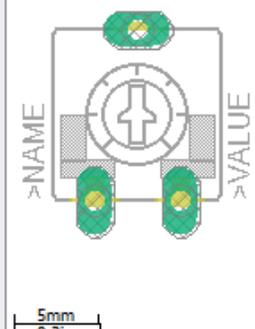


- POT



ADD

Name	Managed Folder	Description	Popularity
opto-trans-siemens	Eagle Pcb	Siemens Opto Tran...	
opto-transmittter-hp	Eagle Pcb	Hewlett-Packard O...	
opto-vishay	Eagle Pcb	VISHAY Optocoupler	
optocoupler	Eagle Pcb	Opto Couplers	
philips-semiconductors	Eagle Pcb	Philips Semiconduct...	
photo-elements	Eagle Pcb	Photocells	
piher	Eagle Pcb	Piher Potentiometers	
pinhead	Eagle Pcb	Pin Header Connec...	
pld-intel	Eagle Pcb	Intel PLDs	
plxtech	Eagle Pcb	PCI 9056 Data Boo...	
pot	Eagle Pcb	Potentiometers	
3RP/1610G		16mm Potentiomet...	■■■■■■■■■■
3RP/1610N		16mm Potentiomet...	■■■■■■■■■■
EUV		9 mm Square Rotar...	
TRIM_1234-S64YW		POTENTIOMETER	■■■■■■■■■■
TRIM_EU-		POTENTIOMETER	
TRIM_EU-3223G		3223G	■■■■■■■■■■
TRIM_EU-3223J		3223J	
TRIM_EU-3223W		3223W	
TRIM_EU-B25P		B25P	■■■■■■■■■■
TRIM_EU-B25U		B25U	
TRIM_EU-B25V		B25V	
TRIM_EU-B25X		B25X	
TRIM_EU-B64W		B64W	
TRIM_EU-B64Y		B64Y	
TRIM_EU-B90P		SP19L	
TRIM_EU-CA6H		CA6H	
TRIM_EU-CA6V		CA6V	■■■■■■■■■■
TRIM_EU-CA9H		CA9H	
TRIM_EU-CA9V		CA9V	■■■■■■■■■■
TRIM_EU-CA14H		CA14H	

TRIM_EU- (Version 2)

POTENTIOMETER

Footprint: CA9V (Version 1)

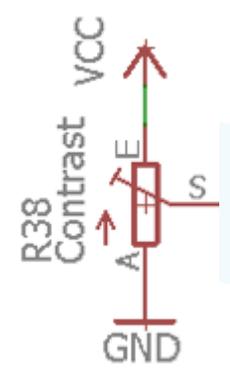
POTENTIOMETER

distributor Schukat

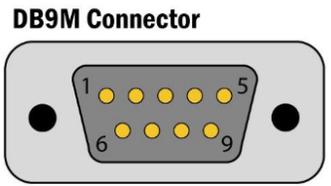
3D Package: CA9V (Version 1)

POTENTIOMETER distributor Schukat

Attribute	Value
POPULARITY	0



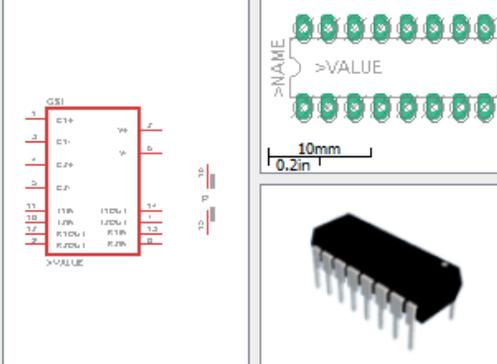
• RS232-MAX232



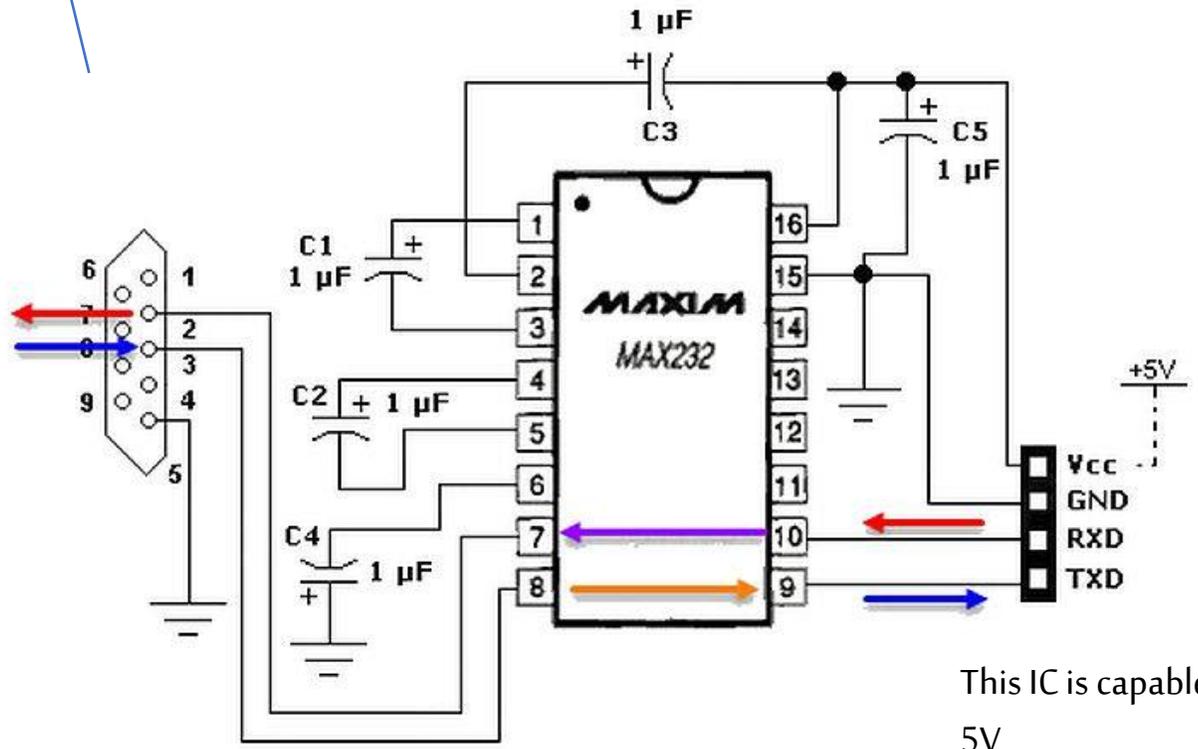
Pin #	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

SCH ADD

Name	Managed Folder	Description	Popularity
maxim	Eagle Pcb	Maxim Components	
MAX232		RS232 TRANSCEIVER	



MAX232 (Version 3)
RS232 TRANSCEIVER
Footprint: DIL16 (Version 1)
Dual In Line Package
3D Package: DIL16 (Version 2)
Dual In Line Package



This IC is capable of +30V to -30V from RS-232 and shifts the levels down to 0V to 5V

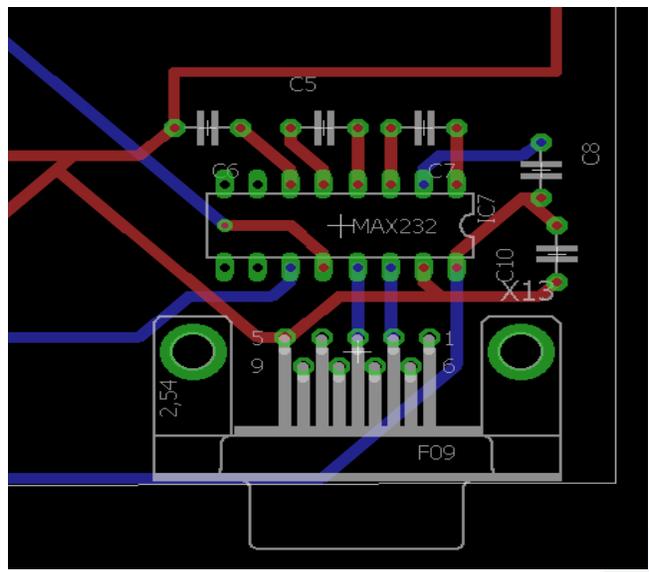
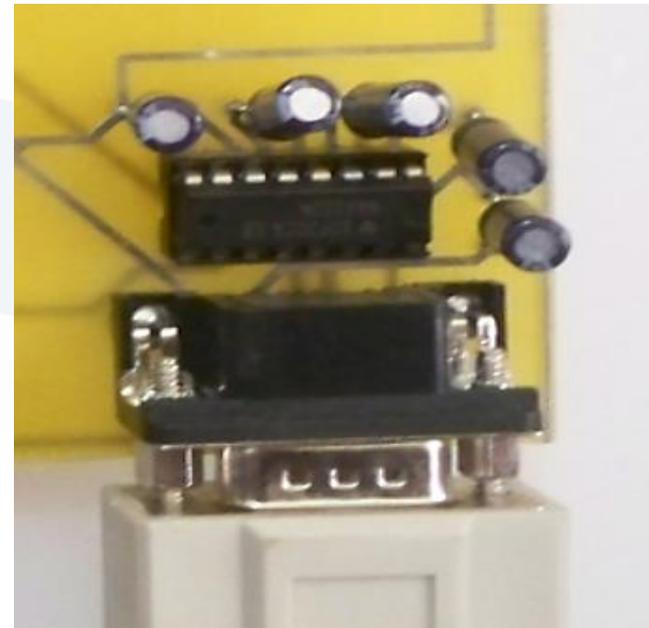
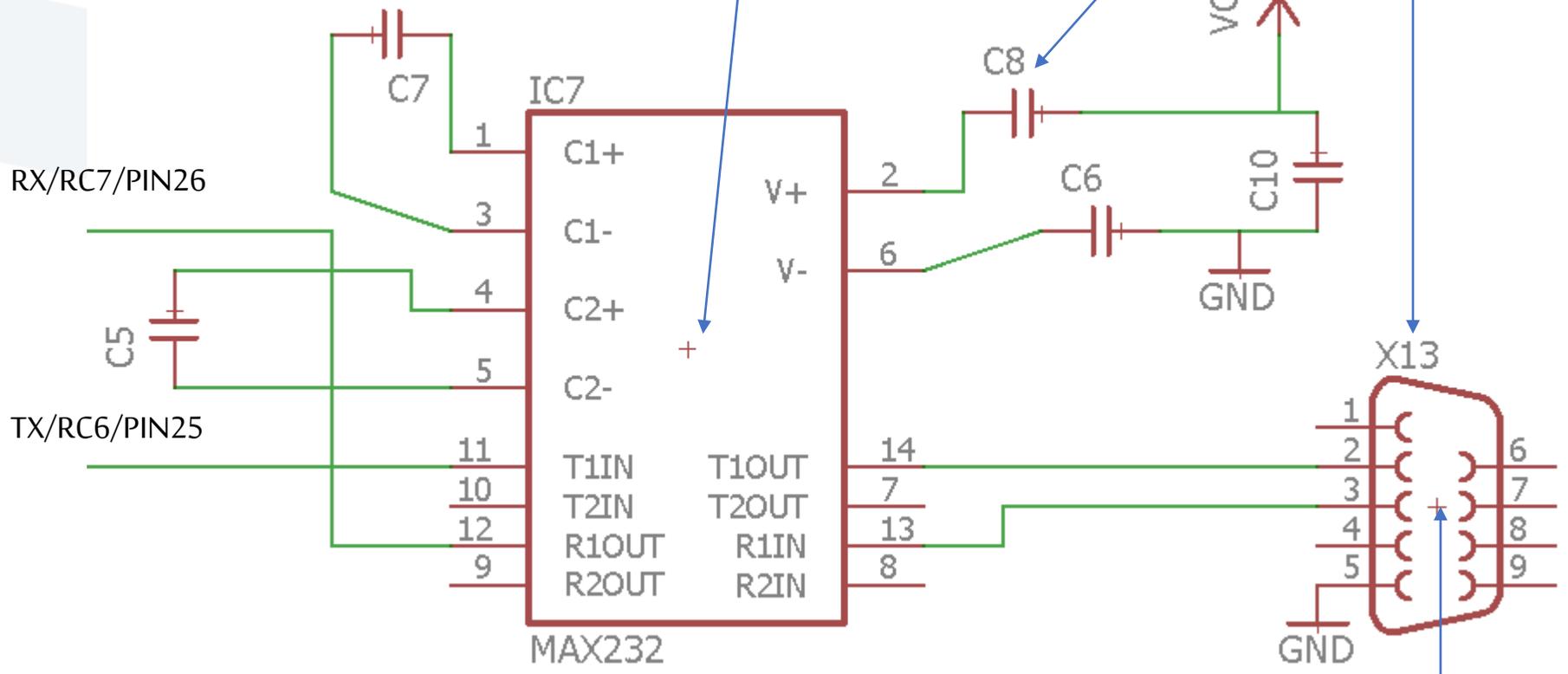
RS232-MAX232



