

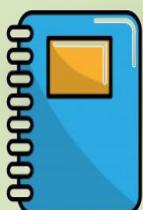


Instrumentation and Sensor Networks:

ENGT5105

**ARDUINO VS EMBEDDED SYSTEMS
IN INSTRUMENTATION WORLD**

Dr Ata Jahangir Moshayedi



Prof Associate ,
School of information engineering Jiangxi university of
science and technology, China

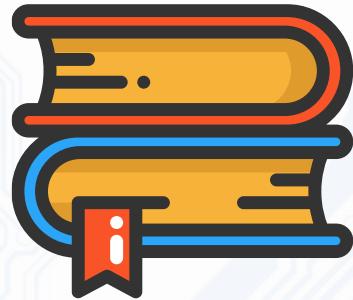
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Autumn _2021



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Instrumentation and Sensor Networks:

ENGT5105

LECTURE 03: ARDUINO VS EMBEDDED SYSTEMS IN INSTRUMENTATION WORLD (2)

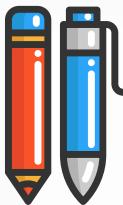


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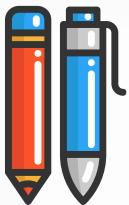
Agenda

24 OCT 2021

Instrumentation and Sensor Networks: ENGT5105

- Simulator In Arduino Why and types?
 - **16 Best Arduino Simulator That You Can Download Now free**
 - Introduction to tinker cad as Arduino simulator and some examples



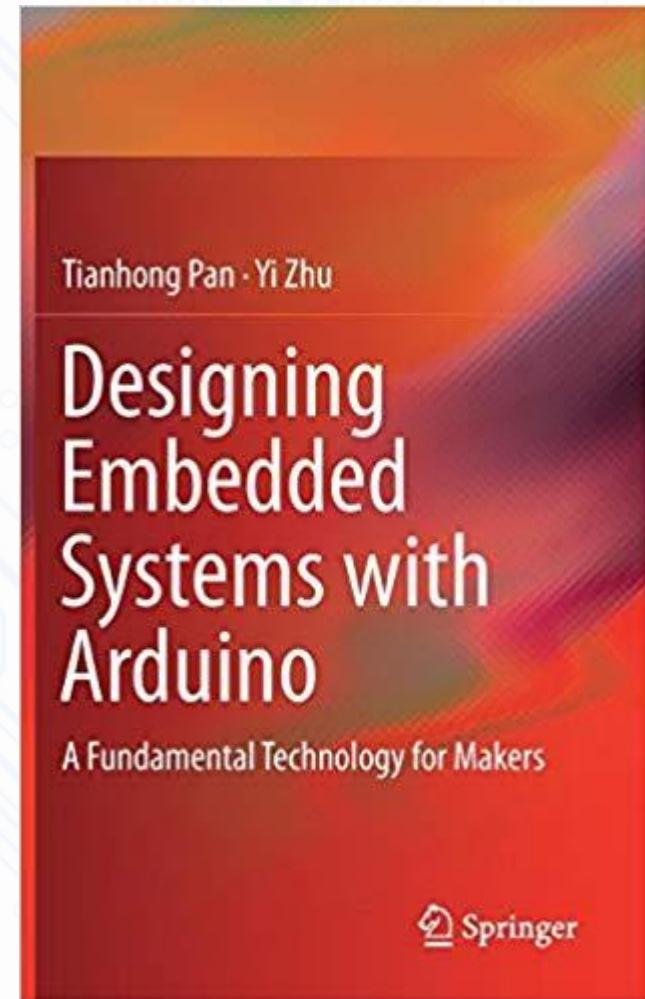


Reference book

Designing Embedded Systems with Arduino:
A Fundamental Technology for Makers

1st ed. 2018 Edition

by **Tianhong Pan , Yi Zhu**





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嵌入式系统

EMBEDDED SYSTEMS

Simulator In Arduino

Why and types?

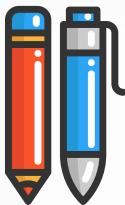


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16 Best Arduino Simulator That You Can Download Now free



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Model Library Resources Applications User Forum About Log In Search

PSpice User Forum

Have questions about Cadence® PSpice® technologies? Ask the PSpice User Forum! The PSpice user community is your destination to find PSpice resources, ask and answer questions, and interact with your industry peers and PSpice experts!

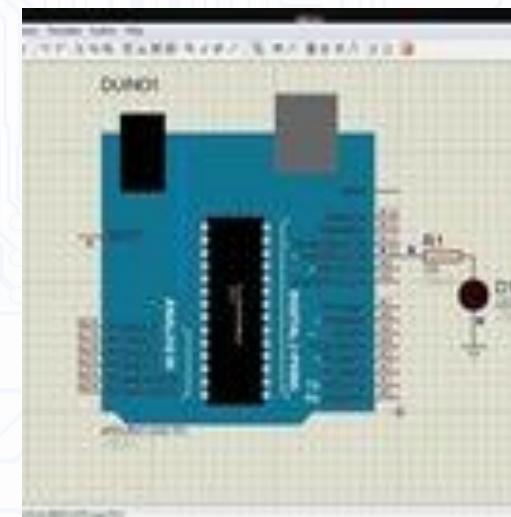
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Make Reliable Designs That Won't Fail In The Real World! Use Smoke Analysis In PSpice

Head about the ongoing recalls in Automotive and Cellphone Industry? Recalls are never fun and are costly. Check out our latest blog which addresses the important issue of Circuit Reliability!



Arduino Led Array

All changes saved

Code Editor Components Stop Simulation

Arduino Led Array

CIRCUIT LAB

Search My Workbench Electronics Q&A Textbook

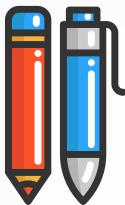
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Circuit simulation and schematics.

Build and simulate circuits right in your browser.

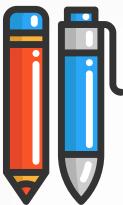
- Design with our easy-to-use schematic editor.
- Analog & digital circuit simulations in seconds.
- Professional schematic PDFs, wiring diagrams, and plots.
- No installation required! Launch it instantly with one click.

Launch CircuitLab or watch a quick demo video →



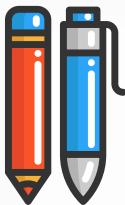
Why we need simulator

- A simulator is a device or software that simulates certain functions of another system but does not claim to create an exact copy.
- This is some kind of virtual environment in which we simply model another system. With that being said, Arduino simulator is not any different than any other simulator.
- A good Arduino simulator program can read, understand and interpret the Arduino IDE based programs without needing any physical Arduino board.
- Real-time event modeling is the basis of many industries today. Over the years, some large-scale simulation processes have been an area of study for ??aeronautics and aviation.
- Today, the Arduino simulators allow all novices and professional designers to learn how to program and test ideas in a virtual environment without any consequences.



Advantages of an Arduino Simulator

- Arduino simulators are a great platform for programmers and designers who want to learn the basics of design and circuit design.
- The success of such programs is due to the fact that it provides you with the opportunity to study without fear of damaging the device. In addition, students who may have problems with the acquisition of electrical equipment, without having a clue about how they will function, can understand many nuances through tests and errors with the help of these simulators. It will save you a lot of money and time.
- Another great advantage of Arduino simulators is that it supports line-by-line debugging. So, the user knows exactly where and in which line he or she did something wrong. Simulators exist in various forms and are designed compatible with the mainstream operating systems like Windows, Linux, and Mac OS. Therefore, in order to simplify the search for an excellent Arduino simulator created for the ecosystem of your computer, we have compiled a list of the most popular Arduino Simulators.



16 Best Arduino Simulator That You Can Download Now free

1. PaulWare Arduino Simulator

Download PaulWare Arduino Simulator:

<https://github.com/Paulware/ArduinoDebugger/>

2 .Simduino for iPad

Download Simduino for iPad:

[https://apps.apple.com/us/app/simduino/id526927905?ls=1&mt=8.](https://apps.apple.com/us/app/simduino/id526927905?ls=1&mt=8)

3. ArduinoSim

Download ArduinoSim: <https://sourceforge.net/projects/arduinosim>

4. Arduino Simulator for PC

Download Arduino Simulator for PC:

<http://www.virtronics.com.au/Simulator-for-Arduino.html>

5. Emulare Arduino Simulator

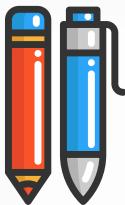
Download Emulare Arduino Simulator:

<https://www.softpedia.com/get/Others/Miscellaneous/Emulare.shtml>

6. Simulator for Arduino

Download Simulator for Arduino:

<http://virtronics.com.au/Simulator-for-Arduino.html>



16 Best Arduino Simulator That You Can Download Now

7. Yenka

Download Yenka: <https://www.yenka.com>

8. Autodesk EAGLE

Download Autodesk Eagle: <https://www.autodesk.com/solutions/123d-apps>

9. LTSpice Arduino Simulator

Download LTSpice Arduino Simulator:

<https://www.analog.com/en/design-center/design-tools-and-calculators.html#LTspice>

10. PSpice

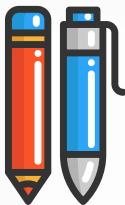
Download Pspice: <https://www.pspice.com>

