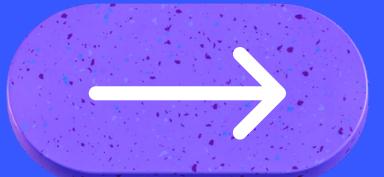


RISC PRESENTS

Arduino Pro

the Project based Arduino
Workshop!



Objectives

Get a
refresher
on
Arduino.

Explore
TinkerCAD

Build a
Project
from
start to
finish

Kickstart
your
own
Project!

Arduino Refresher

This will cover enough basics so that even first timers will be able to understand and participate in the Workshop.

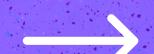


PROGRAM STRUCTURE

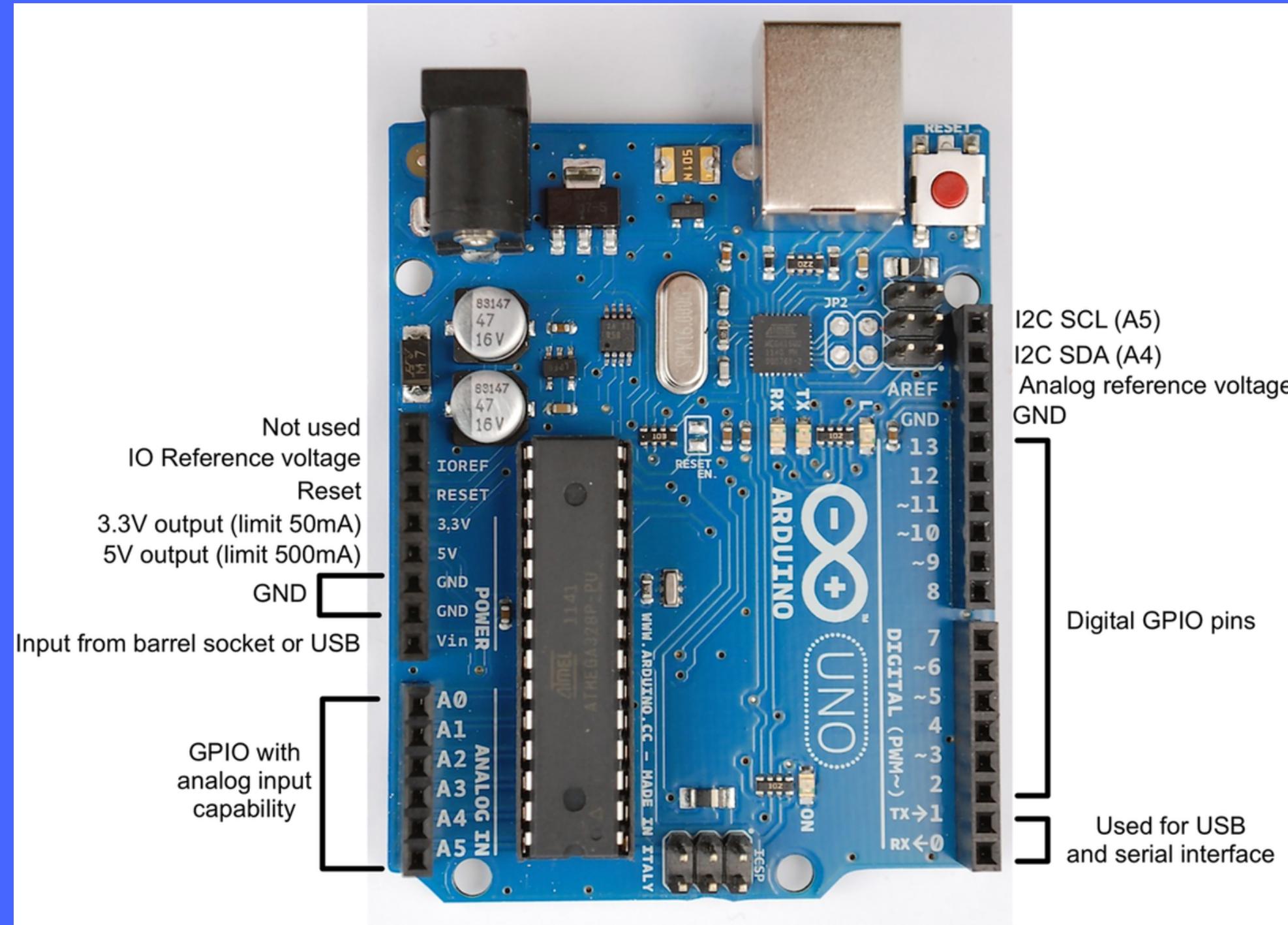
- Header Files
- Setup Function
- Loop Function

TOPICS

- Function
- Data structures
- Variables and Constants
- Control statements and loops



Intro to Arduino UNO



Program Structure

- Libraries

- Syntax : #include<library_name.h>
- Initialising necessary object variables (eg: Servo MyServo;).

- void setup() Function

- Use it to initialize the variables, pin modes, etc.
- It will only run once, after each power up or reset of the Arduino board.