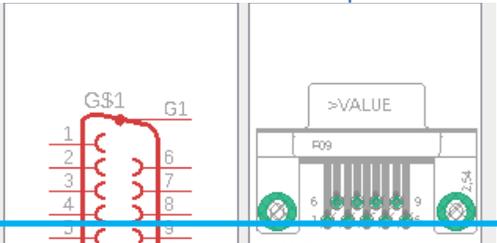
Device	MAX232
Package	DIL16
Library	maxim

Device	CAPNP-5
Package	C-5
Library	discrete

Device	F09HP (F09)
Package	F09HP
Library	con-subd



Name	Managed Folder	Description	Popularity
con-subd	Eagle Pcb	SUB-D Connectors	
F09		SUB-D	
F09HP		SUB-D	■■■■■■■■



Voltage Regulator



7805 IC Rating

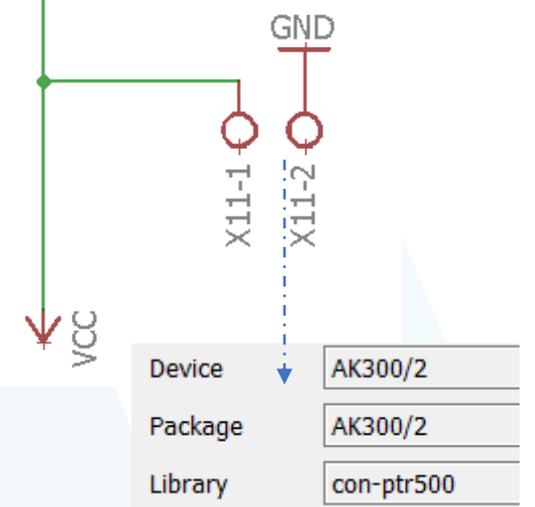
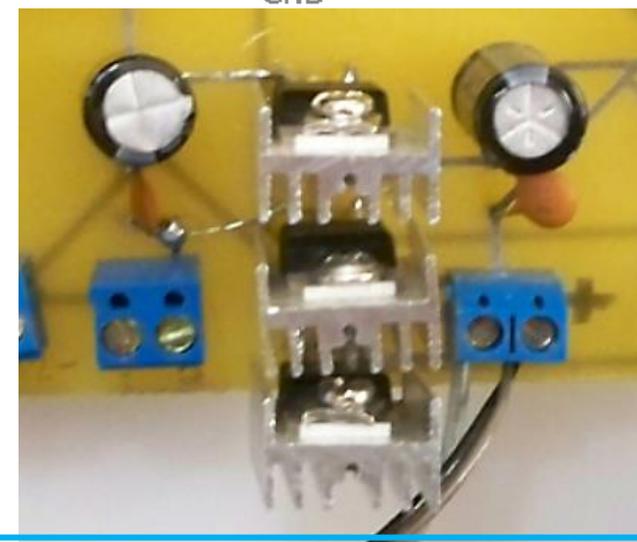
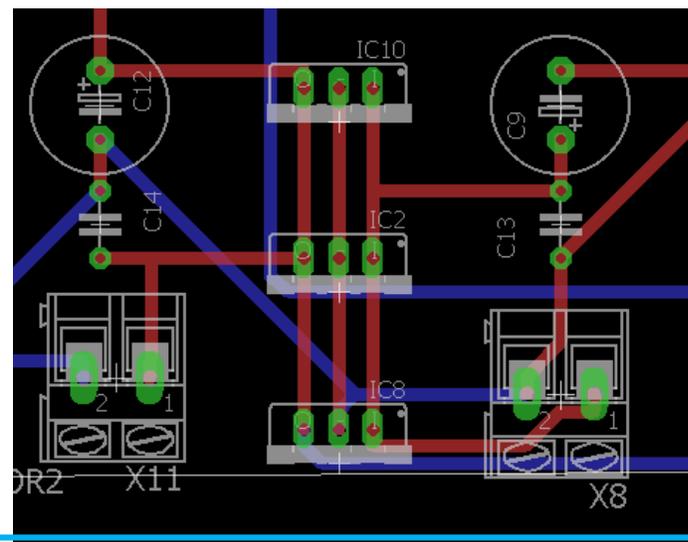
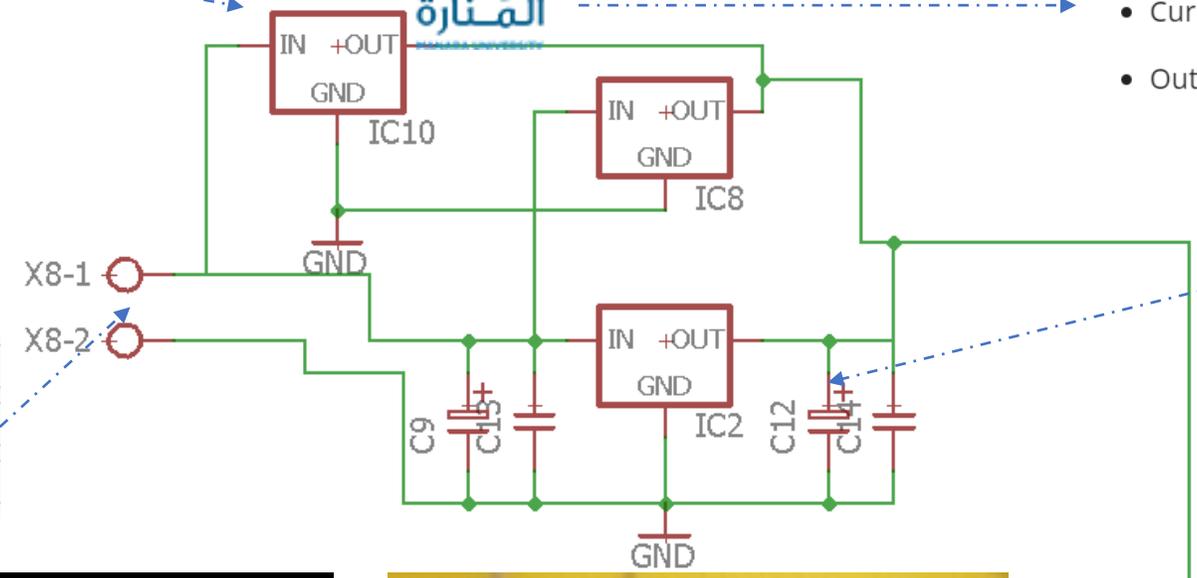
- Input voltage range 7V- 35V
- Current rating $I_c = 1A$
- Output voltage range $V_{Max}=5.2V, V_{Min}=4.8V$

Device	78XXS
Package	78XXS
Library	v-reg

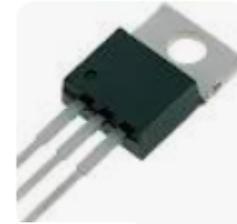
Device	AK300/2
Package	AK300/2
Library	con-ptr500