11. Circuit Lab

Download Circuit Lab: <https://www.circuitlab.com/>

12. EasyEDA Simulator

Download EasyEDA Simulator: <https://easyeda.com>



16 Best Arduino Simulator That You Can Download Now free

13. Circuits-cloud Simulator

Download circuits-cloud simulator:

<http://circuits-cloud.com/>

14. Systemvision

Download SystemVision:

<https://www.systemvision.com/>

15. Proteus from Labcenter

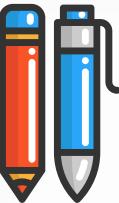
Download Proteus:

<https://www.labcenter.com/>

16. Virtual BreadBoard

Download Virtual BreadBoard:

<http://www.virtualbreadboard.com>



Example

```
int button = 5 ; // button connected to pin 5  
int LED = 6; // LED connected to pin 6
```

```
void setup () {
```

```
    pinMode(button , INPUT_PULLUP);  
    // set the digital pin as input with pull-up resistor  
    pinMode(button , OUTPUT);  
    // set the digital pin as output
```

```
}
```

```
void setup () {
```

```
    If (digitalRead(button ) == LOW) // if button pressed
```

```
{
```

```
        digitalWrite(LED,HIGH); // turn on led  
        delay(500); // delay for 500 ms  
        digitalWrite(LED,LOW); // turn off led  
        delay(500); // delay for 500 ms
```

```
}
```

Note:

```
}
```

It is worth mentioning here that digitalWrite command doesn't store or return any value unlike most of the commands used in Arduino that help in storing some value.

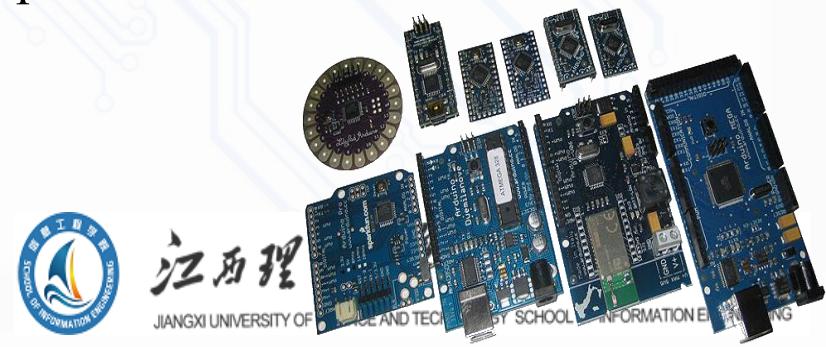


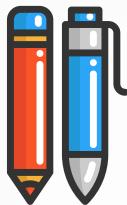


LECTURE 09: Introduction To Tinker cad as Arduino simulator
and some examples

嵌入式系统

EMBEDDED SYSTEMS



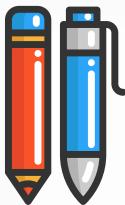


Agenda

- Arduino Simulation Using TINKERCAD
- Review on IDE Important part
- What Are The Different File Extensions For?



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TINKERCAD®



What's Tinkercad

- **Tinkercad** is a free, online 3D modeling program that runs in a web browser, known for its simplicity and ease of use.
- Since it became available in 2011 it has become a popular platform for creating models for 3D printing as well as an entry-level introduction to constructive solid geometry in schools



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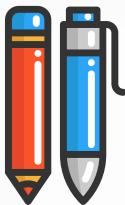


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Owner	Autodesk
URL	www.tinkercad.com
Commercial	Yes
Registration	Yes
Launched	2011
Written in	WebGL, JavaScript

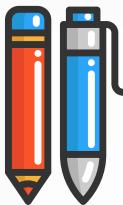


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Tinkering With Arduino

- In the world of 3D modelling, Tinkercad has established itself as a worthy introduction to computer-aided design (CAD). It's a free and intuitive web-based CAD program that anyone can use. In fact, if you want to get started with Tinkercad, we even have a beginner's tutorial to get you going.
- Recently, Tinkercad has introduced something new: An expansion to include circuits in its design capability called Tinkercad Circuits. This brings a whole new side to Tinkercad, revolving around simulating circuits with Arduino.
Arduino is an open-source electronic prototyping platform that also sells microcontrollers. Tinkercad Circuits allows anyone to virtually create and program Arduino projects without the need for physical hardware.

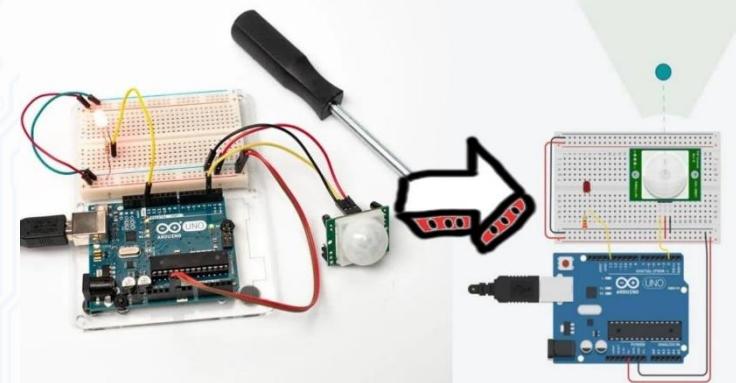


Why TINKERCAD Circuits ?

- TinkerCad is a simple, online 3D design and 3D printing app for everyone.
- we will show ,how to use TinkerCad for electronics simulation using Circuits.

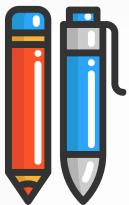


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TinkerCad offers many benefits :

- 1- Online : You do not need to install any thing in your PC.
- 2- OpenSoure : Free, no license needed, for everyone.
- 3- Simulator : He offer a good interface for designing and simulate your project he is better than Fritizing but his little problem is the lack of packages and components.

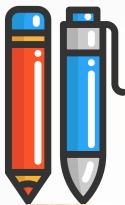


What Do Circuits Add to Tinkercad?

- Tinkercad has also introduced something extra to combine these two worlds: Its CAD environment now comes with circuit component models.
- **This means you can design a model with circuits and hardware, and once 3D printed, the circuit can be easily placed within the creation.**
- As we mentioned before, Tinkercad Circuits opens up the possibility of electrical functionality in your 3D printing projects. To that end, in the user's dashboard, you can find a whole section devoted to circuit projects.
- It's organized similarly to the CAD project gallery, making it easy to navigate.



You can also find circuits in the “Gallery” and “Learn” pages of Tinkercad.



TINKERCAD

The Design Suite

Incredible Jarv

Saving... (Cloud icon)

Code Start Simulation Export Share

Components All

Search

74HC93 74HC283
4-Bit Binary Counter 4-Bit Adder

74HC595 74HC4017
8-Bit Shift Register Johnson Decade Counter

CD4511
7-Segment Decoder

The screenshot shows the Tinkercad Circuits interface. At the top, there's a toolbar with icons for selection, trash, move, zoom, and eye. To the right are buttons for 'Code', 'Start Simulation', 'Export', and 'Share'. A progress bar indicates 'Saving...' with a cloud icon. On the left, there's a component palette with a search bar and a list of components: 74HC93 (4-Bit Binary Counter), 74HC283 (4-Bit Adder), 74HC595 (8-Bit Shift Register), 74HC4017 (Johnson Decade Counter), and CD4511 (7-Segment Decoder). The main workspace contains a complex circuit diagram with an Arduino Uno at the center, connected to various sensors (light, motion, temperature), a keypad, a digital display, and logic gates. A breadboard is also visible.

Once you decide to create a circuit, you'll be using the new Tinkercad Circuits environment.

Main page parts

The screenshot shows the Tinkercad main page with several labeled components:

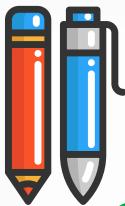
- Name of your project
- Some editing tool
- Your profile
- All changes saved
- Code
- Start Simulation
- Export
- Share
- Component
- Building Area
- Components area

Below the Building Area, a yellow box contains the URL:

<https://www.tinkercad.com/>

Component list from the Components area:

General	
Resistor	Capacitor
Polarized Capacitor	Diode
Zener Diode	Inductor



Components Area

- On the right side of your screen, you'll see a group of drag-and-drop electronic components.
- On top, you can search and filter through an impressive number of available components:
- There's everything from LEDs to integrated circuits (ICs), and even a few instrument tools.

Components Basic

Search

Resistor LED

Pushbutton Potentiometer

Capacitor Slide switch

9V Battery Coin Cell 3V

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Components Basic

Components Basic All

Starters

Basic

Arduino

micro:bit

Circuit Assemblies

All

Components Basic

Search

Resistor

Resistor Restricts the flow of electricity in a circuit, reducing the voltage and current as a result.

LED

Light-Emitting Diode that lights up when electricity passes through it in the correct...

Pushbutton

A switch that closes a circuit while pressed.

Potentiometer

A type of resistor whose resistance changes at the turn of a knob.

Capacitor

Stores and releases electrical energy in a circuit.

