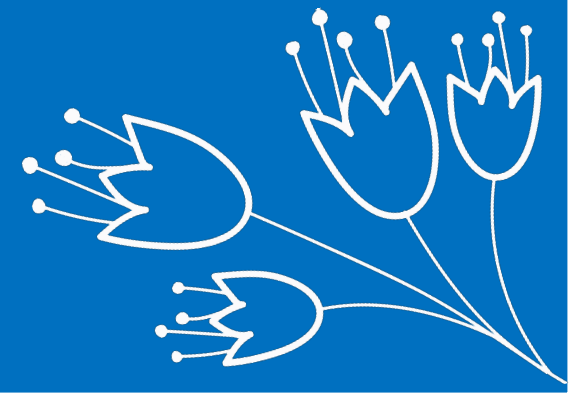
Intro to C++ programming

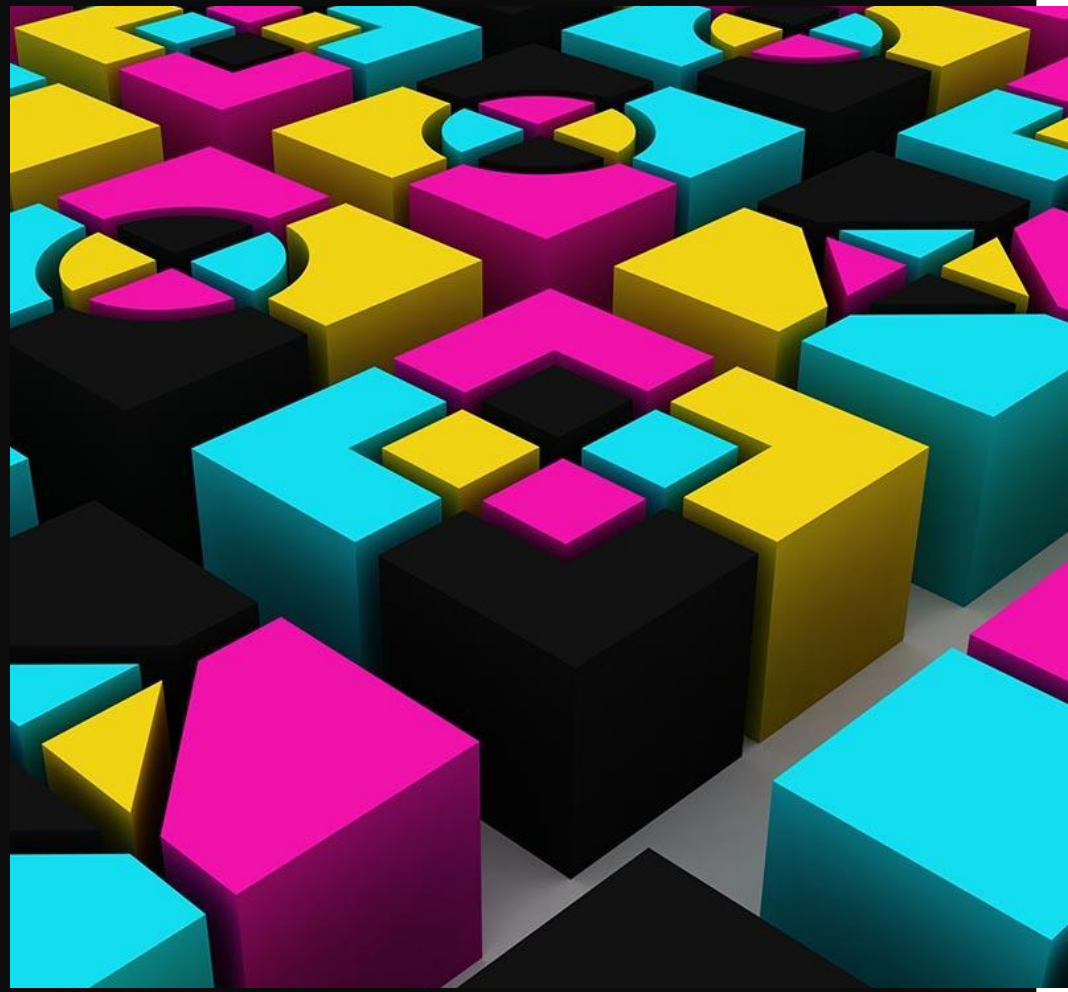
Presentation Main Points

- ✔ Introduction
- ✔ About C++
- ✔ Data Types
- ✔ Loops
- ✔ Functions
- ✔ Arduino
- ✔ Advice