- void loop() Function

- It will continuously run whatever code is provided to it.
- Use it for the main code. (Have the importance of int main() from C++)

```
void setup()
{
}

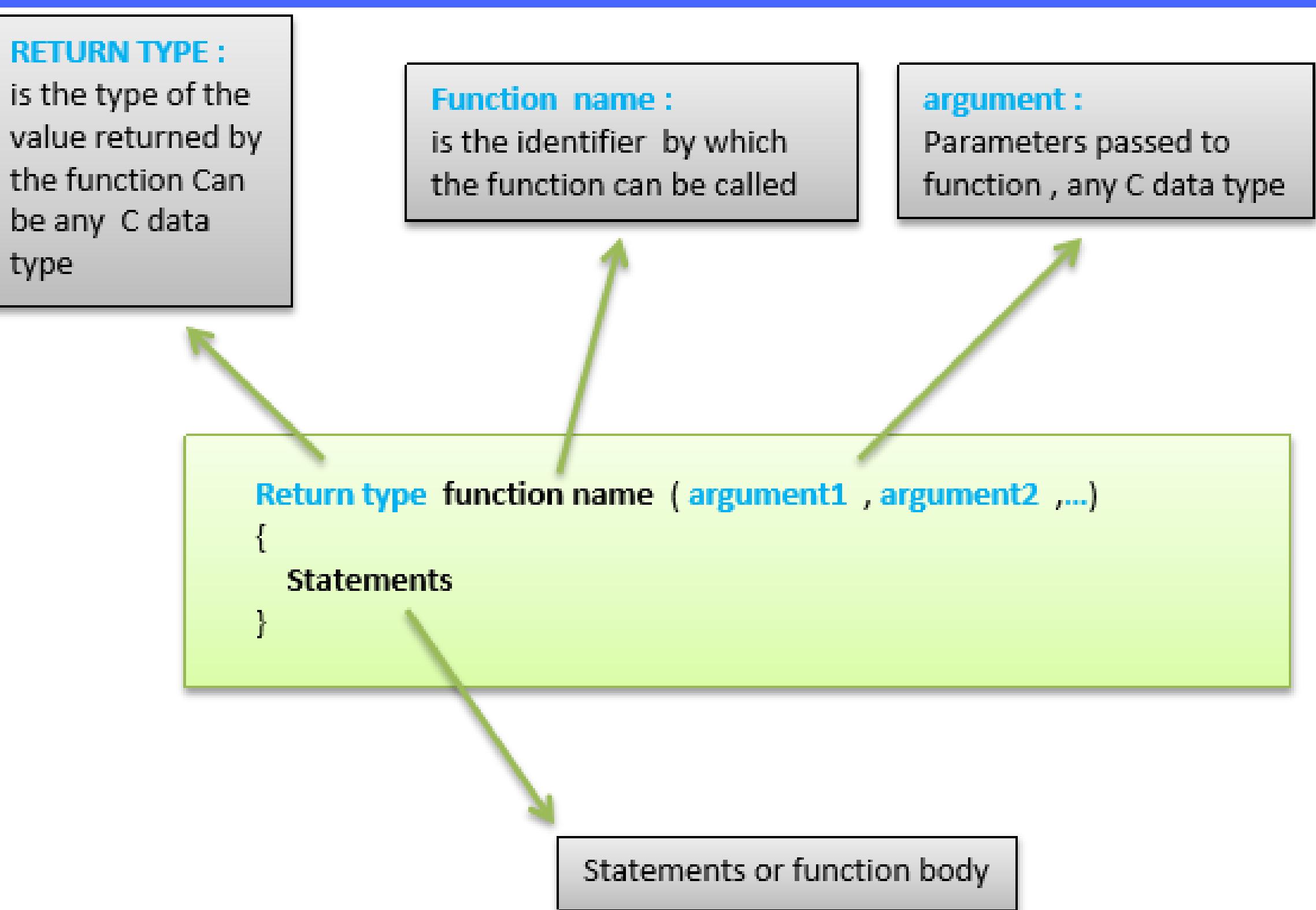
void loop()
{}
```

How to use a function?

NOTE:

void data type is only used in defining a function from which we don't want any output don't use it to define any variable.

Arguments are optional there can be functions without any arguments, like void setup() and void loop()