Zener Diode

Jiangxi University of Science and Technology

Components Basic

Search

General

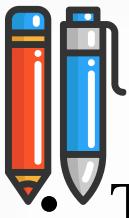
Resistor

Capacitor

Polarized Capacitor

Diode

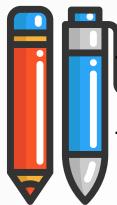
Inductor



building area

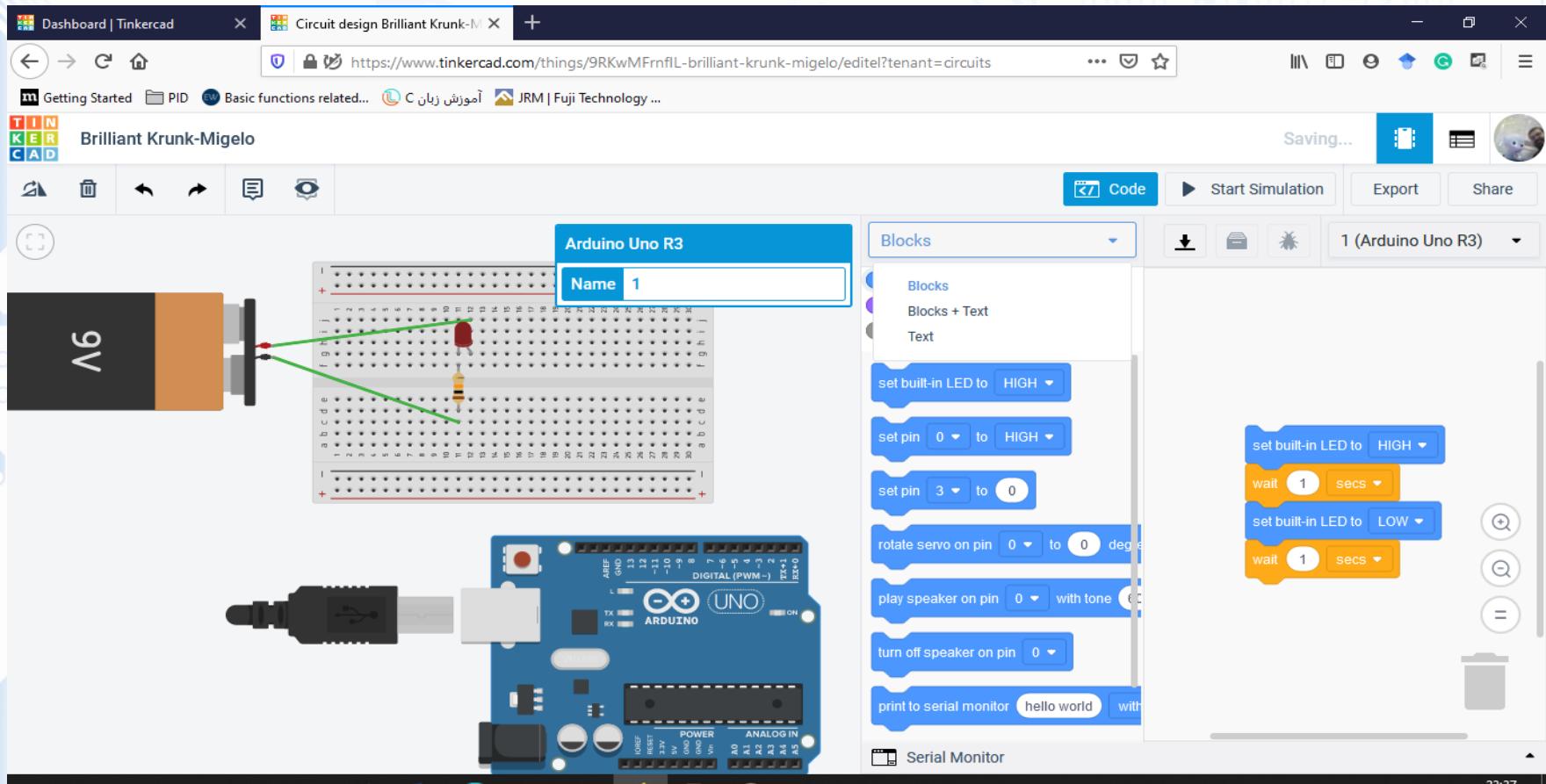
The open building area is where you design your creation..

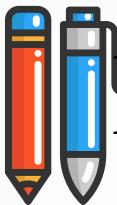
The screenshot shows the Tinkercad web interface for circuit design. At the top, there's a navigation bar with tabs for 'Dashboard | Tinkercad' and 'Circuit design Brilliant Krunk-M'. Below the bar, the URL is https://www.tinkercad.com/things/9RKwMFrfL-brilliant-krunk-migelo/editel?tenant=circuits. The main workspace is the 'building area' where components like resistors, capacitors, and diodes are placed. To the right is the 'Components' library, which is currently set to 'All' and shows categories like 'General', 'Microcontrollers', 'Power', 'Sensors', and 'Actuators'. Under 'General', components are categorized and shown with their icons: Resistors, Capacitors, Polarized Capacitors, Diodes, Zener Diodes, and Inductors.



Programming(coding) Area

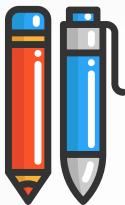
- Once you have a programmable component in your design, you can open the “Code” viewer by clicking on the button at the top right of the toolbar.





Programming(coding) Area

- Currently, the only two devices available are the Arduino Uno R3 and the ATTiny.
- The ATTiny is a more limited and miniaturized Arduino
- The programming area is a simplified integrated development environment (IDE) that makes programming the Arduino very straightforward.
- The default method is via code blocks, which we'll look at later, and there's also a dual view for learning how the code blocks translate to actual code.



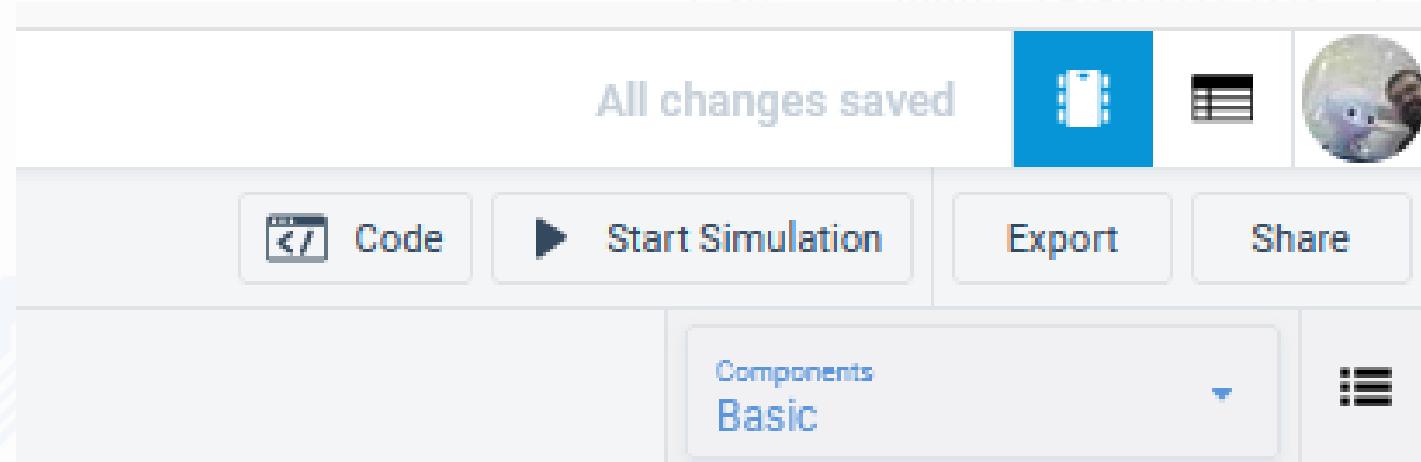
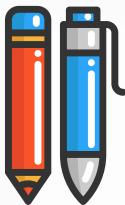
The top toolbar starting on the left gives you the general operations to rotate, delete, and even make notes on your different components



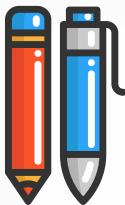
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A cool feature is that, in addition to exporting and sharing your work, you can download the component list. This makes it easier to bring your creations into the real world



How to get started:

- Go to TinkerCad and Set up a free account.
 - After you have signed up and activated your account you should see a screen similar to the one below.
 - Click where it says 3D in the top left of the work area to toggle to the Circuit design area.

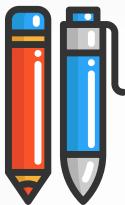
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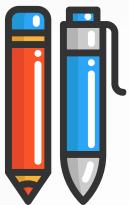
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TINKER CAD AUTODESK TINKERCAD

Welcome back
How will you sign in?

Students, join your class

Email or Username

Sign in with Google

Sign in with Apple

More sign in options...

Don't have an account yet?
Join Tinkercad

Privacy Settings

A black arrow points from the 'Email or Username' field on the Tinkercad page to the 'Email or Username' field on the Autodesk sign-in page.

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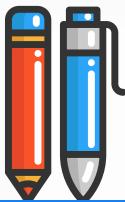
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@pete_codes**Tinkercad Lesson Plans**

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User Ata Jahangir Moshayedi X +

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ACCOUNT SETTINGS

Personal information

Kids

Picture

Browse... No file selected.