Device	ELC-5
Package	ES-5
Library	discrete

Device	CAPNP-5
Package	C-5
Library	discrete



Add voltage regulator 78L05

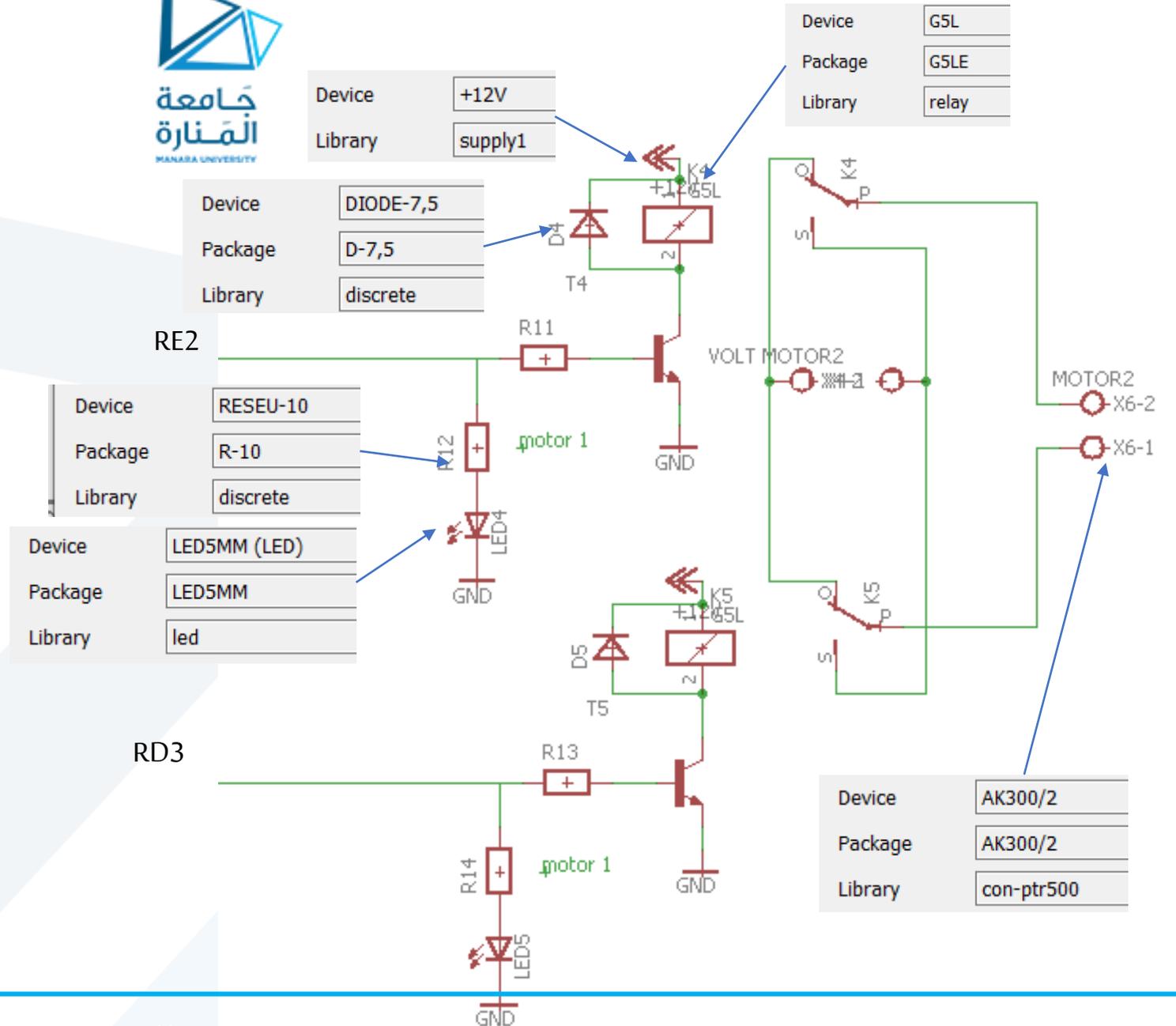


SCH ADD

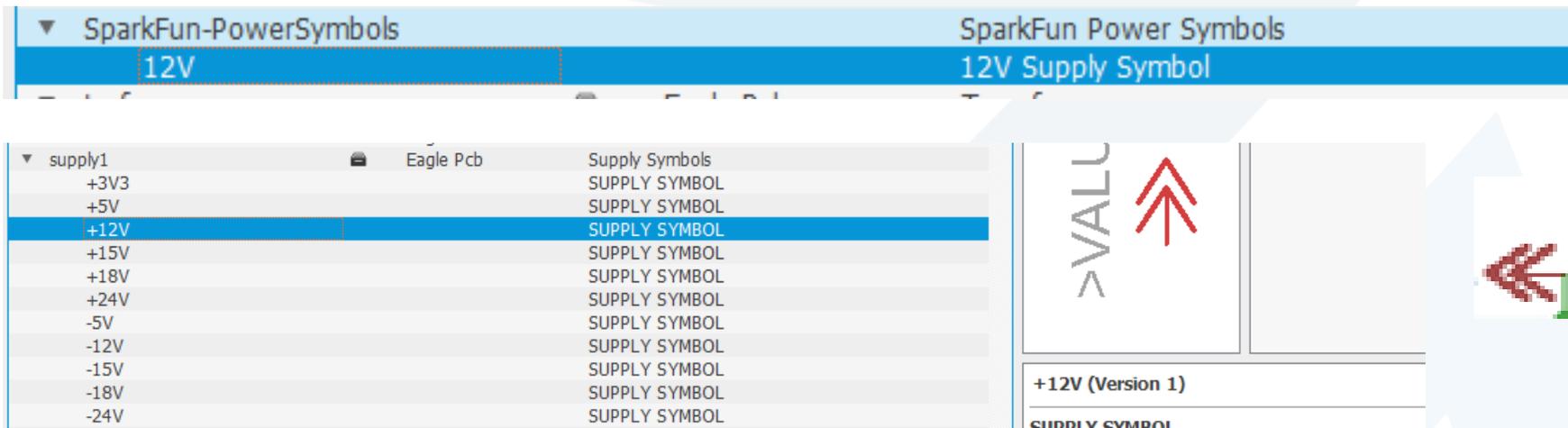
Name	Managed Folder	Description	Popularity
▶ transistor-neu-to92	Eagle Pcb	NPN Transistors	
▶ transistor-npn	Eagle Pcb	NPN Transistors	
▶ transistor-pnp	Eagle Pcb	PNP Transistors	
▶ transistor-power	Eagle Pcb	Power Transistors	
▶ transistor-small-signal	Eagle Pcb	Small Signal Transistors	
▶ triac	Eagle Pcb	Thyristors, Triacs, Trigger Di...	
▶ trimble	Eagle Pcb	Trimble GPS/GNSS Receiver...	
▶ uln-udn	Eagle Pcb	Driver Arrays	
▶ User-Submitted		SparkFun User Contributed ...	
▼ v-reg	Eagle Pcb	Voltage Regulators	
78LXX		VOLTAGE REGULATOR	■■■■■■■■
78MXXL		VOLTAGE REGULATOR	■■■■■■■■■■
78MXXS		VOLTAGE REGULATOR	■■■■■■■■
78XX-T03		VOLTAGE REGULATOR	
78XX/T03		VOLTAGE REGULATOR	

78MXXL (Version 2)

Add relay



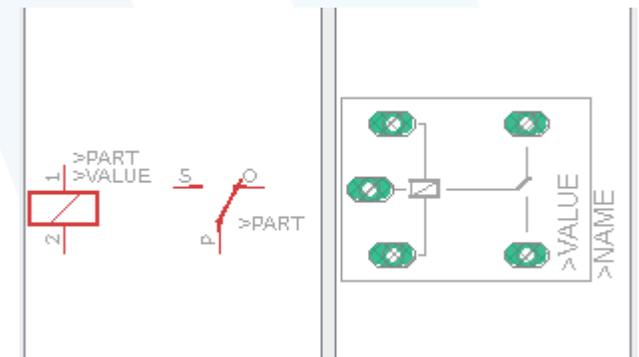
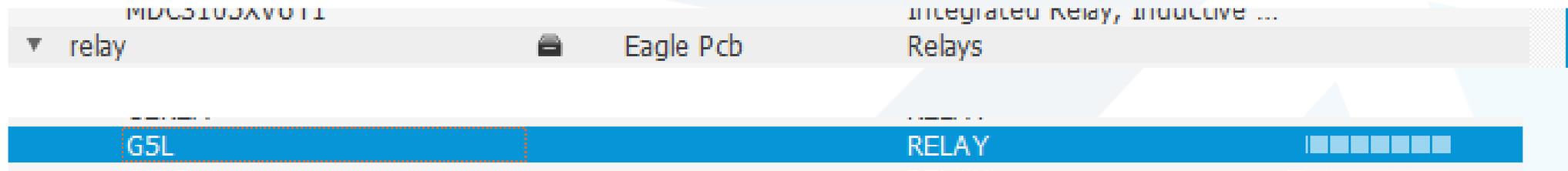
Add ANOTHER VOLTAGE SOURCE 12V



The screenshot shows the Eagle PCB software interface. At the top, the 'SparkFun Power Symbols' library is open, displaying a list of symbols. The '12V Supply Symbol' is highlighted. Below this, a table lists various supply symbols, with '+12V' selected. To the right, a preview window shows the selected '+12V (Version 1)' symbol, which consists of a red arrow pointing up and a green arrow pointing left.

Symbol Name	Description
+3V3	SUPPLY SYMBOL
+5V	SUPPLY SYMBOL
+12V	SUPPLY SYMBOL
+15V	SUPPLY SYMBOL
+18V	SUPPLY SYMBOL
+24V	SUPPLY SYMBOL
-5V	SUPPLY SYMBOL
-12V	SUPPLY SYMBOL
-15V	SUPPLY SYMBOL
-18V	SUPPLY SYMBOL
-24V	SUPPLY SYMBOL

Add relay



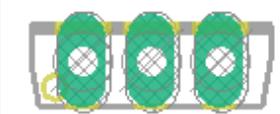
Add Transistor NPN

SCH ADD

Name	Managed Folder	Description	Popularity
transistor-power	Eagle Pcb	Power Transistors	
BD679		NPN DARLINGTON TRANSIS...	