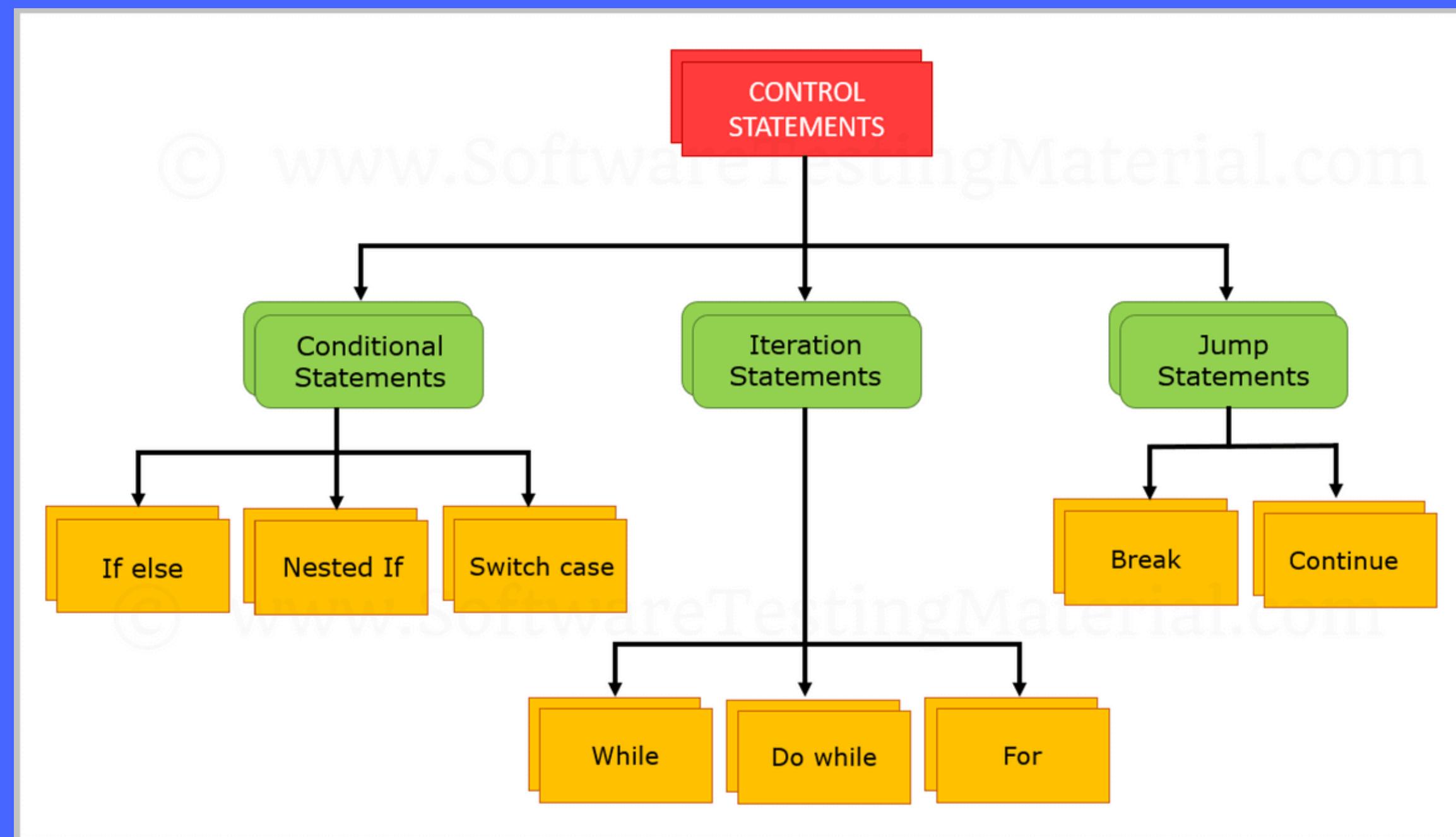


Data types and Objects

- void, bool, byte, int, char, string.
 - Variables and constants.
 - Syntax: data_type var_name & const data_type const_name
- Class and Objects :
 - For now think of class as a user defined data type (eg, Servo, LCD).
 - Variables formed using Classes are called Objects. (defined in same way as variables and constants)
- Constructor :
 - While creating objects they have a default value set by using a function which is called constructor, though this value can be changed at later stages or while defining variables only. Syntax: Class Object(val1, val1,..)
- Arrays and 2D Arrays.

Control Statements

Control statements are used to control the flow of the code.



Conditional Statements

- if-else-if statements: (Control Statements)

- Syntax :

```
if(condition1)
  { //statement to be executed if condition1 was true}
  else if(condition2)
  { //statement to be executed if condition1 was false but
    condition2 is true.}
  else
  { //statement to be executed if none of the condition is true.}
```

- switch statements.

Loops

- For loops:

- Syntax : `for(starting condition; constraints; updates)`

```
{  
    //statements you want to perform till condition is within constraints.  
}
```

- while loops:

- Syntax : `for(condition)`

```
{  
    //statements you want to perform while condition is true.  
}
```

- do-while loops:

TinkerCAD Intro:

Tinkercad is a free-of-charge, online 3D modeling program that runs in a web browser. Also allows us to make and render circuit designs.



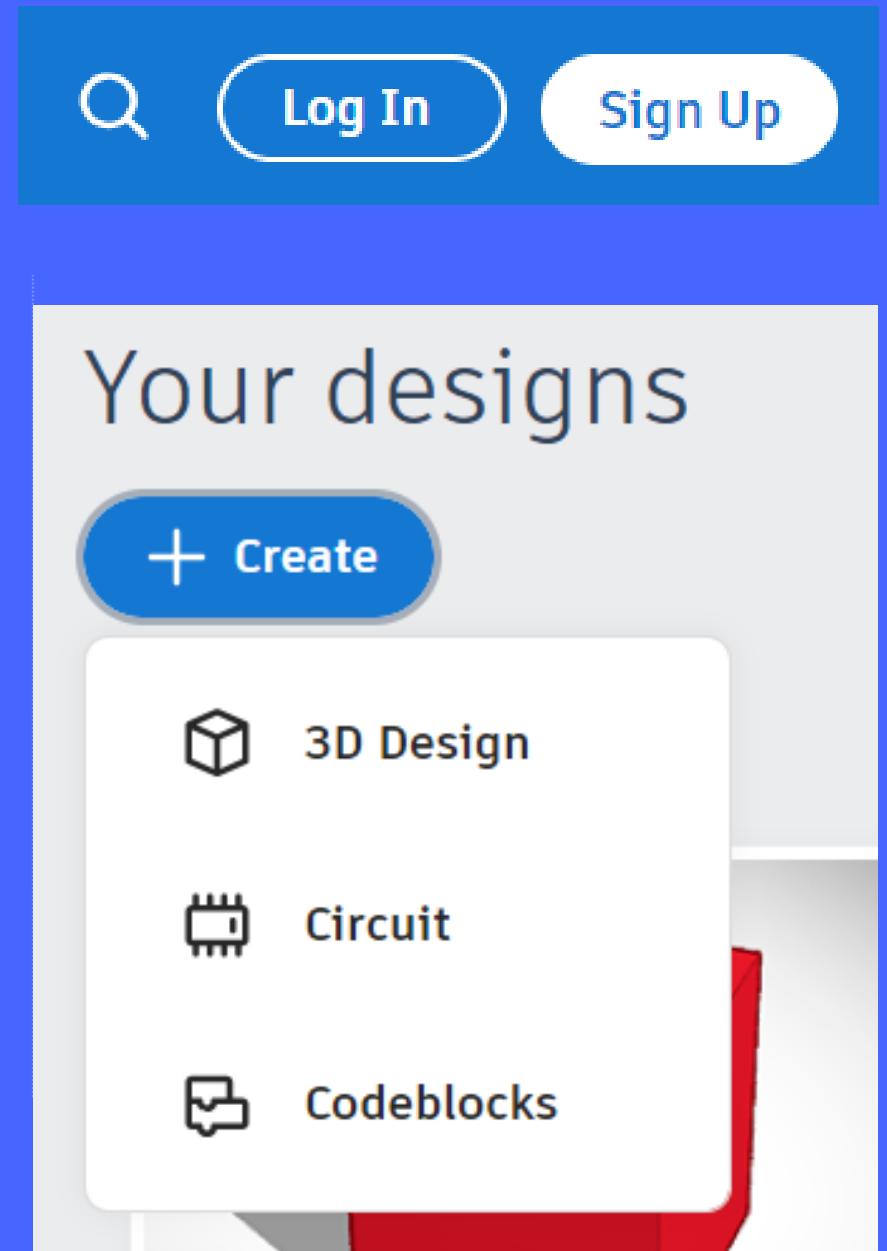
WHAT WE WILL COVER:

- How to access?
- Creating a project
- Basic Functions
- Executing Codes



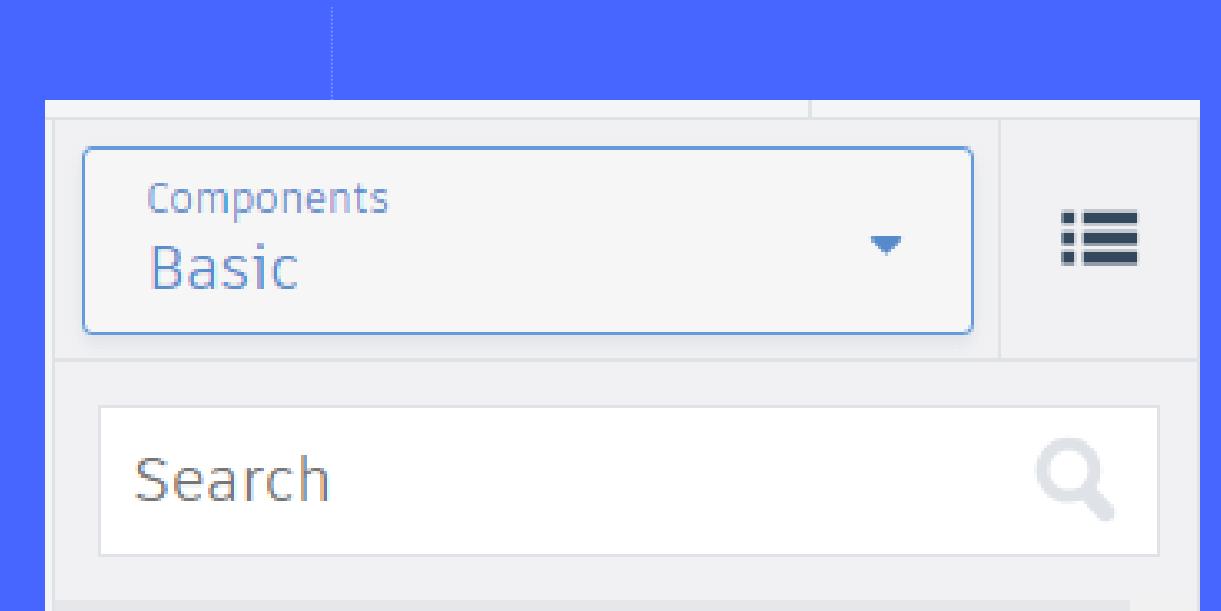
Getting started

- Search for tinkercad and then select the first link or directly go to URL : "tinkercad.com"
- Click on "Log In" or "Sign Up" located on the top right corner.
- Finish all the necessary steps(if any) while signing up.
- Click on "+ Create" under Your Design.
- Choose Circuit.
- Now you will be redirected to workspace of tinkercad we will be making and simulating our today's project here only.