Full name*: Ata Jahangir Moshayedi

Email*: moshaydi@gmail.com

Used as login, not shown to others

Little bit about you:

Ata Jahangir Moshayedi, Born in Arak, Iran on 1980, he received his Bachelor of engineering degree in Power electrical from Azad University, Iran in 2004 and MSc degree in Instrumentation from the Department of INFORMATION ENGINEERING

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Teacher

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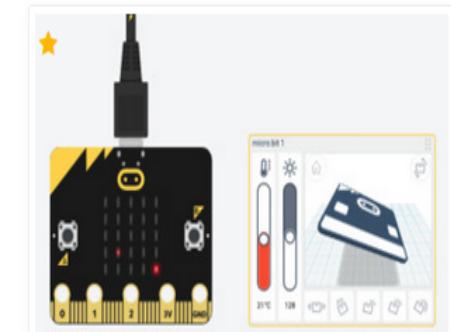
Classes Gallery Blog Learn Teach Q

https://www.tinkercad.com/things?type=circuits&view_mode=default

Gallery

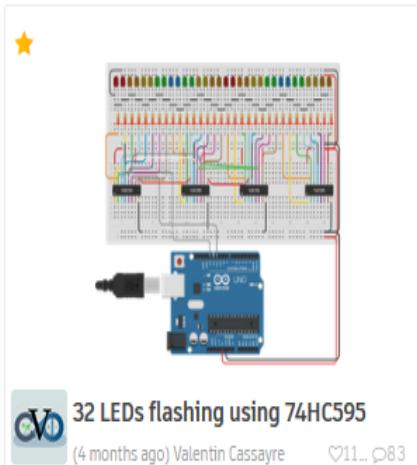
Designs Circuits

★ Staff favorites ▾ Small



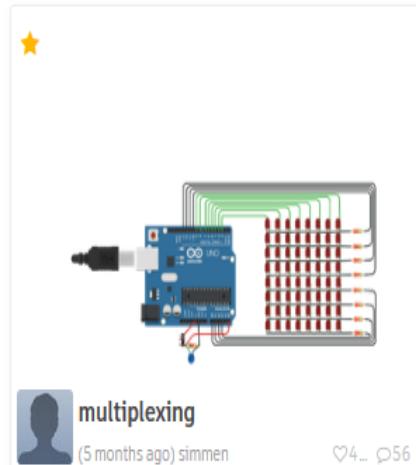
Falling rock game
(2 days ago) mr.punch

15 5



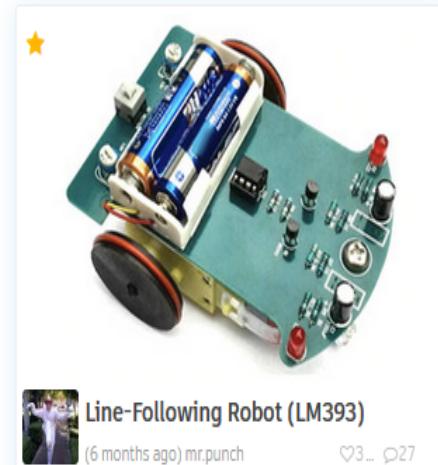
32 LEDs flashing using 74HC595
(4 months ago) Valentin Cassayre

11 83



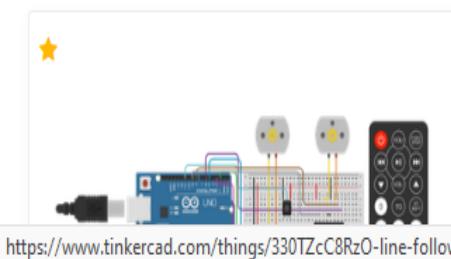
multiplexing
(5 months ago) simmen

4 56

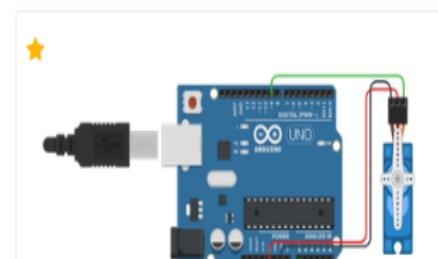
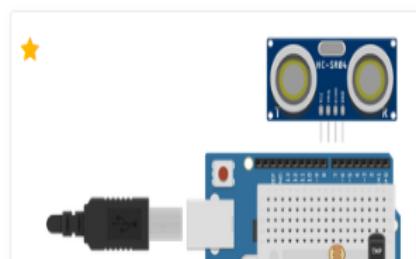
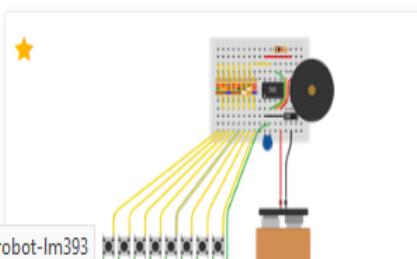


Line-Following Robot (LM393)
(6 months ago) mr.punch

3 27



<https://www.tinkercad.com/things/330TZcC8RzO-line-following-robot-lm393>



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Search designs...

3D Designs

Circuits

Codeblocks NEW

Lessons

Join Class

Projects

Project 1

+ Create project

Tweets Follow

Tinkercad Retweeted

Pete Gallagher - Azure #M

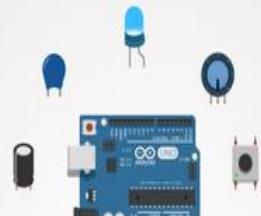


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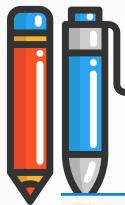
Circuits

Create new Circuit



Tinker with Circuits on Tinkercad!

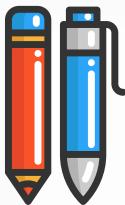
Try Circuits



Take A Tour In Tinkercad

The screenshot shows the Tinkercad homepage. At the top, there's a browser header with the URL <https://www.tinkercad.com>. Below the header, the Tinkercad logo is visible, followed by the text "AUTODESK® TINKERCAD". On the right side of the header, there are links for "Gallery", "Blog", "Learn", "Teach", a search icon, "Sign in", and a "JOIN NOW" button. The main visual is a 3D rendering of a scene with a green articulated dinosaur standing next to a potted plant in a yellow pot. To the right is a brown city skyline with several buildings. In the background, there's a bright blue sky with a yellow sun, a colorful rainbow, and some white clouds. In the foreground, there's a small blue toy car and another potted plant. The overall theme is creative and playful.

From mind to design in minutes



Creating an Account

- If you don't already have a **Tinker Cad** account then create one.

Create account



Country

United States

Birthday

Month

Day

Year

NEXT

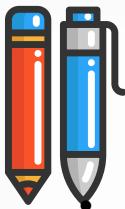
ALREADY HAVE AN ACCOUNT? [SIGN IN](#)



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Step 3: Go to TinkerCad Circuits

Click on Circuits to switch from 3D Designs to Circuits mode, and then click on Create new Circuit.

- If everything is all right let's start working and discover this platforme .

The screenshot shows the Tinkercad Circuits interface. On the left, there is a sidebar with a user profile picture for 'ahmnouira' and a search bar. Below the search bar are tabs for '3D Designs' (which is currently not selected), 'Circuits' (which is selected and highlighted in blue), and 'Lessons'. Under 'Projects', there are two items: 'Project 2' and 'Project 1', with a 'Create project' button below them. The main area is titled 'Circuits' and features a green 'Create new Circuit' button. Below this are four project cards: 'Smooth Lappi' (20 days ago, Private), 'Funky Blorr' (2 months ago, Private), 'Super Migelo' (2 months ago, Private), and 'Funky Bojo' (2 months ago, Private). Each card displays a small image of the circuit board and its components.



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DEMO#1

Dashboard | Tinkercad Bodacious Jarv | Tinkercad www.BANDICAM.com

<https://www.tinkercad.com/dashboard?type=circuits&collection=designs>

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Classes Gallery Blog Learn Teach Search

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Search designs...

3D Designs

Circuits

Codeblocks NEW

Lessons

Join Class

Projects

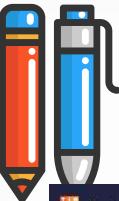
Project 1

Create new Circuit

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Bodacious Jarv
an hour ago
Private

23:32
ENG
13/11/2020



DEMO#2

Dashboard | Tinkercad Bodacious Jarv | Tinkercad + www.BANDICAM.com

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Ata Jahangir Moshayedi

Search designs...

3D Designs

Circuits

Create new Circuit

Select

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Bodacious Jarv
an hour ago
Private

Windows taskbar icons: File Explorer, Edge, Word, Excel, Powerpoint, Firefox, File, Task View.

23:32 13/11/2020



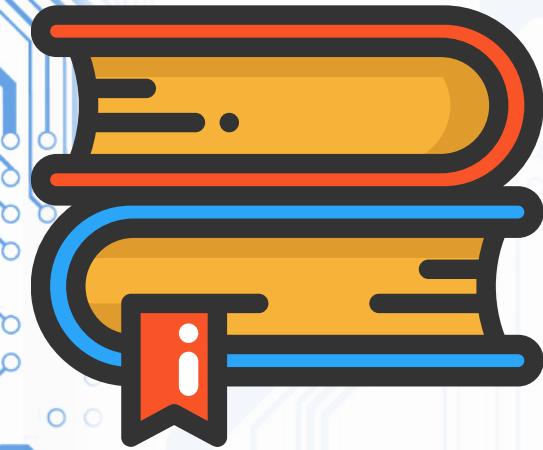
Log in china

A screenshot of a web browser window. The address bar shows "tinkercad.com/things/3Y2Qp0rOQA4-chinese". The search bar contains "Search Google or type a URL". Below the search bar are several links: YouTube, Facebook, Gmail, PSArips, Index of, Download m..., PSArips, 登录, TBD, RU, and a link to "Photo by Ev Tchebotarev". The bottom of the screen shows the taskbar with icons for File Explorer, Edge, File, and others, along with system status indicators like battery level, volume, and network.