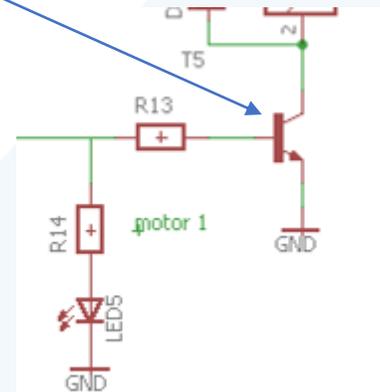
1
>VALUE



>NAME
>VALUE

2mm
0.1in

BD679 (Version 2)



Con amp



pinhead

J1



Properties

Part

Name: J1

Position: -3.1 4.5

Gate: G\$1 (MTA-1_6)

Angle: 90

Mirror

Device: MTA06-100

Package: 10X06MTA

Library: con-amp

Value:

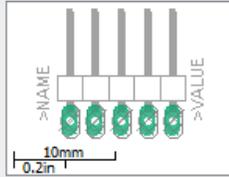
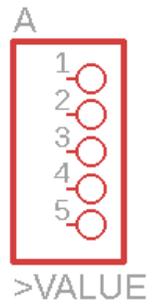
Smashed

AMP connector

OK Cancel Apply

ADD

Name	Managed Folder	Description	Pop
▶ TSW-149-*-G		THROUGH-HOLE .025" SQ ...	
▶ TSW-149-*-G-S		THROUGH-HOLE .025" SQ ...	
▶ TSW-150-*-G		THROUGH-HOLE .025" SQ ...	
▶ TSW-150-*-G-S		THROUGH-HOLE .025" SQ ...	
▶ TSW-150-*-G-T		THROUGH-HOLE .025" SQ ...	
▼ jumper	Eagle Pcb	Jumpers	
JUMP-Q		JUMPER header	■ ■ ■
JUMPER		JUMPER header	
▼ pinhead	Eagle Pcb	Pin Header Connectors	
PINHD-1X1		PIN HEADER	■ ■ ■
▶ PINHD-1X2		PIN HEADER	
▶ PINHD-1X3		PIN HEADER	
▶ PINHD-1X4		PIN HEADER	
▼ PINHD-1X5		PIN HEADER	
PINHD-1X5		1X05	■ ■ ■
PINHD-1X5/90		1X05/90	■ ■ ■
PINHD-1X55X2MM		1_05X2MM	
▶ PINHD-1X6		PIN HEADER	
▶ PINHD-1X7		PIN HEADER	
▶ PINHD-1X8		PIN HEADER	
▶ PINHD-1X9		PIN HEADER	
▶ PINHD-1X10		PIN HEADER	
▶ PINHD-1X11		PIN HEADER	
▶ PINHD-1X12		PIN HEADER	
▶ PINHD-1X13		PIN HEADER	
▶ PINHD-1X14		PIN HEADER	



PINHD-1X5 (Version 5)

PIN HEADER

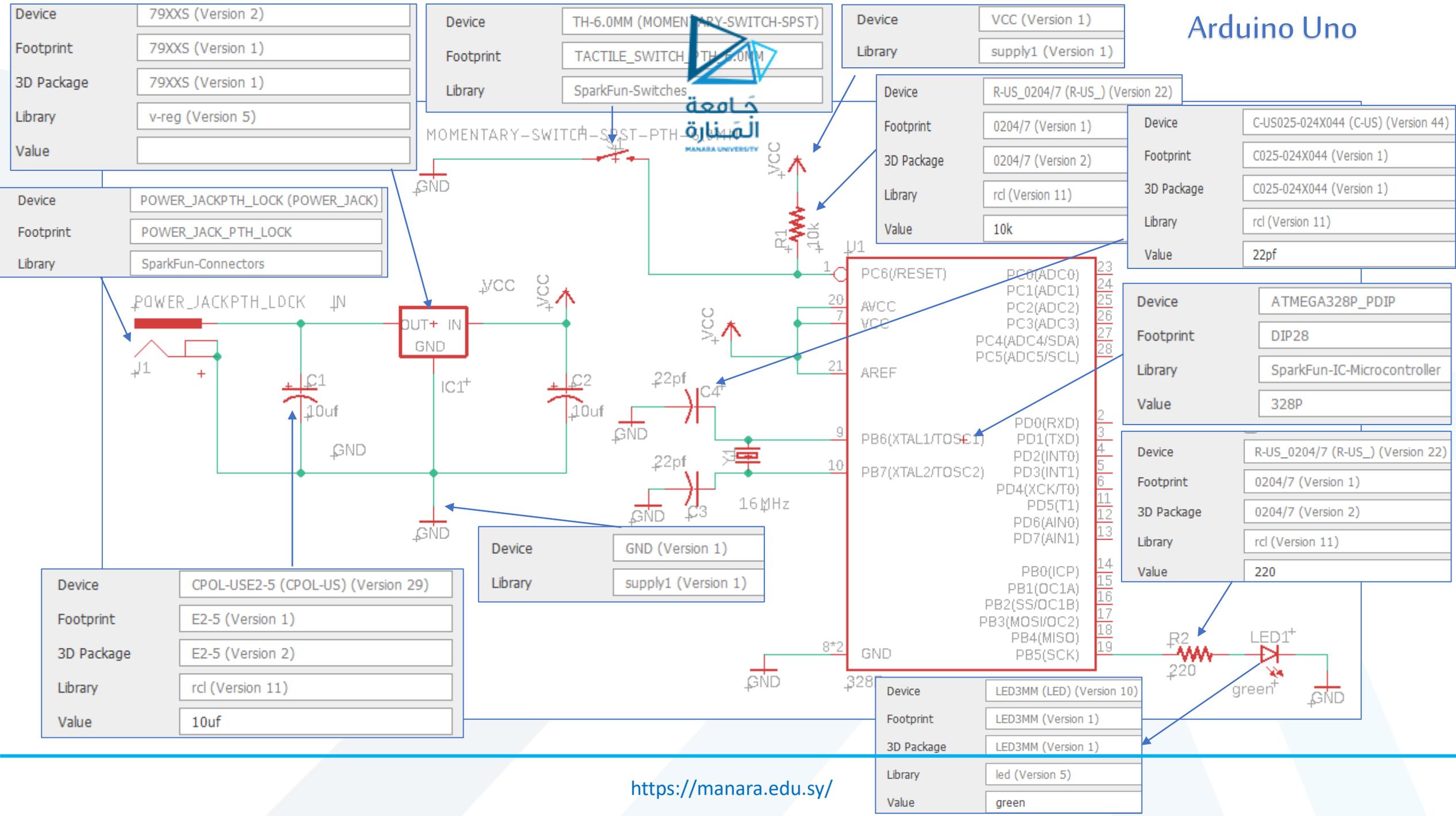
Footprint: 1X05/90 (Version 1)

PIN HEADER

3D Package: 1X05/90 (Version 2)

PIN HEADER

Arduino Uno



Device	79XXS (Version 2)
Footprint	79XXS (Version 1)
3D Package	79XXS (Version 1)
Library	v-reg (Version 5)
Value	

Device	TH-6.0MM (MOMENTARY-SWITCH-SPST)
Footprint	TACTILE_SWITCH_TH-6.0MM
Library	SparkFun-Switches

Device	VCC (Version 1)
Library	supply1 (Version 1)

Device	R-US_0204/7 (R-US_) (Version 22)
Footprint	0204/7 (Version 1)
3D Package	0204/7 (Version 2)
Library	rd (Version 11)
Value	10k

Device	C-US025-024X044 (C-US) (Version 44)
Footprint	C025-024X044 (Version 1)
3D Package	C025-024X044 (Version 1)
Library	rd (Version 11)
Value	22pf

Device	POWER_JACKPTH_LOCK (POWER_JACK)
Footprint	POWER_JACK_PTH_LOCK
Library	SparkFun-Connectors

Device	ATMEGA328P_PDIP
Footprint	DIP28
Library	SparkFun-IC-Microcontroller
Value	328P

Device	R-US_0204/7 (R-US_) (Version 22)
Footprint	0204/7 (Version 1)
3D Package	0204/7 (Version 2)
Library	rd (Version 11)
Value	220

Device	CPOL-USE2-5 (CPOL-US) (Version 29)
Footprint	E2-5 (Version 1)
3D Package	E2-5 (Version 2)
Library	rd (Version 11)
Value	10uf

Device	GND (Version 1)
Library	supply1 (Version 1)

Device	LED3MM (LED) (Version 10)
Footprint	LED3MM (Version 1)
3D Package	LED3MM (Version 1)
Library	led (Version 5)
Value	green

Properties

Part

Name: S1

Position: 2.5 4.1

Gate: G\$1 (SWITCH-MOMENTARY-2)

Angle: 0

Mirror

Device: TH-6.0MM (MOMENTARY-SWITCH-SPST)