About C++

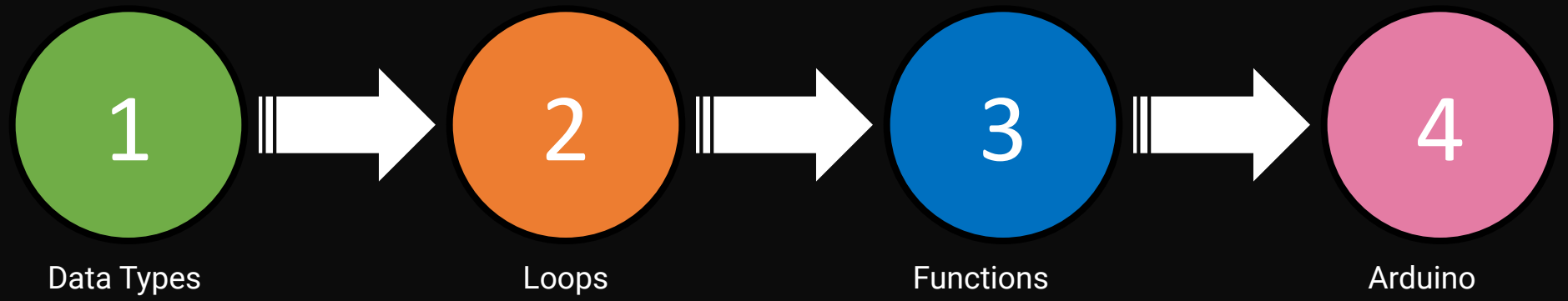
- Created for higher level of control over memory
- Object oriented programming
- Imperative language
- Compiled language



How much do you need to know?

-
- It rly depends
- On your project

Process Info-Graphic Slide



- You are on your way to be a arduino programmer!