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嵌入式系统

EMBEDDED SYSTEMS

First project :

How to start working with TinKerCad



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First project :How to start working with Tin Ker Cad

Step 1:

- After creating your free Autodesk account, login to TinkerCAD.
- You will be met with a project selection page.
- Click the 'Circuits' button on the left.

The screenshot shows the Tinkercad interface. On the left, there's a sidebar with various options: UNSW Makerspace Network, Search designs..., 3D Designs (which is the active tab, indicated by a blue background), Circuits (highlighted with a red border), Codeblocks (NEW), Lessons, Projects, Create project, Tweets, and Follow. Below the sidebar, there's a message from STEMHub_SWest about the MoonCamp Discovery challenge. In the center, it says 'My recent designs' and has a 'Create new design' button. The background features a light blue circuit board pattern. At the bottom right, there's a logo for Jiangxi University of Science and Technology School of Information Engineering.

UNSW Makerspace Network

Search designs...

3D Designs

Circuits

Codeblocks NEW

Lessons

Projects

Create project

Tweets Follow

Tinkercad Retweeted

STEMHub_SWest @STEMHub_SWest

The deadline for [esa_education's #MoonCamp](#) Discovery challenge has been extended to the 7th May due to the coronavirus (COVID-19) situation. Students aged 6-18 are

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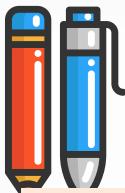


First project :How to start working with Tin Ker Cad

Step 2

- Click 'Create New Circuit' for a new design, or click on one of your existing designs and 'Tinker This' to edit your past designs.

The screenshot shows the Tinkercad website's Circuits interface. At the top left is the Tinkercad logo and the Autodesk Tinkercad banner. The top right features navigation links: Classes, Gallery, Blog, Learn, Teach, and a search icon. On the left, a sidebar includes sections for UNSW Makerspace Network, Search designs..., 3D Designs, Circuits (which is highlighted with a blue background), Codeblocks (with a NEW badge), Lessons, Projects, Create project, Tweets, and Follow. The main area is titled 'Circuits' and contains a green 'Create new Circuit' button, which is highlighted with a red border. Below it is a preview window showing various electronic components like resistors, capacitors, and an Arduino board, with the text 'Tinker with Circuits on Tinkercad!' and a 'Try Circuits' button. The bottom of the page features a footer with the NTFS logo, social media links for Tinkercad Retweeted and STEMHub_SWest, and a challenge deadline notice. Logos for Jiangxi University of Science and Technology School of Information Engineering and Jiangxi University of Science and Technology School of Information Engineering are also present at the bottom right.

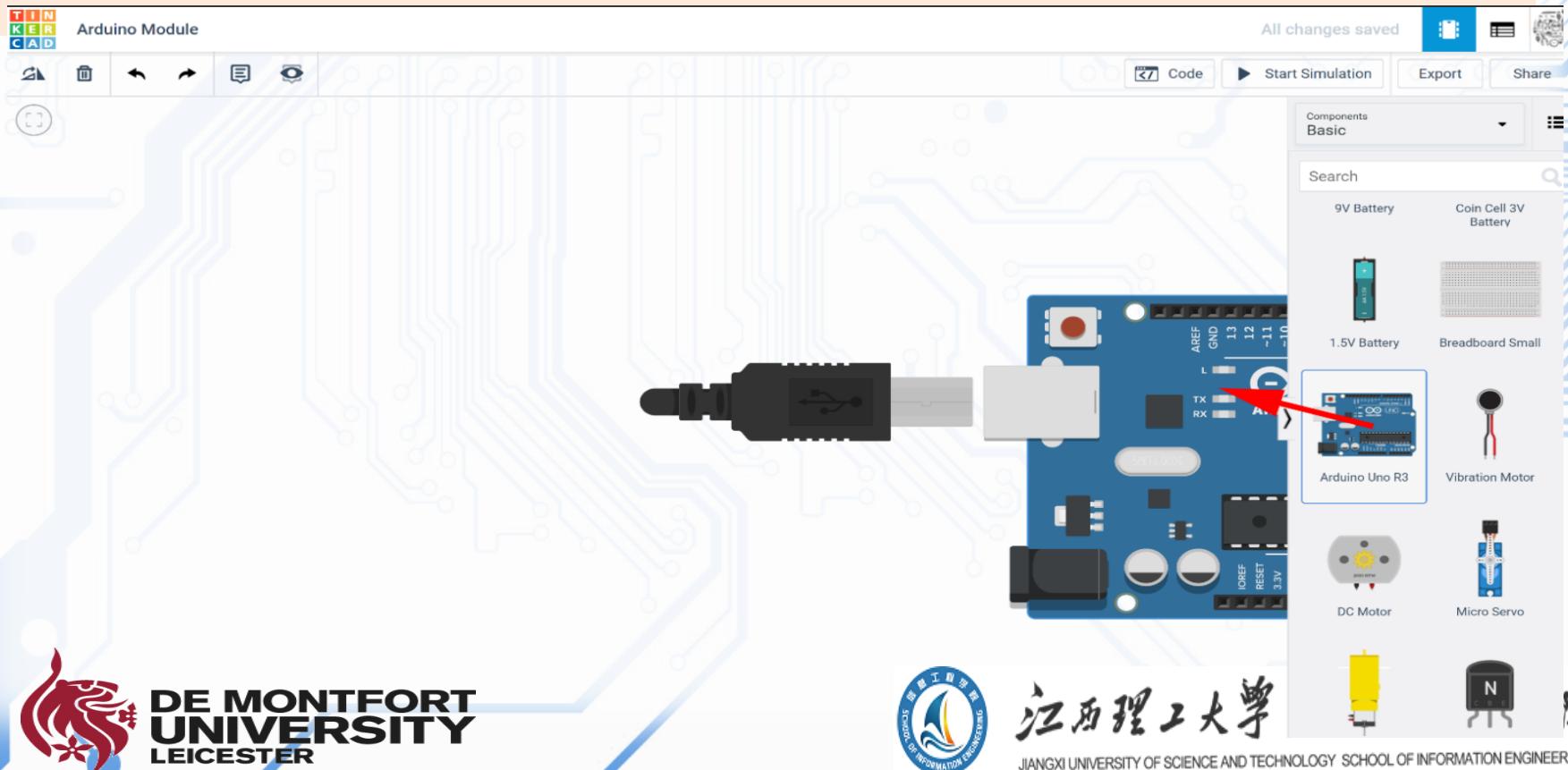


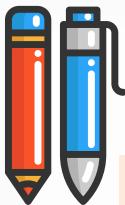
First project :How to start working with Tin Ker Cad

Step 3

Click and drag out an Arduino Uno R3 Module

If you don't want to start from scratch, there's pre-made template modules in the dropdown menu under 'Starters - Arduino' where it says 'Components - Basic'