Footprint: TACTILE_SWITCH_PTH_6.0MM

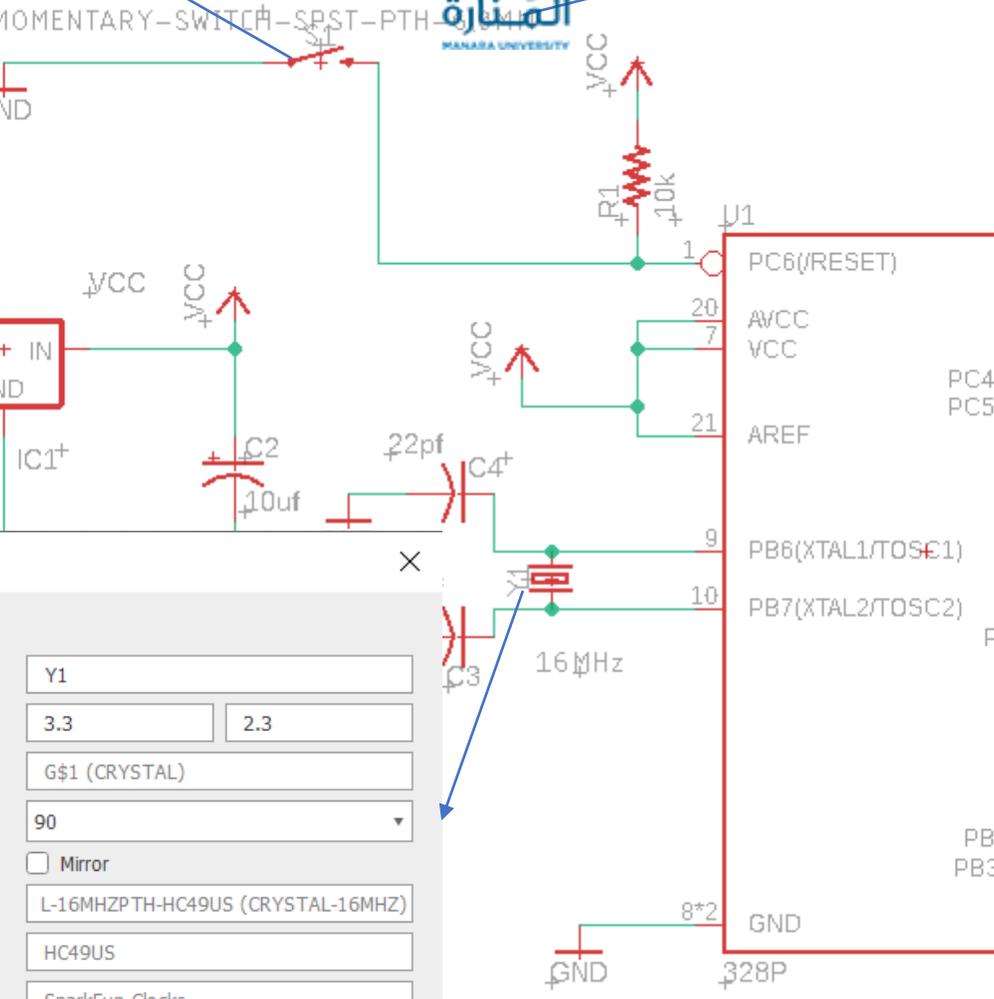
Library: SparkFun-Switches

Description: Momentary Switch (Pushbutton) - SPST

Attributes

Name	Value
SF_SKU	COM-00097
PROD_ID	SWCH-08441

OK Cancel



Properties

Part

Name: Y1

Position: 3.3 2.3

Gate: G\$1 (CRYSTAL)

Angle: 90

Mirror

Device: L-16MHZPTH-HC49US (CRYSTAL-16MHZ)

Footprint: HC49US

Library: SparkFun-Clocks

Value: 16MHz

Description: 16MHz Crystal

Properties

Attribute

Name: NAME

Value: S1

Position: 2.5 4.16

Angle: 0

Mirror

Size: 0.07

Ratio: 8 %

Font: vector

Align: bottom-center

Layer: **95 Names**

Display: value

Part

Name: S1

Gate: G\$1 (SWITCH-MOMENTARY-2)

Device: TH-6.0MM (MOMENTARY-SWITCH-SPST)

Footprint: TACTILE_SWITCH_PTH_6.0MM

Library: SparkFun-Switches

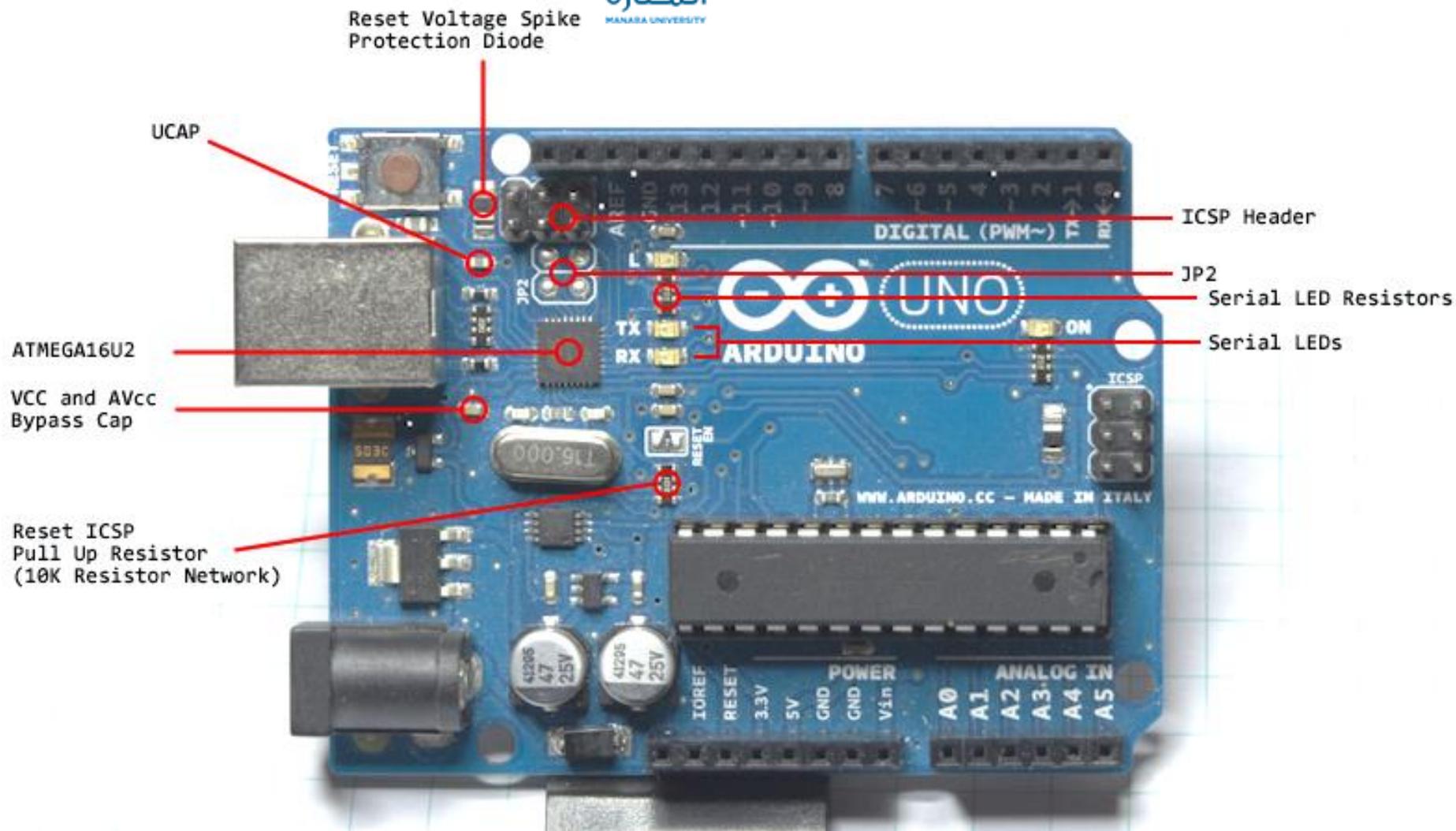
Description: Momentary Switch (Pushbutton) - SPST

OK Cancel Apply



جامعة
المنارة
MANARA UNIVERSITY

atmega8u2-mu



Properties

Part

Name: C5

Position: 4.2 | 4

Gate: G\$1 (C-US)

Angle: 90

Device: C-US025-024X044 (C-US) (Version 44)

Footprint: C025-024X044 (Version 1)

3D Package: C025-024X044 (Version 1)

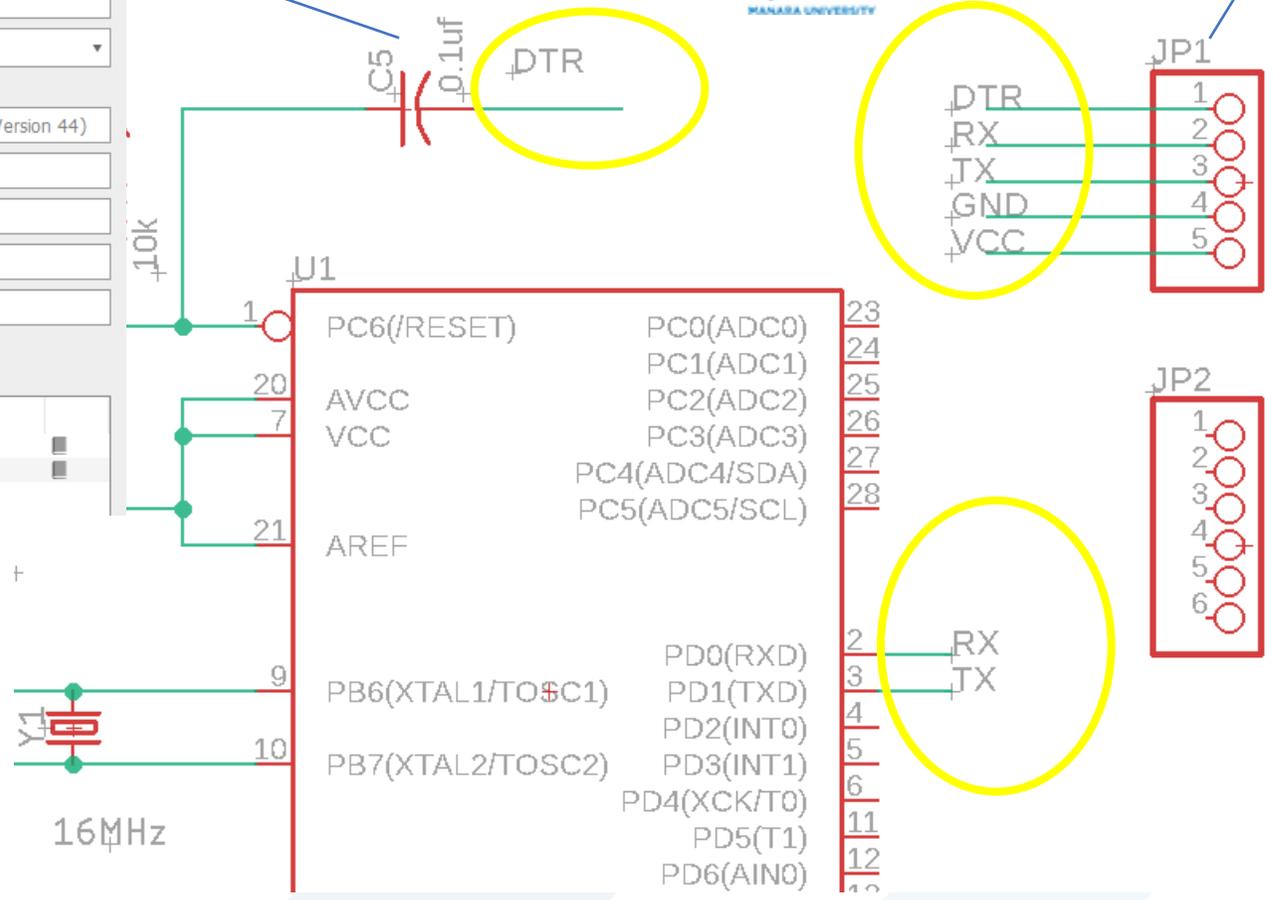
Library: rcl (Version 11)