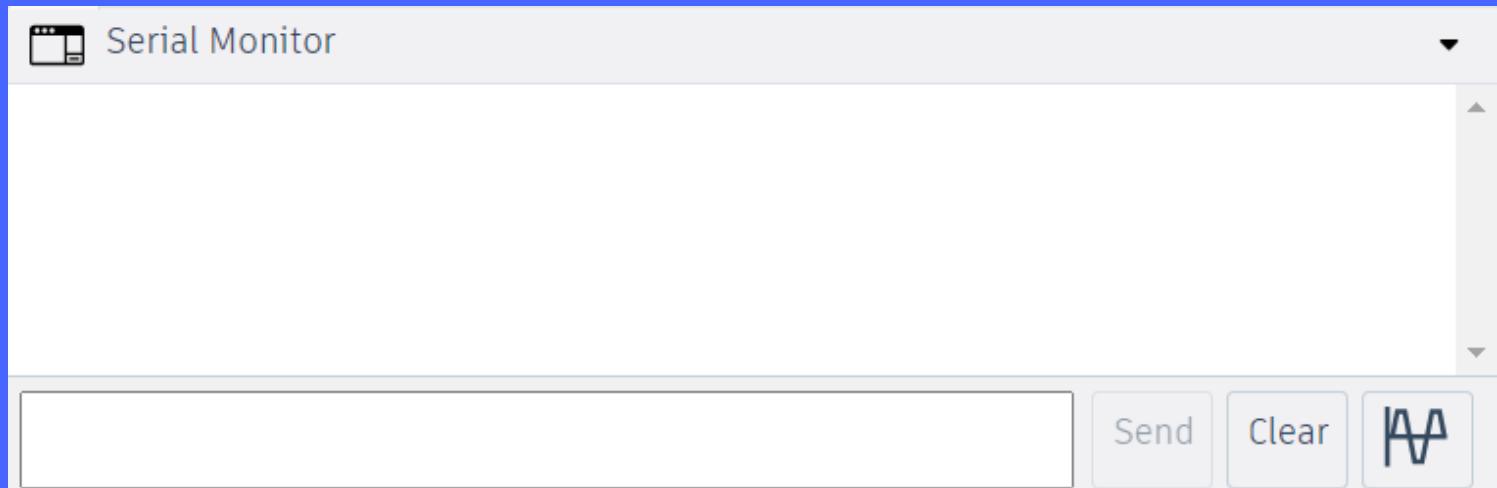
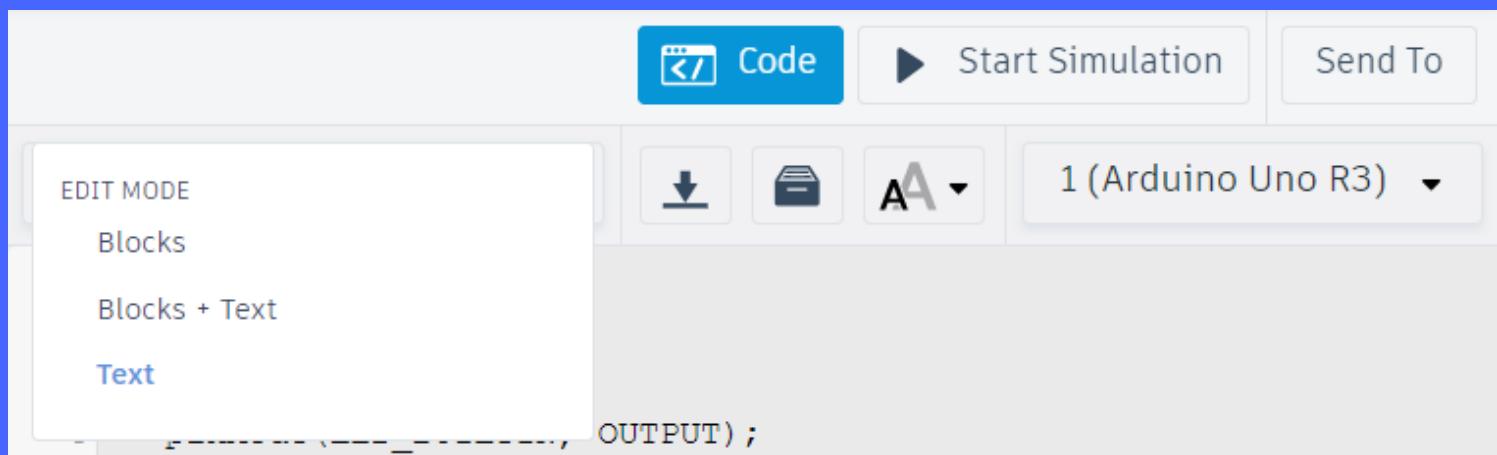
Basic Functions

- Pinch in and out to zoom in and zoom out on trackpad and scroll up and down on mouse.
- Search and find the required component.
- Once component is found hold and drag to workspace to use it in the project.
- You can interact with sensors and buttons by clicking on it and using provided facilities(if any).
- Click on component then "delete" from keyboard(or use bin icon on workspace) to remove it.
- Use "Shift" key to select multiple components.
- You can use "Ctrl"+"C" and "Ctrl"+"V" to make a copy of component(s).