Python Data types

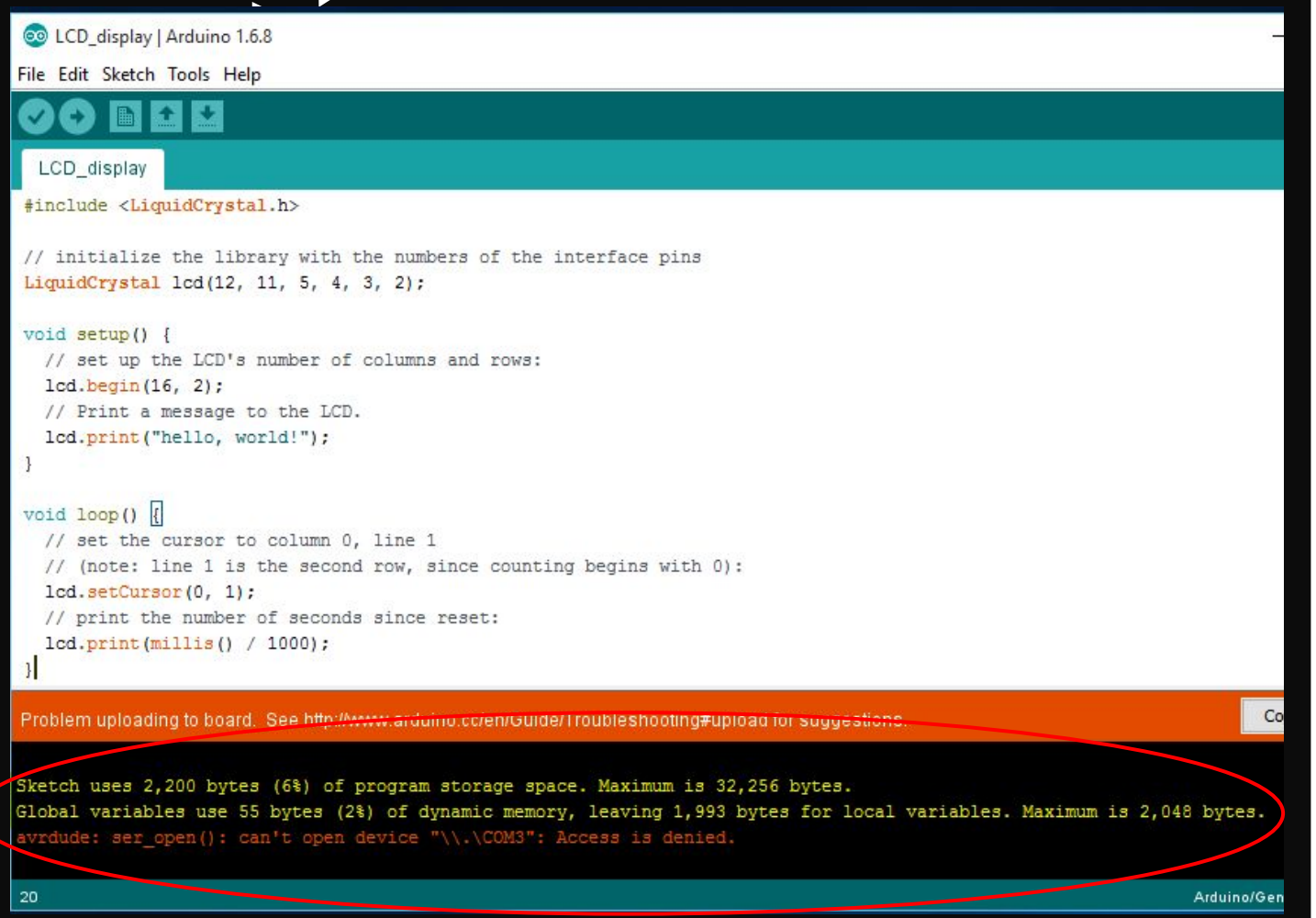
Strings
Integers/Numbers
Float
List, tuple
Dictionaries
boolean

C++

Character - 1 byte
Boolean - 1 byte
Integer - 4 bytes
Float - 4 bytes
Double - 8 bytes
Long - 8 bytes