Value: 0.1uf

Description: CAPACITOR, American symbol

Name	Value
SPICEPREFIX	C
POPULARITY	17

CP2102 USB TO TTL SERIAL ADAPTER



Properties

Part

Name: JP1

Position: 6.5 | 3.8

Gate: A (PINHD5)

Angle: 0

Device: PINHD-1X5/90 (PINHD-1X5) (Version 5)

Footprint: 1X05/90 (Version 1)

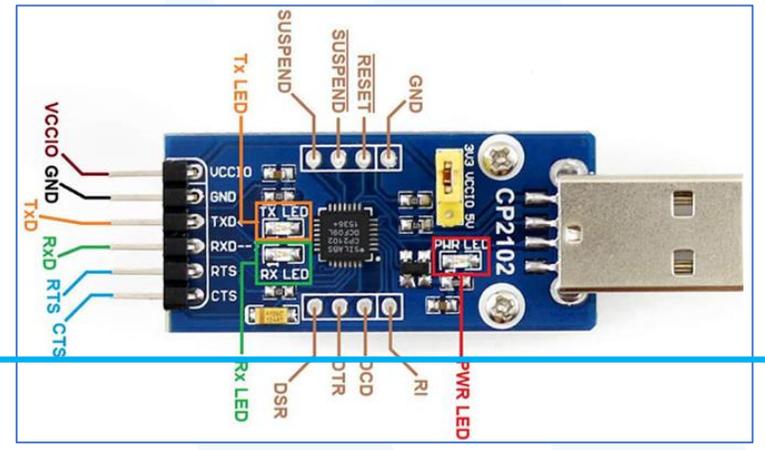
3D Package: 1X05/90 (Version 2)

Library: pinhead (Version 4)

Value:

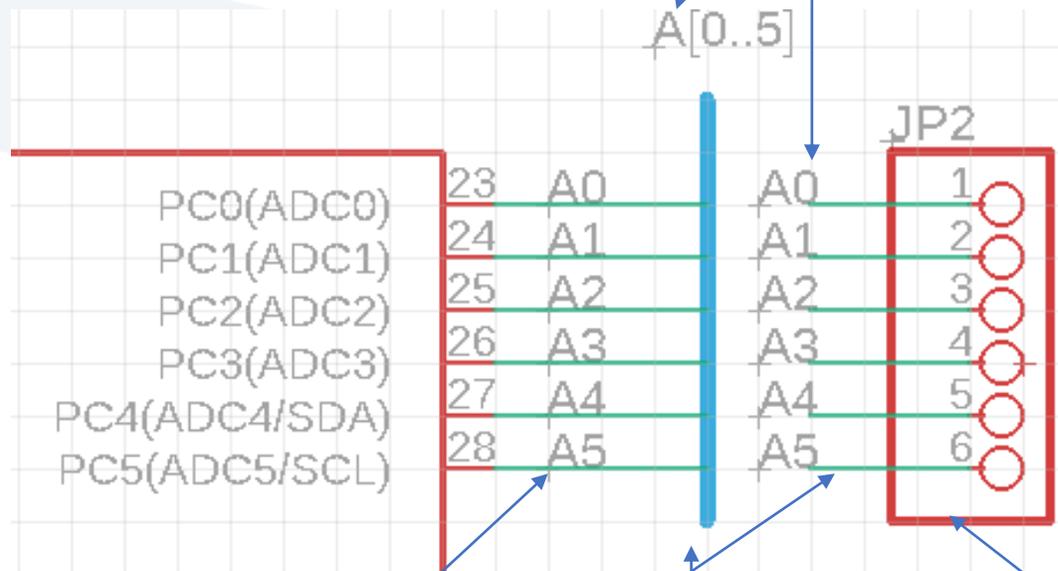
Description: PIN HEADER

Name	Value
POPULARITY	9





A[0..5]



Properties

Part

Name: JP1

Position: 6.5 3.8

Gate: A (PINHD5)

Angle: 0

Mirror

Device: PINHD-1X5/90 (PINHD-1X5) (Version 5)

Footprint: 1X05/90 (Version 1)

3D Package: 1X05/90 (Version 2)

Library: pinhead (Version 4)

Value:

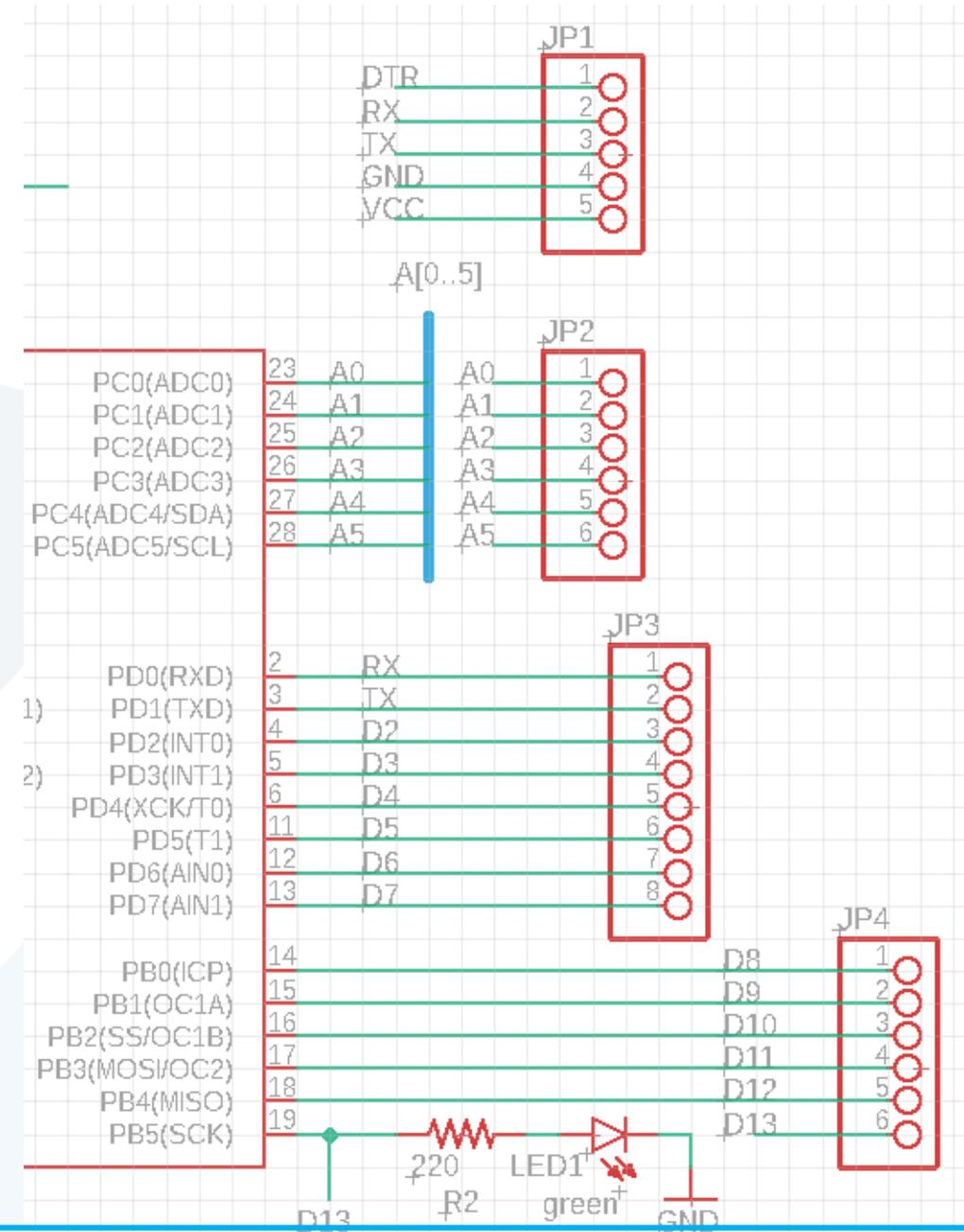
Description: PIN HEADER

Attributes

Name	Value
POPULARITY	9

- Using Bus wire
- Label
- Name

- Label
- Name



Add frame A4

TABL_P	FRAME
▼ SparkFun-Aesthetics	SparkFun Aesthetics
FRAME-A4L	Schematic Frame - A4L - Eu...
▶ FRAME-LEDGER	Schematic Frame - Ledger
▶ FRAME-LETTER	Schematic Frame - Letter
▼ SparkFun-IC-Comms	SparkFun Communication ICs
▶ MCP2515(MCP2510)	CAN controller with SPI inte...
▼ SparkFun-Resistors	SparkFun Resistors
▶ TRIMPOT	Trimming Potentiometer (T...
▼ SparkFun-Retired	SparkFun Electronics' Retire...
CREATIVE_COMMONS	Creative Commons License s...
FRAME-A3	Schematic Frame
FRAME-LETTER	Schematic Frame

Pads
 Smds
 Description
 Hide Unpopular Parts
 Preview

Search

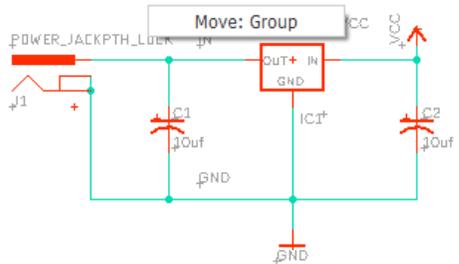
Attributes

Attribute	Value
DESIGNER	
REV	

Add frame A4- global attributes



Group
Then move each group (right click to move a group after selecting it)