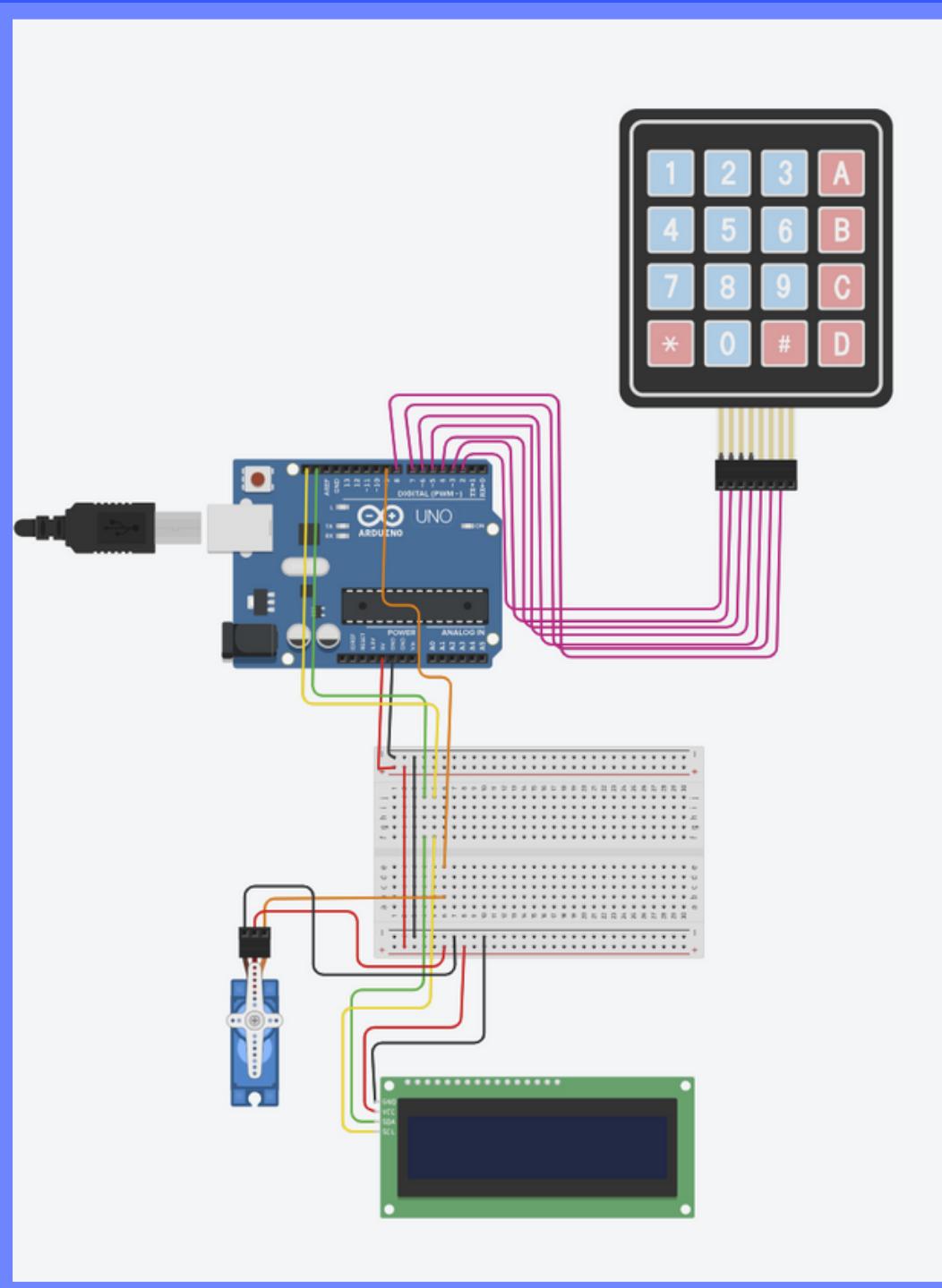
Making a project on TinkerCAD

- Once your circuit is complete and now you are ready for coding part.
- Click on "Code" button available.
- Once clicked go to drop down menu on its left which is "Block" by default now select "Text" option.
- Write the required code in the given space.
- Then click on "Start Simulation" button to execute the code.
- Click on "Serial Monitor" window in the bottom right to read any output you printed on "Serial Monitor".

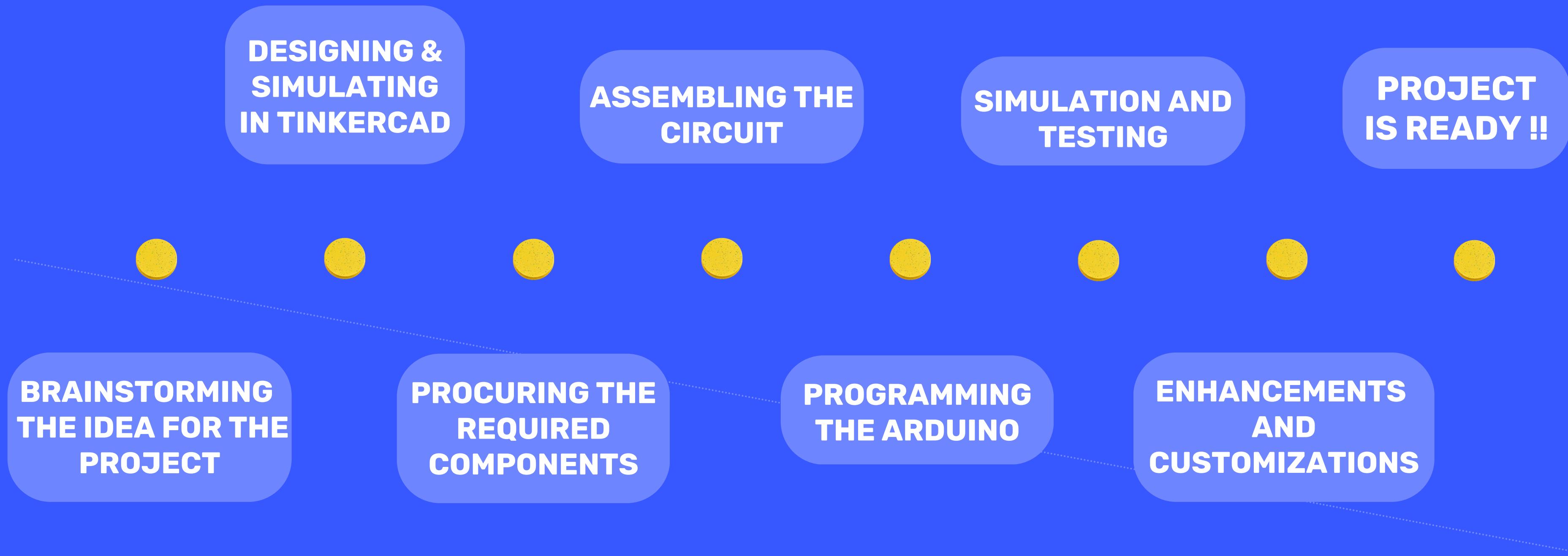


What Are We Going To Build?

- We will explore how to create a smart door lock system using Arduino in TinkerCAD. We shall be using an Arduino microcontroller and a servo motor to create a simple yet effective system to lock and unlock a door electronically.
- The project will utilize a pushbutton as a user input for activating the locking mechanism. When the correct code is entered on the pushbutton, the servo motor will rotate, unlocking the door. Conversely, when the code is entered again, the servo motor will rotate in the opposite direction, locking the door securely