Arrays - 1 D, 2 D
Many more

Why memory?

- Potential memory problem later on
- Solved by
  - Connecting another arduino uno
  - Get a bigger arduino like mega



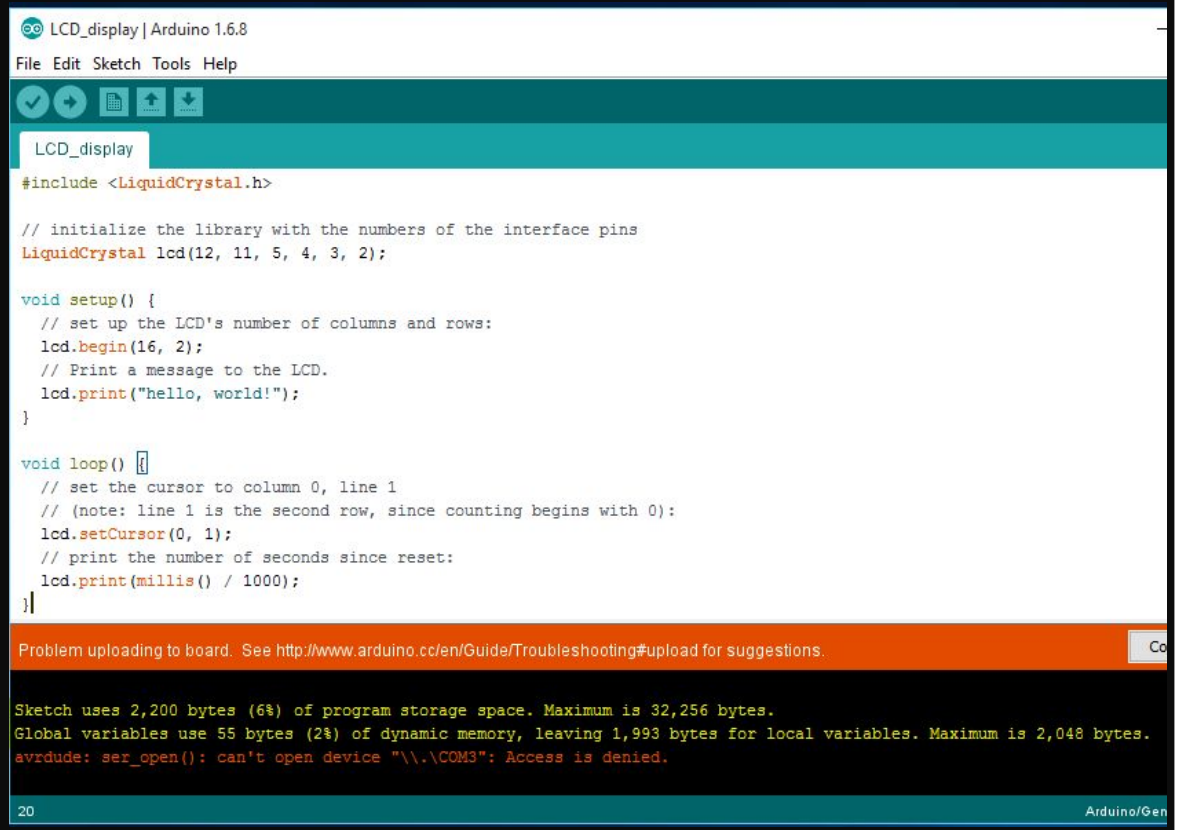
How do we save memory?