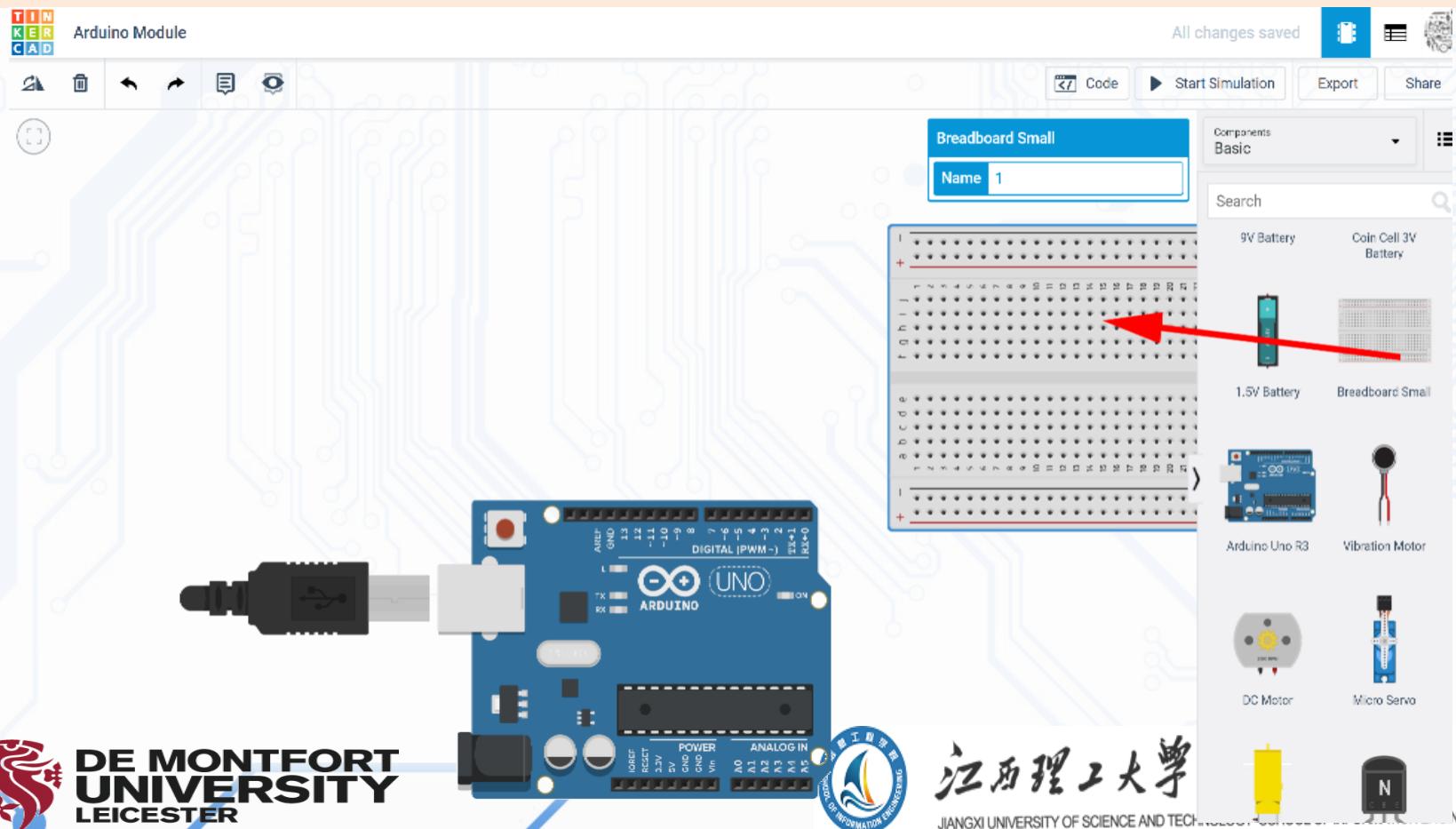


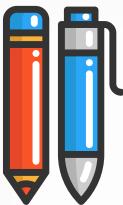


First project :How to start working with Tin Ker Cad

Step 4

- To make your work easier, always use a prototyping board (or breadboard) to test your circuits! Drag one out like you did the Arduino Module
- It's easier than having floating components, both in real life and the simulation!

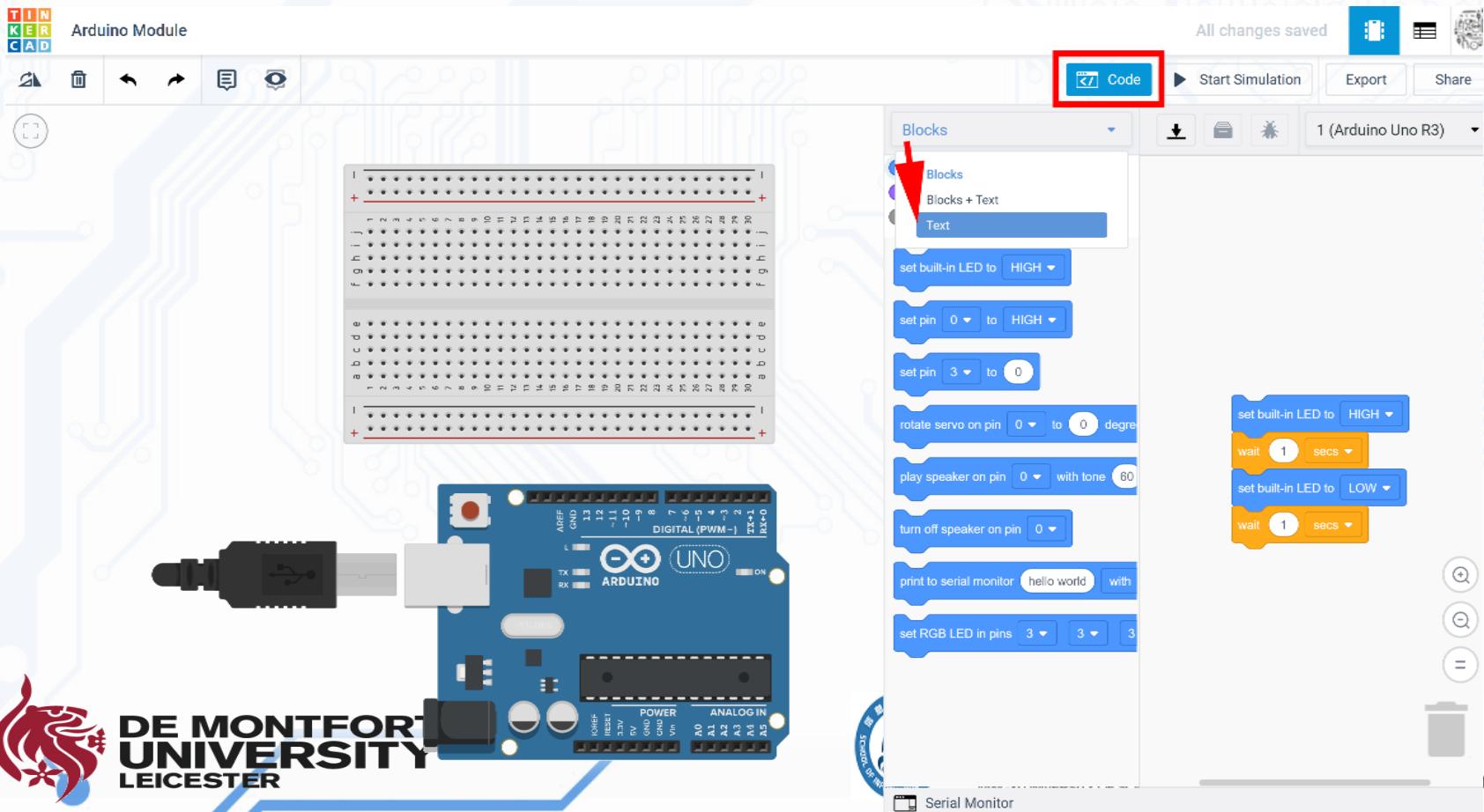


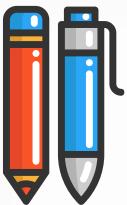


First project :How to start working with Tin Ker Cad

Step 5

- When you need to start programming your Arduino, click the 'Code' button at the top left.
- This brings up the programming sidebar on the right hand side of the screen.
- To swap between programming in blocks and traditional text, click the 'Blocks' drop down menu!
- Finally, to start simulation of your circuit, click 'Start Simulation'





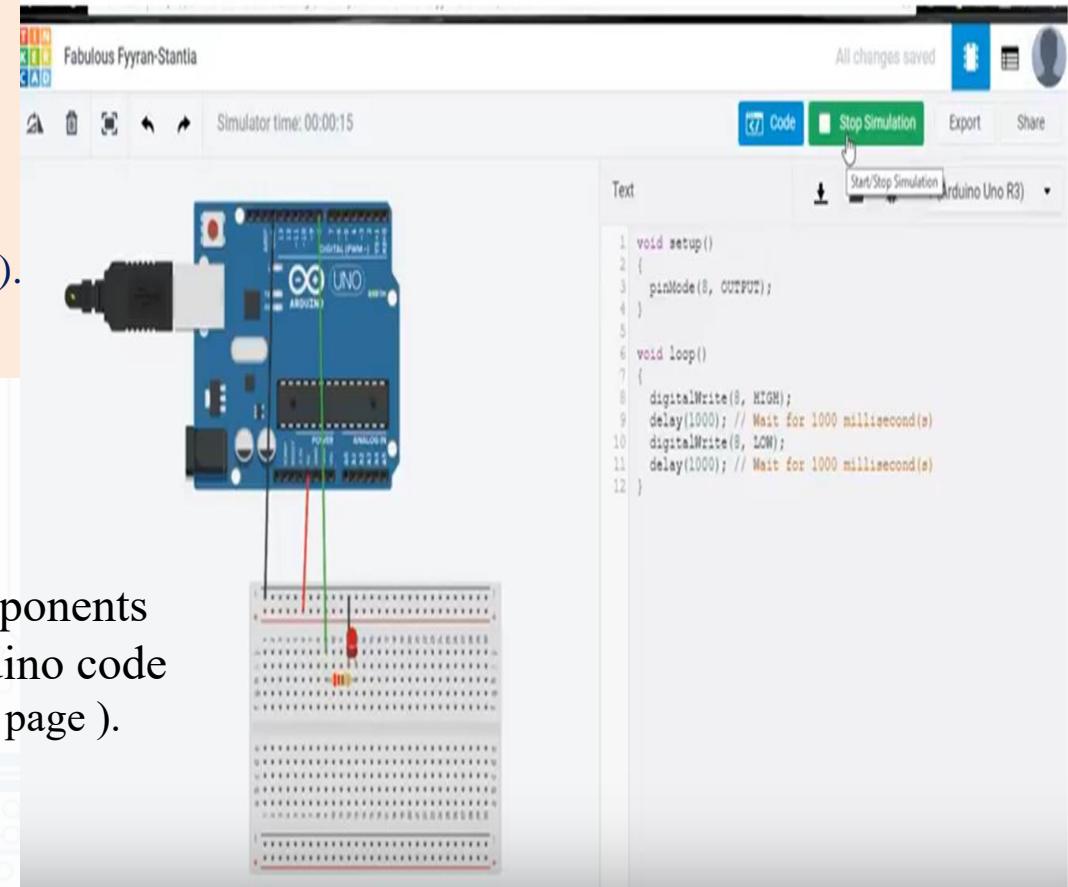
First project :

How to start working with Tin Ker Cad

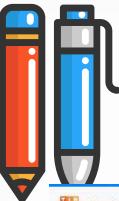
: LED Blinking

We need to drag:

- Arduino Uno.
- LED.
- Resistor (change its value to 220 ohm).
- Breadboard.