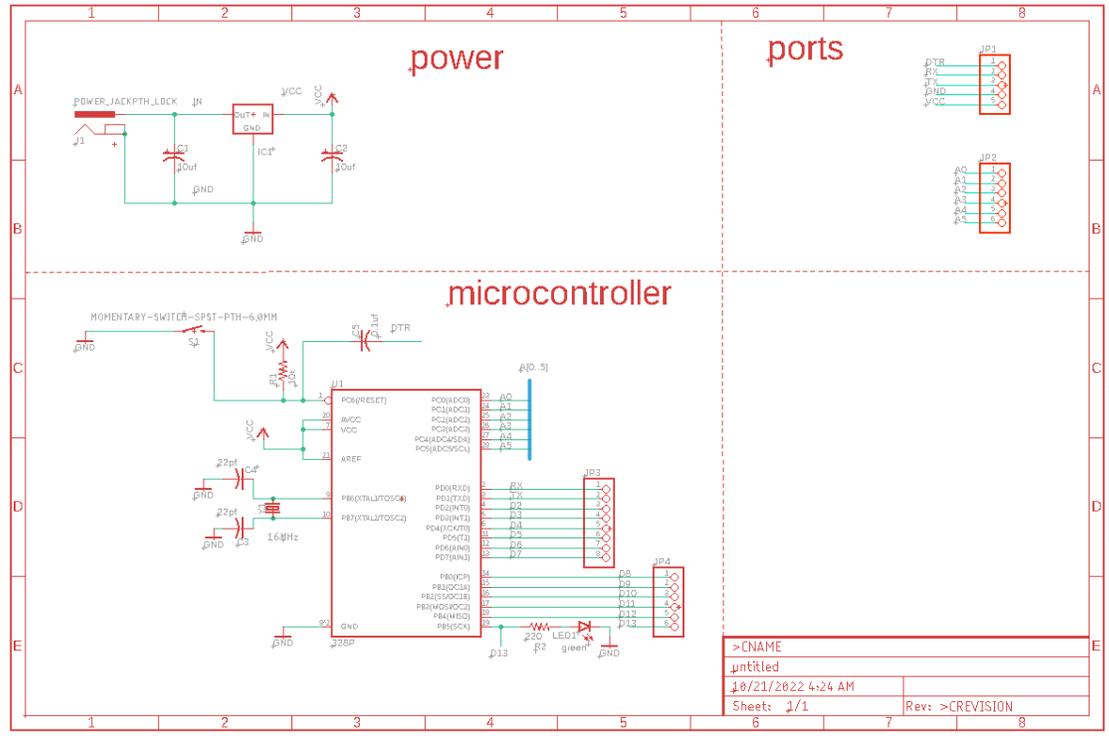
Draw lines
Add text



Layer: ■ 94 Symbols Wid

Width: 0.1524 Style: shortdash Radius: 0

Modify the text by right click on it then properties



Press F2
Or view-> redraw to update the name based on your file name "untitled"
Other like CNAME and rev from edit then global attributes

Global Attributes

Name	Value
CNAME	ESSA

OK New Change Del Cancel

Save as pdf

From Print



Print [Close]

Printer: Microsoft Print to PDF ...

Setup: colored, 1 copy

Output file: [] ...

Paper: A4 (210x297 mm, 8.3x11.7 inch) ...

Orientation: Portrait

Alignment: Center

Area: Full

Preview

Options

Mirror

Rotate

Upside down

Black

Solid

Caption

Scale

Scale factor: [1]

Page limit: [0]

Schematic sheets

All

From [1] to [1]

This (1/1)

Hierarchy

Calibrate

X [1]

Y [1]

Border

Left [0inch] Right [0inch]

Top [0inch] Bottom [0inch]

Actual scaling 1.00

[OK] [Cancel]

EXPORT Bill of Material BOM



1 Schematic - E:\softwares\Engineering Apps\electronic sc

File Edit Draw View Tools Library Options Window Help

- New Ctrl+N
- Open... Ctrl+O
- Open recent
- Save Ctrl+S
- Save as...
- Save Copy for EAGLE 7.x...
- Save all
- Save as Design Block...
- Save Selection as Design Block...
- Print setup...
- Print... Ctrl+P
- Switch to board
- Import
- Export
 - Netlist
 - SpiceNetList
 - Partlist
 - Pinlist
 - NetScript
 - BOM**
 - DXF
 - Libraries
- Execute Script...
- Run ULP...
- Close Ctrl+F4
- Exit Alt+X

Design Manager

1 shown (1 selected)

Type

Parts 34 of

Eagle: Bill Of Material

Current variant "

Part	Value	Device	Package	Description	POPULARITY	PROD_ID	SF_ID	SF_SKU	SPICEPREFIX	VAL
C1	10uf	CPOL-USE2-5	E2-5	POLARIZED CAPACITOR, American symbol	7				C	
C2	10uf	CPOL-USE2-5	E2-5	POLARIZED CAPACITOR, American symbol	7				C	
C3	22pf	C-US025-024X044	C025-024X044	CAPACITOR, American symbol	17				C	
C4	22pf	C-US025-024X044	C025-024X044	CAPACITOR, American symbol	17				C	
C5	0.1uf	C-US025-024X044	C025-024X044	CAPACITOR, American symbol	17				C	
F2	72V/0.25A	PPTC_PTH	PTH	Resettable Fuse PPTC		RES-08490				72V
IC1		79XS	79XS	VOLTAGE REGULATOR	3					
J1	POWER_JACKPTH_LOCK	POWER_JACKPTH_LOCK	POWER_JACK_PTH_LOCK	Power Jack Connector		CONN-08197		PRT-00119		
JP1		PINHD-1X5	1X05	PIN HEADER	69					
JP2		PINHD-1X6	1X06	PIN HEADER	79					
JP3		PINHD-1X6	1X06	PIN HEADER	79					
JP5		PINHD-1X8	1X08	PIN HEADER	67					
LED2	green	LED5MM	LED5MM	LED	93					
LED3	red	LED5MM	LED5MM	LED	93					
LED5	green	LED3MM	LED3MM	LED	97					
R1	10k	R-US_0204/7	0204/7	RESISTOR, American symbol	48				R	
R2	220	R-US_0204/7	0204/7	RESISTOR, American symbol	48				R	
R3	10k	R-US_0204/7	0204/7	RESISTOR, American symbol	48				R	
R4	330	R-US_0204/7	0204/7	RESISTOR, American symbol	48				R	
S1	SPST-PTH-6.0MM	MOMENTARY-SWITCH-SPST-PTH-6.0MM	TACTILE_SWITCH_PTH_6.0MM	Momentary Switch (Pushbutton) - SPST		SWCH-08441		COM-00097		
U1	328P	ATMEGA328P_PDIP	DIP28	Atmel 328P		IC-09136				328P
Y1	16MHz	CRYSTAL-16MHZPTH-HC49US	HC49US	16MHz Crystal		XTAL-08181		COM-00536		16M