- Memory allocation of variables
- Reduce print statements

- Lights -> brightness takes up mem
- Speaker -> volume takes up mem

- Try to estimate how much you need
- But have to consider cost

- If you are good can use optimization of your loops



Python Data types

Declaring variables

```
Max_level = 10

A = []
```

C++

Declaring variables

```
const byte MAX_LEVEL = 10;

byte velocity = 1000;

bool soundonce = false;

byte sequence[MAX_LEVEL]; //c++ array number 10 sets 10 spaces,
not set 10 as a variable inside.
```

Python loops

For loop
While loop
If else
Operators

C++

For loop
While loop
If else
Operators

Python loops

Declaring variables

```
x = 0
For i in range(0,10):
    x +=1
```

C++

Declaring variables

```
for (byte i = 0; i < 3; i++)

while ( generateseq == 1 )

if ( states ==0 ) {}

else if ( states == 1 ) {}

== || &&
```

Python

C++

Functions

Declaration

```
Def func1(arg):
    Return
```

Functions

Declaration

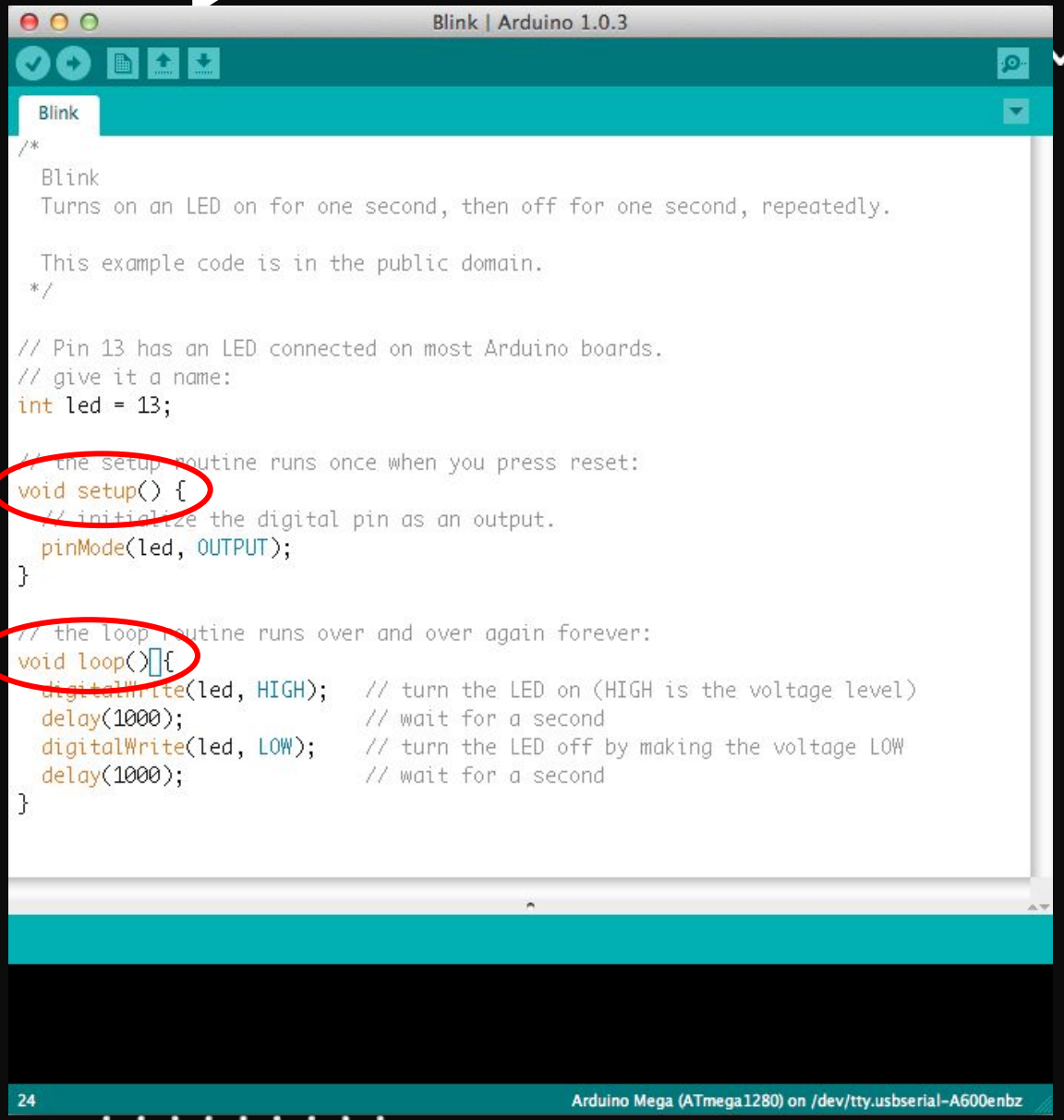
```
void wrong_sequence() { … }

void arduino2(int states) { … }
```

Arduino

- Setup()
- loop()
- pinMode()
- delay()
- digitalRead()
- digitalWrite()