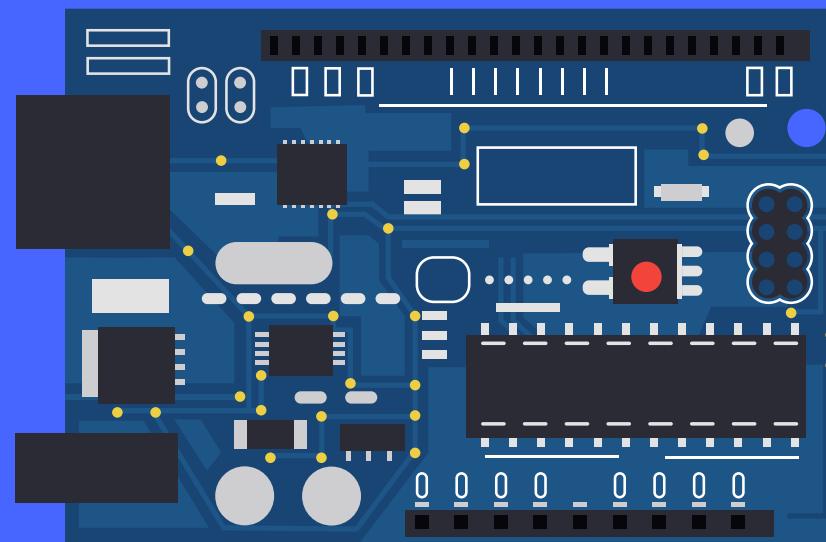
Roadmap



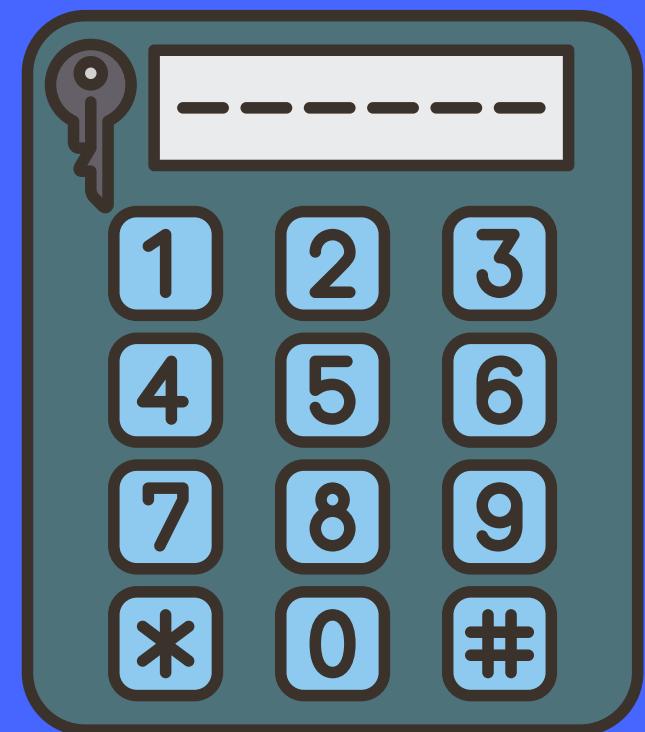
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Materials Required