List type

- Parts
- Values
- List attributes

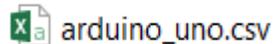
Output format

- Text
- CSV
- HTML

View Save... Help Close

Version 1.11

Click save

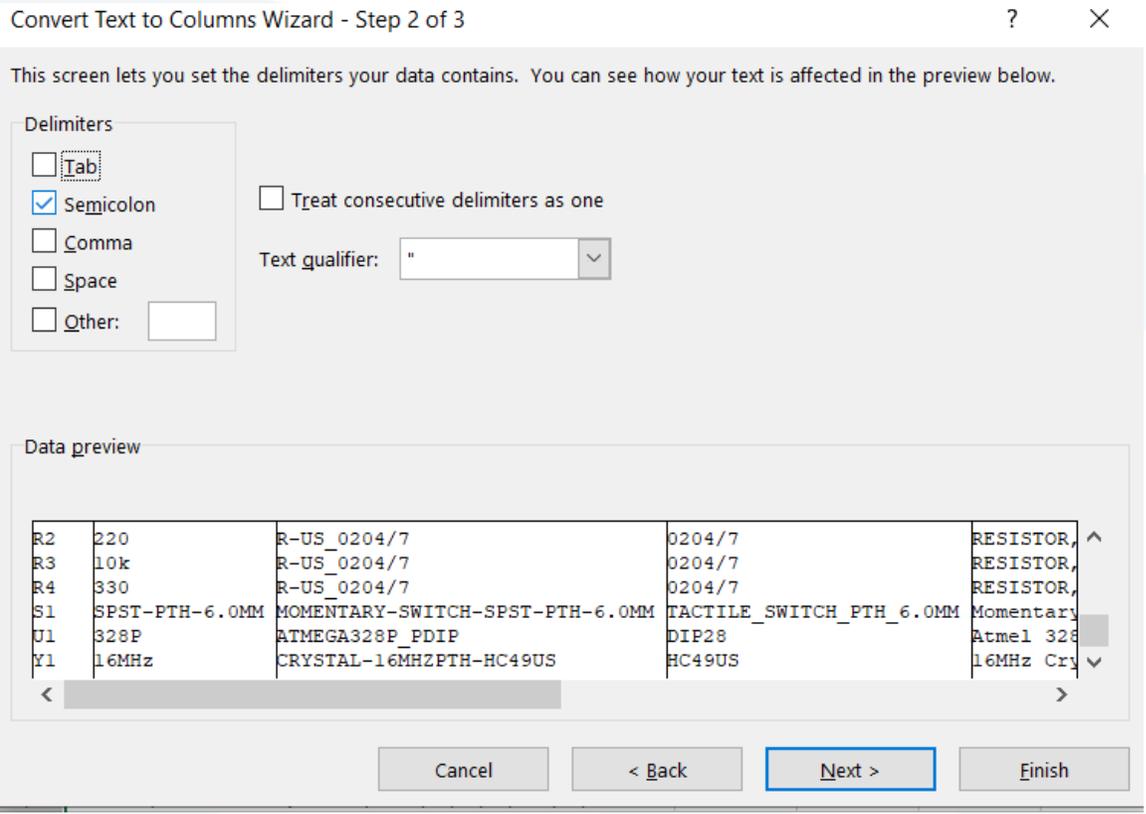
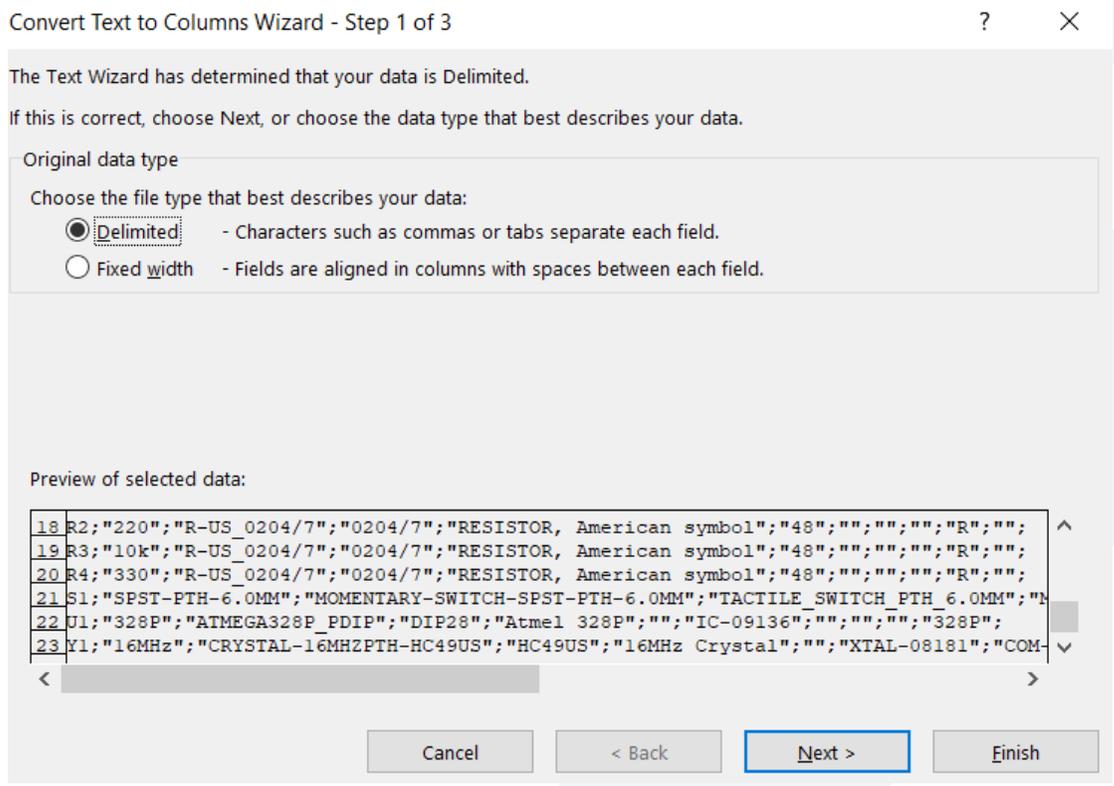
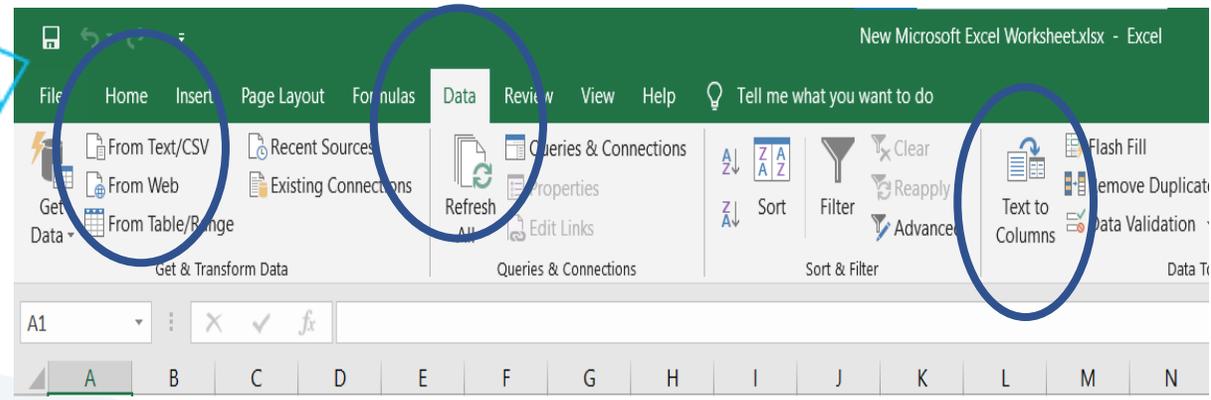


Converts Data csv to Excel

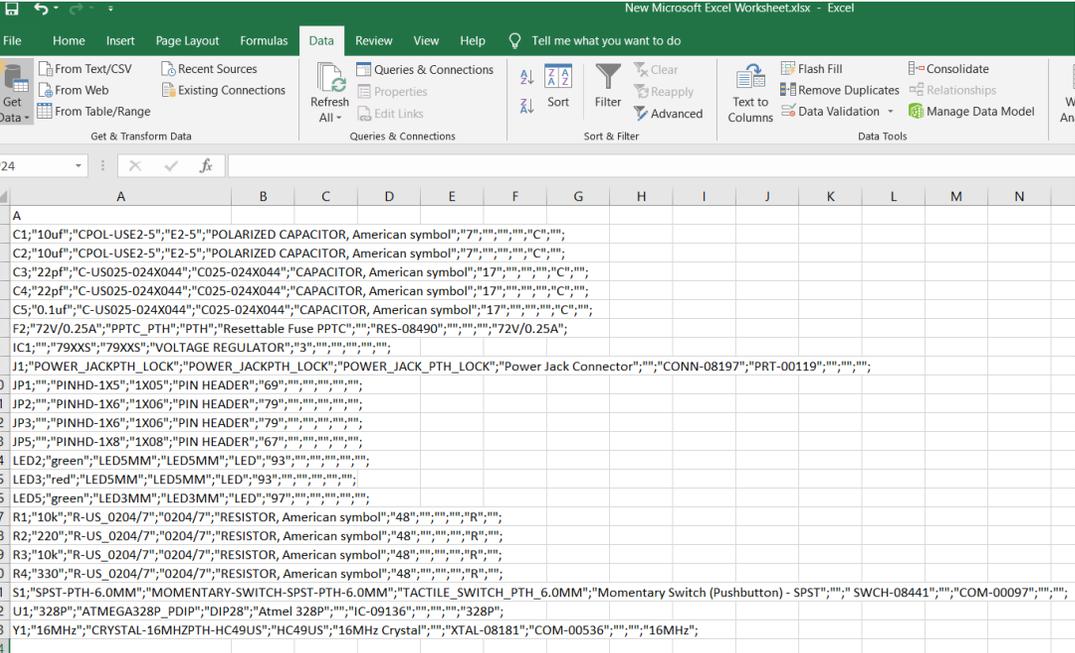
Open the file arduino_uno.csv with notepad++ and select all then copy

Open Excel and select the first column and paste

Select all then Open data then **text to column**



Converts Data csv to Excel



	A	B	C	D	E	F	G	H	I	J	K	L
1	Qty	Value	Device	Package	Parts	Description	POPULARI	PROD_ID	SF_ID	SF_SKU	SPICEPREF	VALUE
2	1		79XXS	79XXS	IC1	VOLTAGE I	3					
3	1		PINHD-1X	1X05	JP1	PIN HEADE	69					
4	2		PINHD-1X	1X06	JP2, JP3	PIN HEADE	79					
5	1		PINHD-1X	1X08	JP5	PIN HEADE	67					
6	1	0.1uf	C-US025-C	C025-024	C5	CAPACITO	17				C	
7	2	10k	R-US_020	0204/7	R1, R3	RESISTOR,	48				R	
8	2	10uf	CPOL-USE	E2-5	C1, C2	POLARIZE	7				C	
9	1	16MHz	CRYSTAL-1	HC49US	Y1	16MHz Crystal		XTAL-0818	COM-00536			16MHz
10	1	220	R-US_020	0204/7	R2	RESISTOR,	48				R	
11	2	22pf	C-US025-C	C025-024	C3, C4	CAPACITO	17				C	
12	1	328P	ATMEGA3	DIP28	U1	Atmel 328P		IC-09136				328P
13	1	330	R-US_020	0204/7	R4	RESISTOR,	48				R	
14	1	72V/0.25A	PPTC_PTH	PTH	F2	Resettable Fuse PPTC		RES-08490				72V/0.25A
15	1	POWER_J	POWER_J	POWER_J	J1	Power Jack Connecto		CONN-081	PRT-00119			
16	1	SPST-PTH-	MOMENTA	TACTILE_S	S1	Momentary Switch (P		SWCH-08441		COM-00097		
17	1	green	LED3MM	LED3MM	LED5	LED	97					
18	1	green	LED5MM	LED5MM	LED2	LED	93					
19	1	red	LED5MM	LED5MM	LED3	LED	93					
20												

Part #/ Keyword × 🔍

Search History

atmega

Clear All

RF Transceiver ICs (24)

Single Chip Microcomputer/Micro

25 < **1** 2 3 4 ... 31 32 33 >

Images	Pricing ↑↓	Quantity	Availability ↓	Mfr.Part # ↑↓	Manufacturer	Description	RoHS
  Datasheet		<input type="text"/> Min: 1 Mult: 1 Add	Discontinued	ATMEGA8A-AN	Microchip Tech	TQFP-32 Microcontroller Units (MCUs/MPUs/SOCs) ROHS	
	1+ US\$2.4512 200+ US\$0.9485 500+ US\$0.9158 1000+ US\$0.9003	<input type="text"/> Min: 1 Mult: 1 Add	0	ATMEGA8A-MU	Atmel	VQFN-32(5x5) Microcontroller Units (MCUs/MPUs/SOCs) ROHS	
	1+ US\$1.847 10+ US\$1.5974	<input type="text"/> Min: 1 Mult: 1 Add	0	ATMEGA8A-MN	Microchip Tech	4K@x16bit -40°C~+105°C 2.7V~5.5V AVR	 



نهاية المحاضرة