red led pin number 7

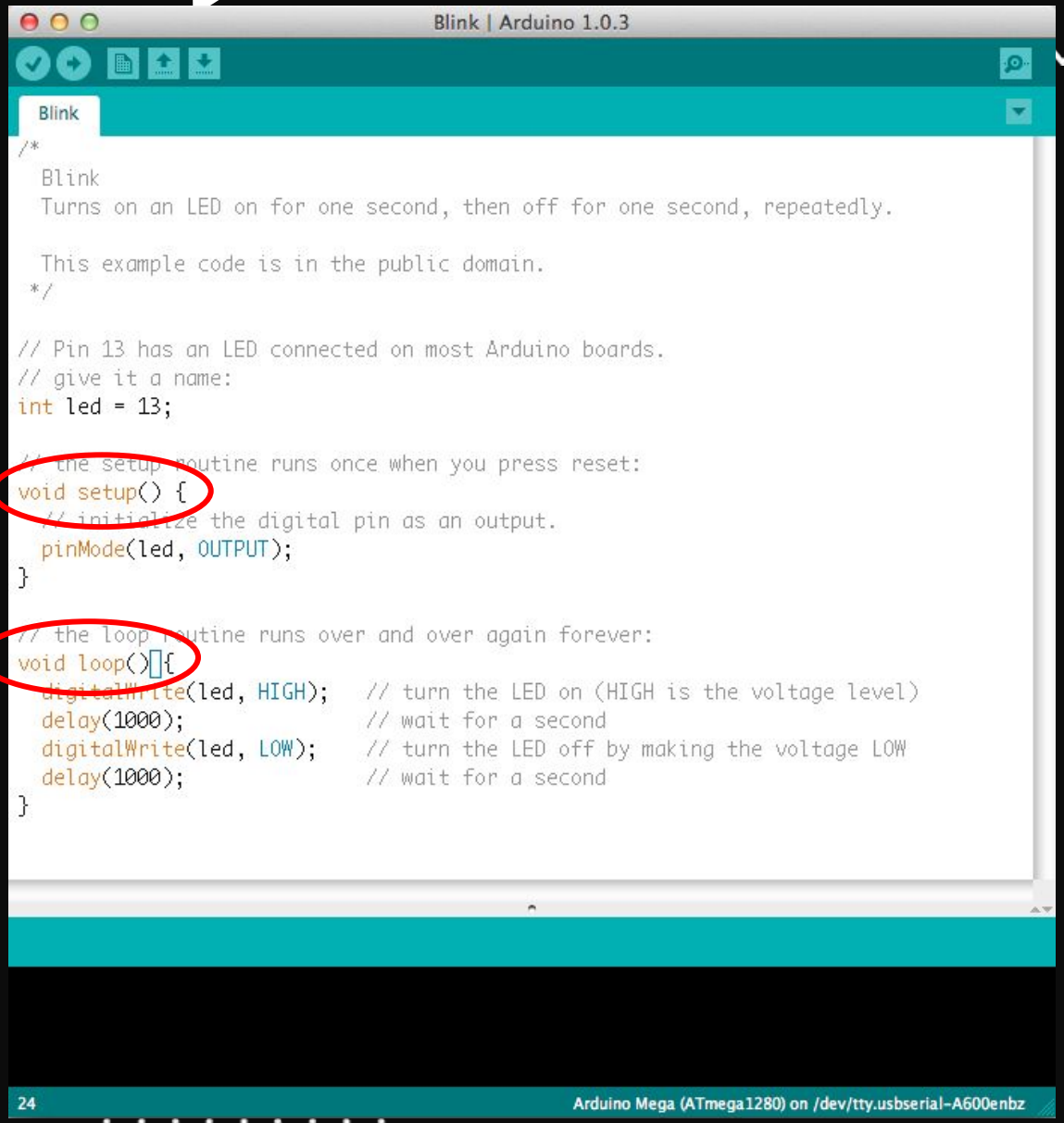
Green led pin number 13



Arduino Activity

Make one 1 led blink (On and off)