Arduino



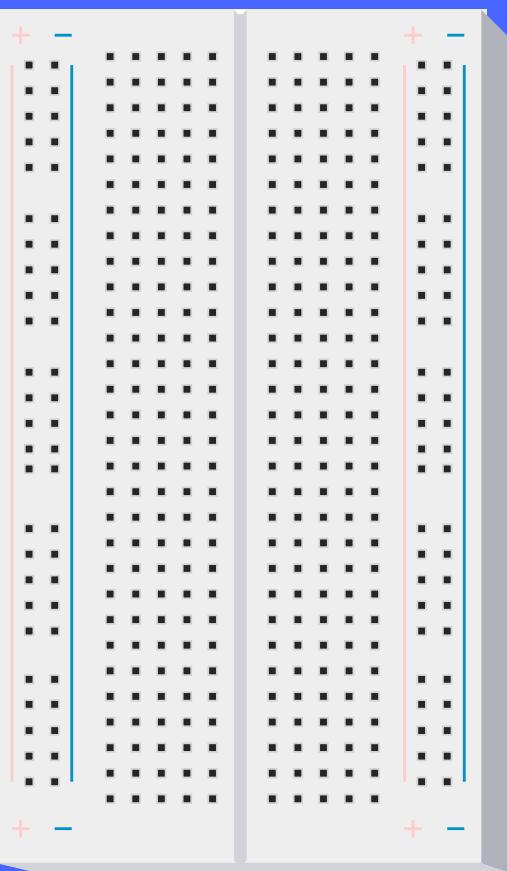
Keypad



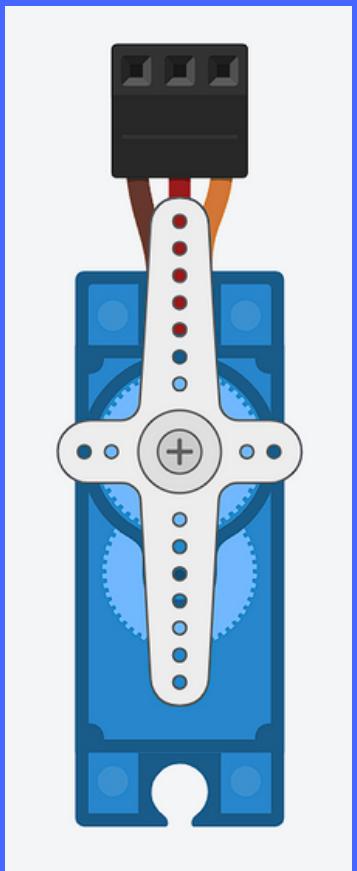
Display



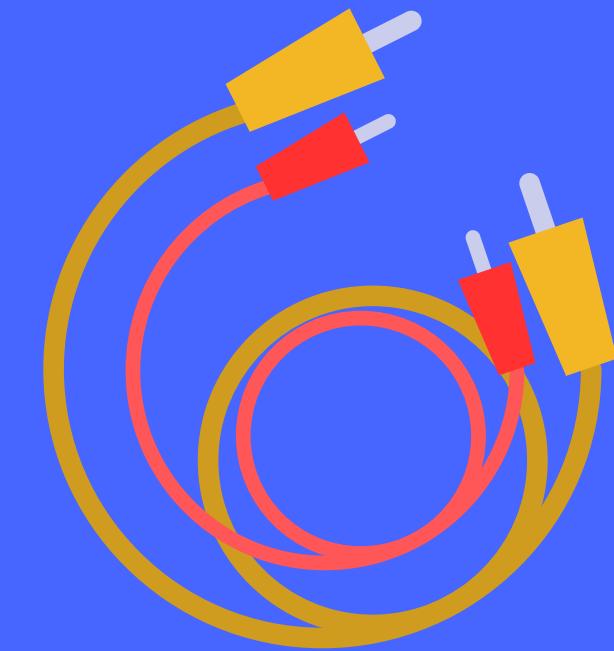
Materials Required



Breadboard



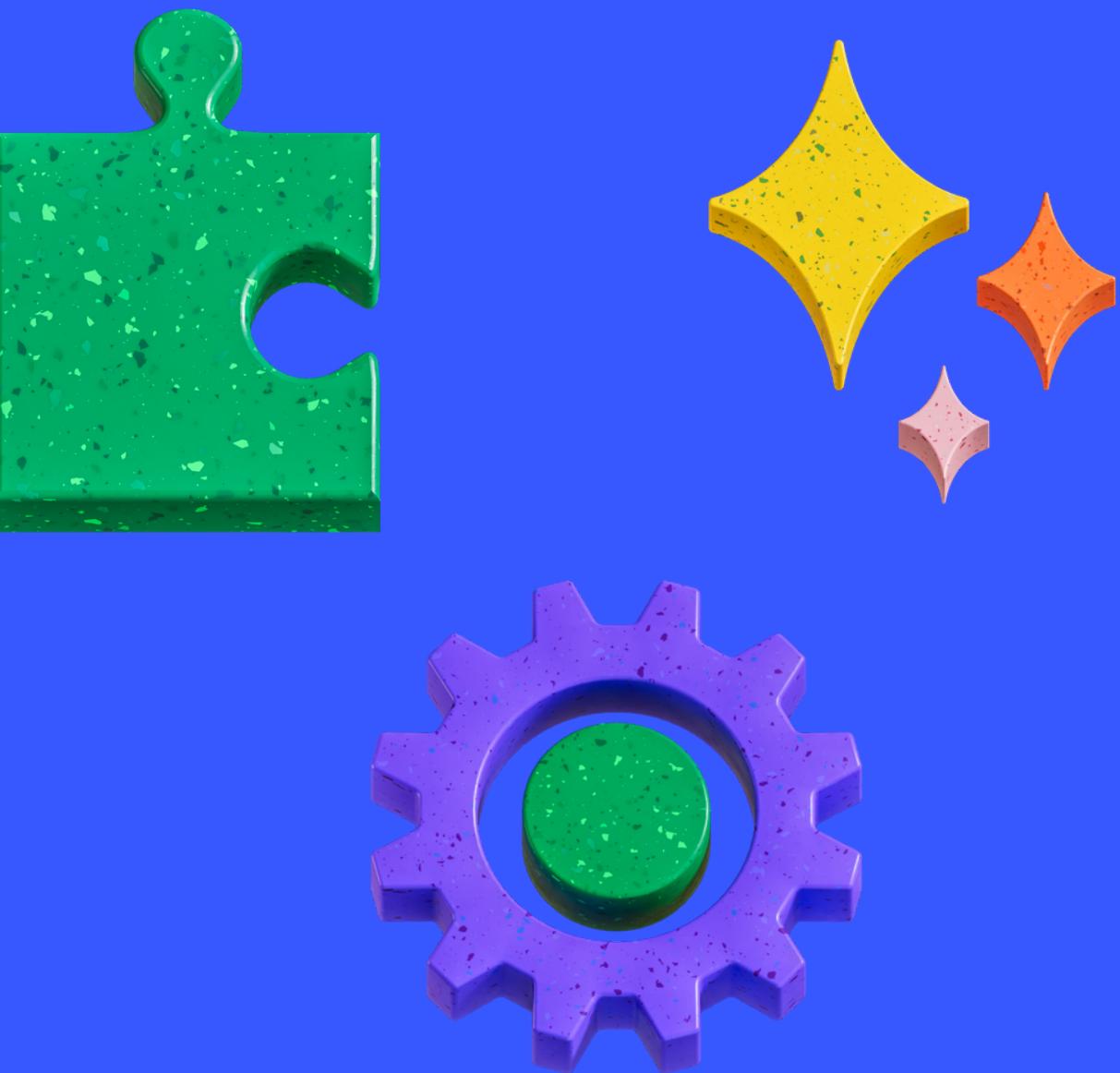
Micro Servo
Motor



Connecting
Wires



Lets Begin!



Task for You

(only for IIT BBS students)



- Make your own project on TinkerCAD.
- The project can be simple & silly, but shouldn't be plagiarized.
- Deadline : 1 week
- Your projects will be accessed for induction in the Arduino Club.





For questions, reach out to:

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SAHOO**

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ARIN DEV

RoboWheelers Club Head

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RESOURCES





Resources for you!

you can use these resources
whenever you get stuck or need
some ideas.

- **Arduino Docs:** <https://docs.arduino.cc>
- **RISC Handbook:** <https://risc-iitbbs.github.io/risc-handbook>
- You can use the "Starters" in TinkerCAD for connections & boilerplate code.
- **Workshop Resources:**
https://github.com/RISC-IITBBS/ArduinoPro_Workshop_2023

Thanks for Joining!



Do follow us on social media:



/IIT-Bhubaneswar-Robotics-Club-RISC



@risc.iitbbs



github.com/RISC-IITBBS