- After you have correctly wired the components you need to write and upload the Arduino code (by using start simulation in the top of the page).
- Hint : you can also copy and paste the example code of the Arduino IDE (Basic > blink) and see the built-in LED blinking.



DEMO#3

Dashboard | Tinkercad x + [www.BANDICAM.com](https://www.tinkercad.com/dashboard?type=circuits&collection=designs) - □ x

[Getting Started](#) [PID](#) [Basic functions related...](#) [اموزش زبان C](#) [JRM | Fuji Technology ...](#)

Autodesk® TINKERCAD®

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Search designs... [3D Designs](#) [Circuits](#) [Codeblocks](#) NEW [Lessons](#)

[Join Class](#)

Projects Project 1 Create project

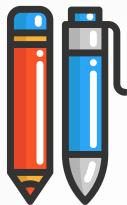
[Tinkercad Lesson Plans](#)
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My recent designs

[Create new design](#)

Windows taskbar:

01:23
14/11/2020



One more example

Just to see performance: Serial Monitor

how to use serial monitor and print some values from a potentiometer.

We need to drag:

- Arduino Uno.
- potentiometer.

After you have correctly wire the components you need to write and upload the arduino code (by using start simulation in the top of the page).

The screenshot shows the SuperMiguelo CAD software interface. On the left, there is a schematic diagram of an Arduino Uno connected to a potentiometer. The Arduino's A5 pin is connected to the potentiometer's wiper terminal, which is also connected to ground. The Arduino's digital pin 9 is connected to the potentiometer's center terminal. A red wire connects the Arduino's digital pin 9 to the digital pins of the Arduino board. The code editor on the right contains the following Arduino sketch:

```
int pot = A5;
void setup()
{
  Serial.begin(9600);
  pinMode(pot, INPUT);
}

void loop()
{
  int x = analogRead(pot);
  Serial.println(x);
  delay(1000);
}
```

The serial monitor window at the bottom shows the output of the code, with values fluctuating between 1023 and 184. The top bar of the software indicates "Super Miguelo", "All changes saved", and various menu options like "Code", "Stop Simulation", "Export", and "Share".



DEMO#4

Circuit design Bodacious Snag X + www.BANDICAM.com

Getting Started PID Basic functions related... آموزش زبان C JRM | Fuji Technology ...

TIN KER CAD ATA_serial All changes saved

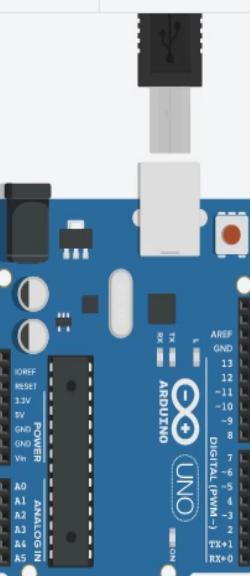
Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

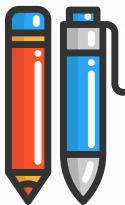
```
void setup() {  
  // initialize serial communication at 9600 bits per second:  
  Serial.begin(9600);  
}  
  
// the loop routine runs over and over again forever:  
void loop() {  
  // read the input on analog pin 0:  
  int sensorValue = analogRead(A0);  
  // print out the value you read:  
  Serial.println(sensorValue);  
  delay(1);      // delay in between reads for stability  
}
```

Serial Monitor

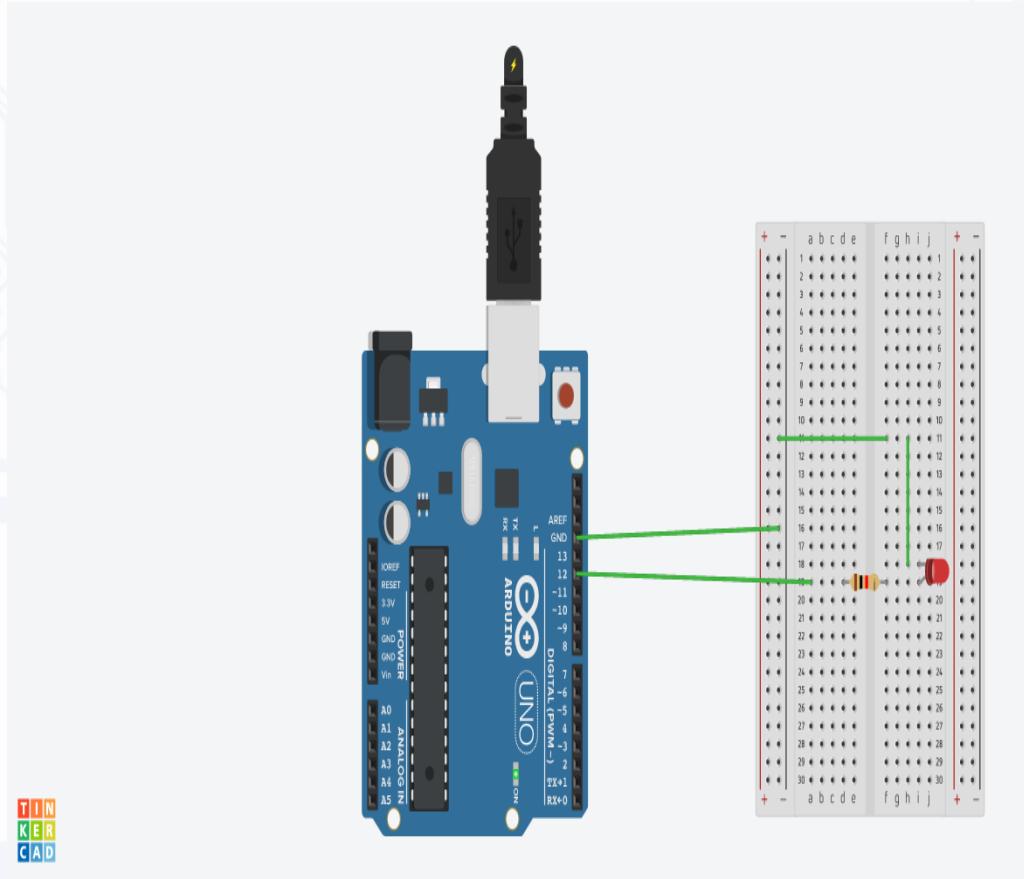
Send Clear



Windows taskbar icons: File, Home, Search, File Explorer, MATLAB, Word, Edge, Firefox, OneDrive, Task View, Start, Taskbar settings, ENG, 01:29, 14/11/2020



PNG Export/Share



Bodacious Snaget-Inari.brd

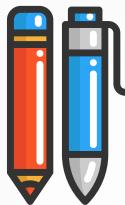
TIN
KER
CAD



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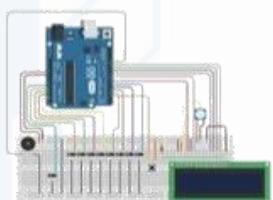


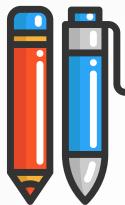
Explore the Possibilities

- There's no doubt that Tinkercad has expanded its horizons. With the addition of Circuits and its many features, the possibilities are endless.
- From the plethora of components to the comprehensive code blocks, there's a lot to explore.