1. Define your pin number
2. Inside Setup() use pinMode()
3. Inside loop() use digitalWrite()

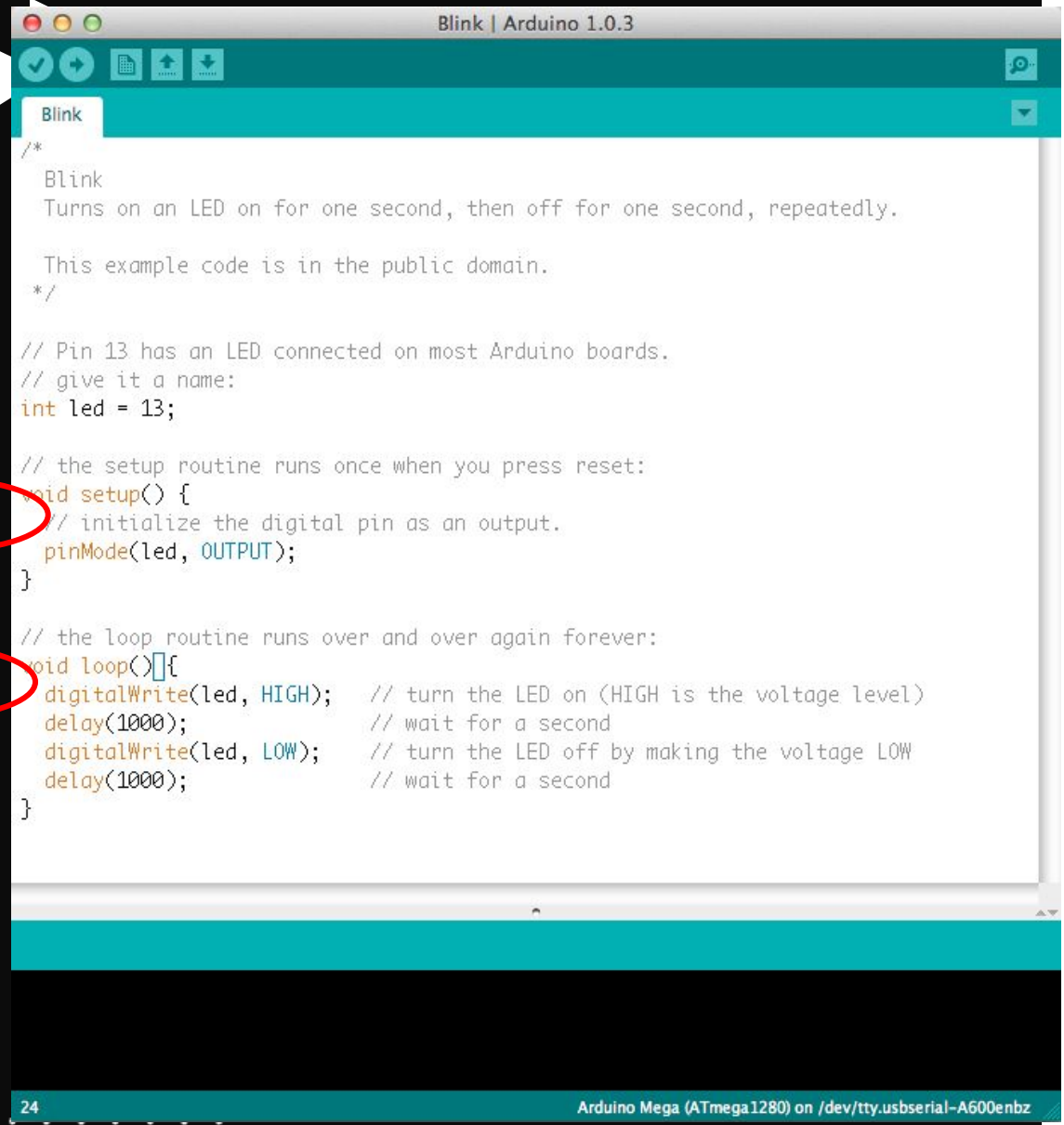


Arduino Activity 2

red led pin number 7
Green led pin number 13

Given 2 leds make them blink simultaneously

[HOW TO MAKE 2 LEDS BLINK AT THE SAME TIME? - Using Arduino / Project Guidance - Arduino Forum]



Advice

- Start Early -> plan your project solution -> go through the details, what parts to buy, what code do you need to do, how much memory do you need.
- If i knew a speaker and a 5m 5V LED strip required an arduino mega i would have gotten a mega instead of a uno.
- Ask advice from seniors/people who are good at certain areas if your idea is feasible and doable.
- Check google, stackoverflow, arduino blog