Gallery Blog Learn Teach





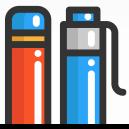
From TINKERCAD web



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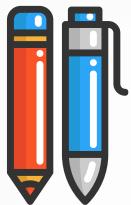


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Top Arduino projects

TOP 10 ARDUINO
PROJECTS **2020**



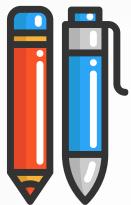
TOP Arduino projects



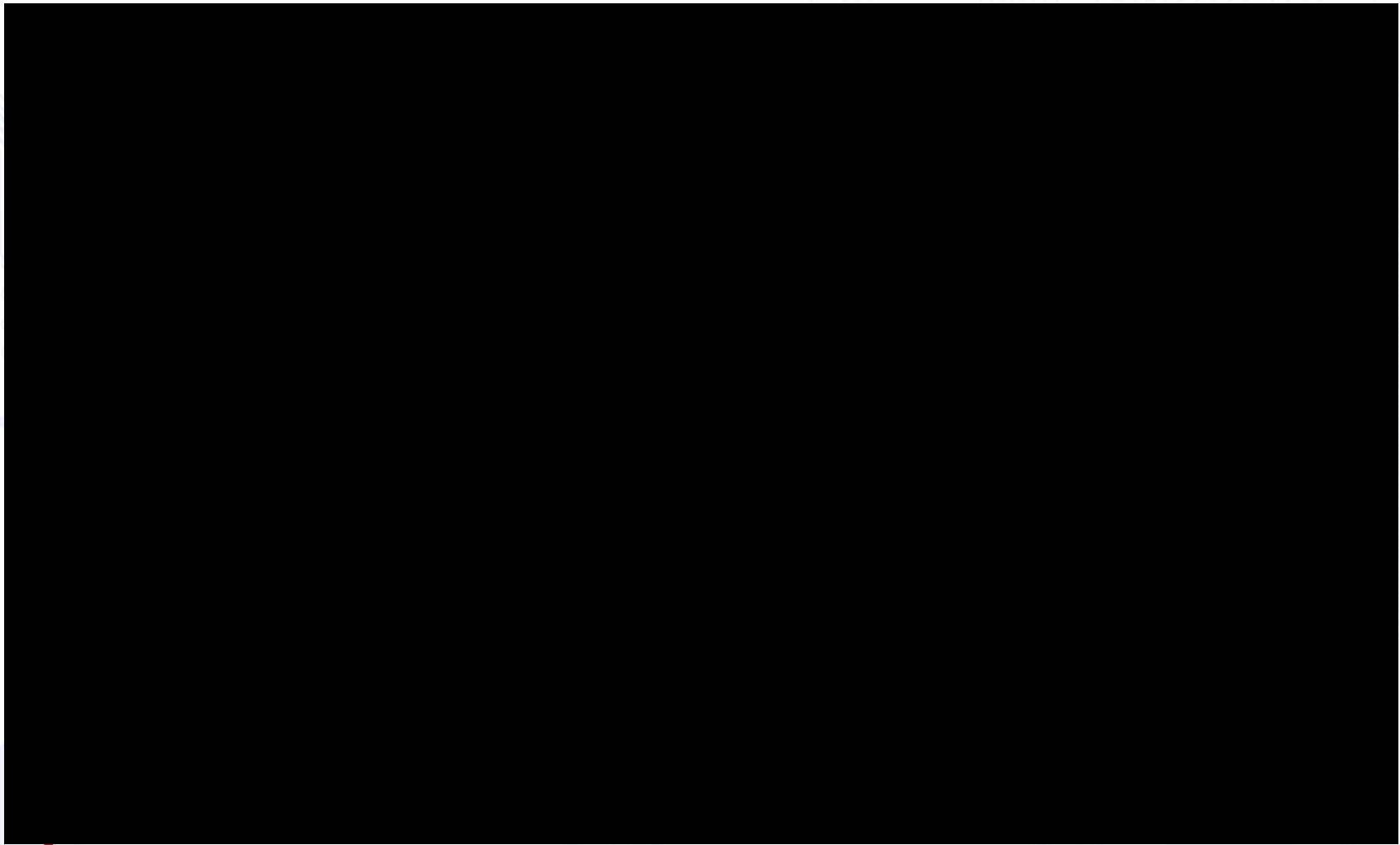
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TOP Arduino projects



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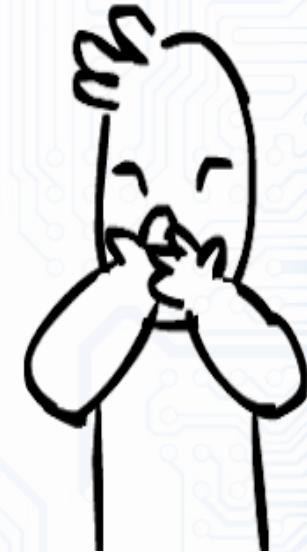


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Thank You FOR LISTENING

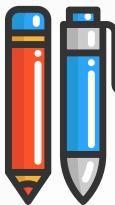


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Dr. Ata Jahangir Moshayedi

- School of information engineering Jiangxi university of science and technology, China
- E-mail: ajm@jxust.edu.cn



Where you can find all my lectures

Embedded Systems Lecture 01 | Introduction to ES | Dr AJM | JXUST

<https://www.youtube.com/watch?v=bcCCPqDKr9Y&list=PLqipy5sqhIACnJodz3zB8gUuOosku6yYP>

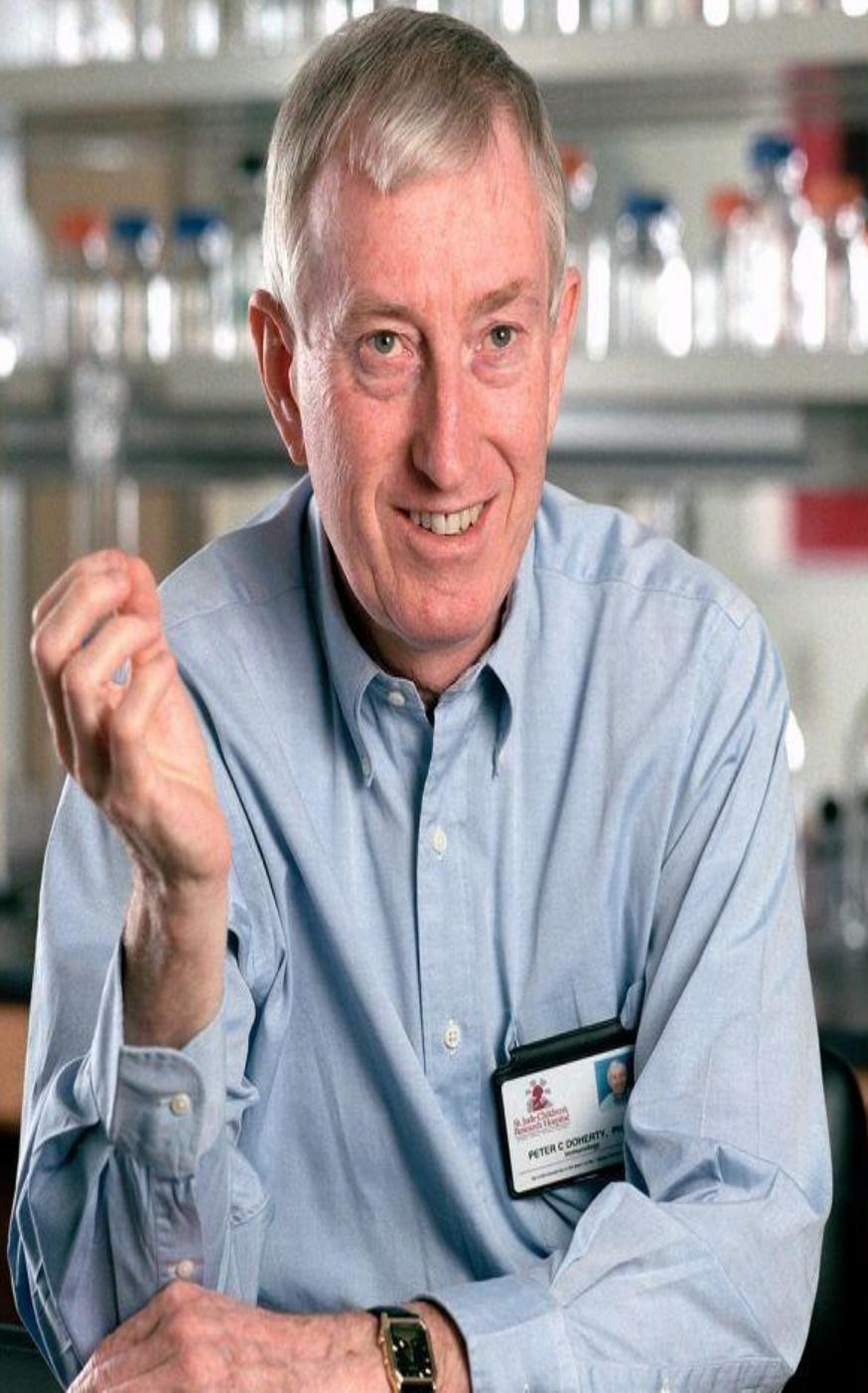


Dr Ata Jahangir Moshayedi

Prof Associate ,
School of information engineering Jiangxi university of
science and technology, China

EMAIL:

ajm@jxust.edu.cn
moshaydi@gmail.com



“Good scientists
are perpetual
adolescents.
They never grow
up.”

PETER DOHERTY
Nobel Prize in Physiology or
Medicine 1996

Some of used References

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- Enjoy the programming with Arduino board, Dr Ata Jahangir Moshayedi
- <http://www.firmcodes.com/difference-uart-usart/>
- <https://www.edn.com/electronics-blogs/embedded-basics/4440395/USART-vs-UART--Know-the-difference>
- <https://www.watelectronics.com/classification-of-embedded-systems/>
- <https://www.theengineeringprojects.com/2018/09/how-to-use-digitalwrite-arduino-command.html>
- https://www.tutorialspoint.com/arduino/arduino_io_functions.htm
- <https://www.watelectronics.com/classification-of-embedded-systems/>



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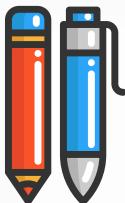
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School of information engineering

Digital Image Processing

THANK YOU





**"BE HUMBLE. BE HUNGRY.
AND ALWAYS BE THE
HARDEST WORKER
IN THE ROOM."**



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