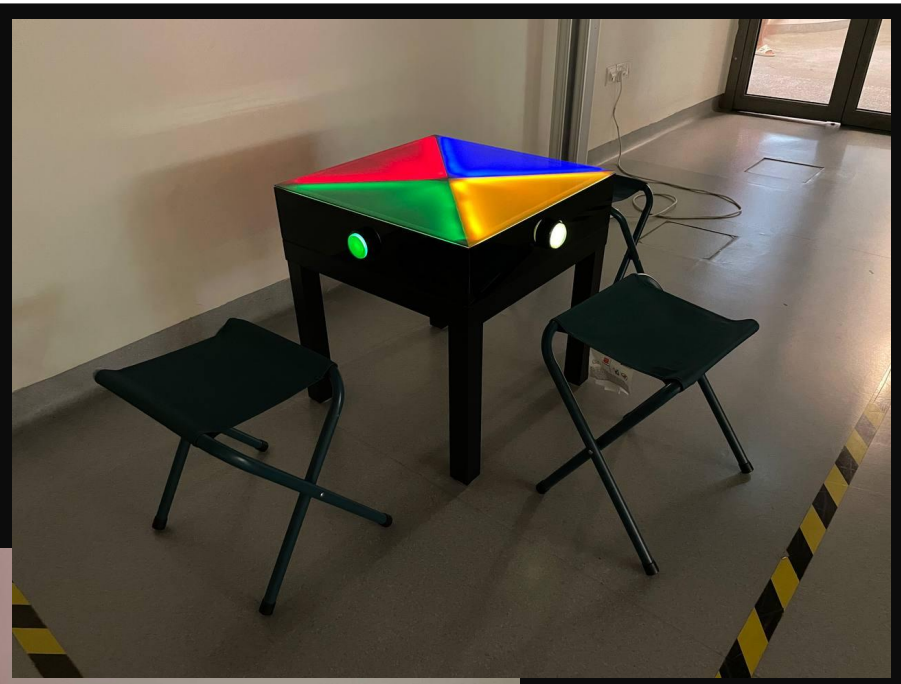
- Use tinkercad

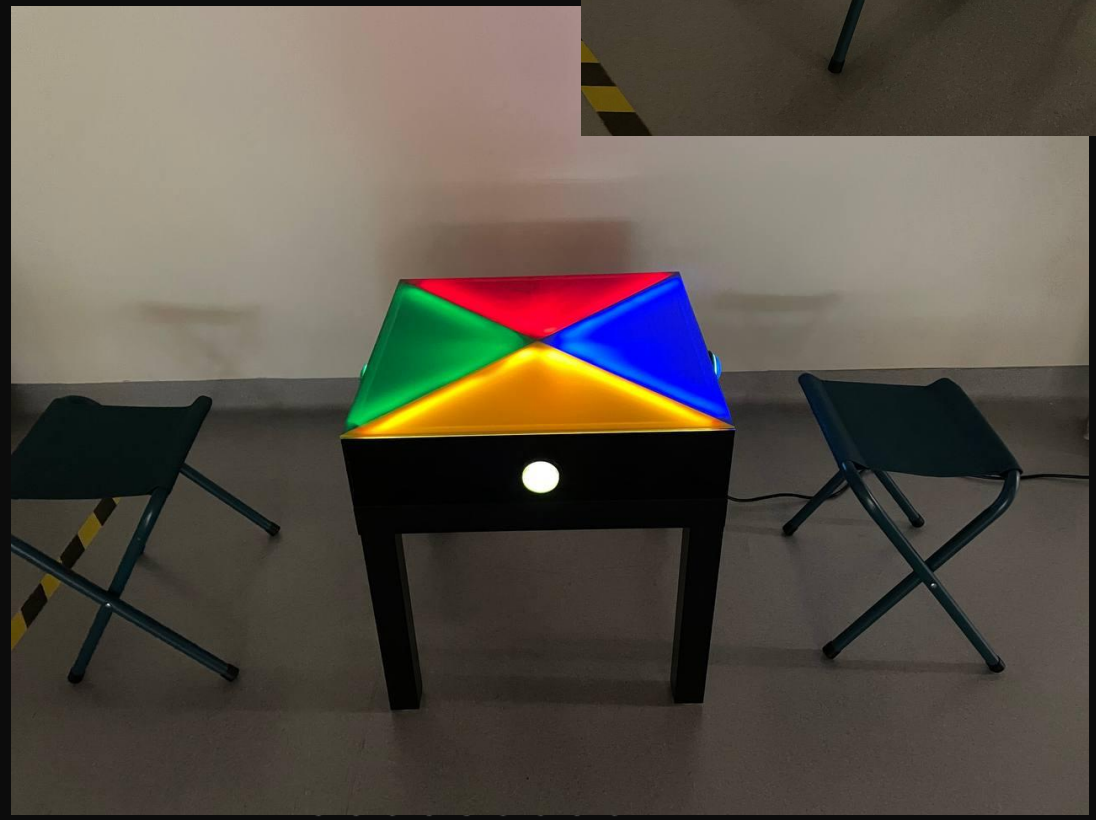
Ideas

- My project
- Multi-functional table
  - Game table
  - Normal table

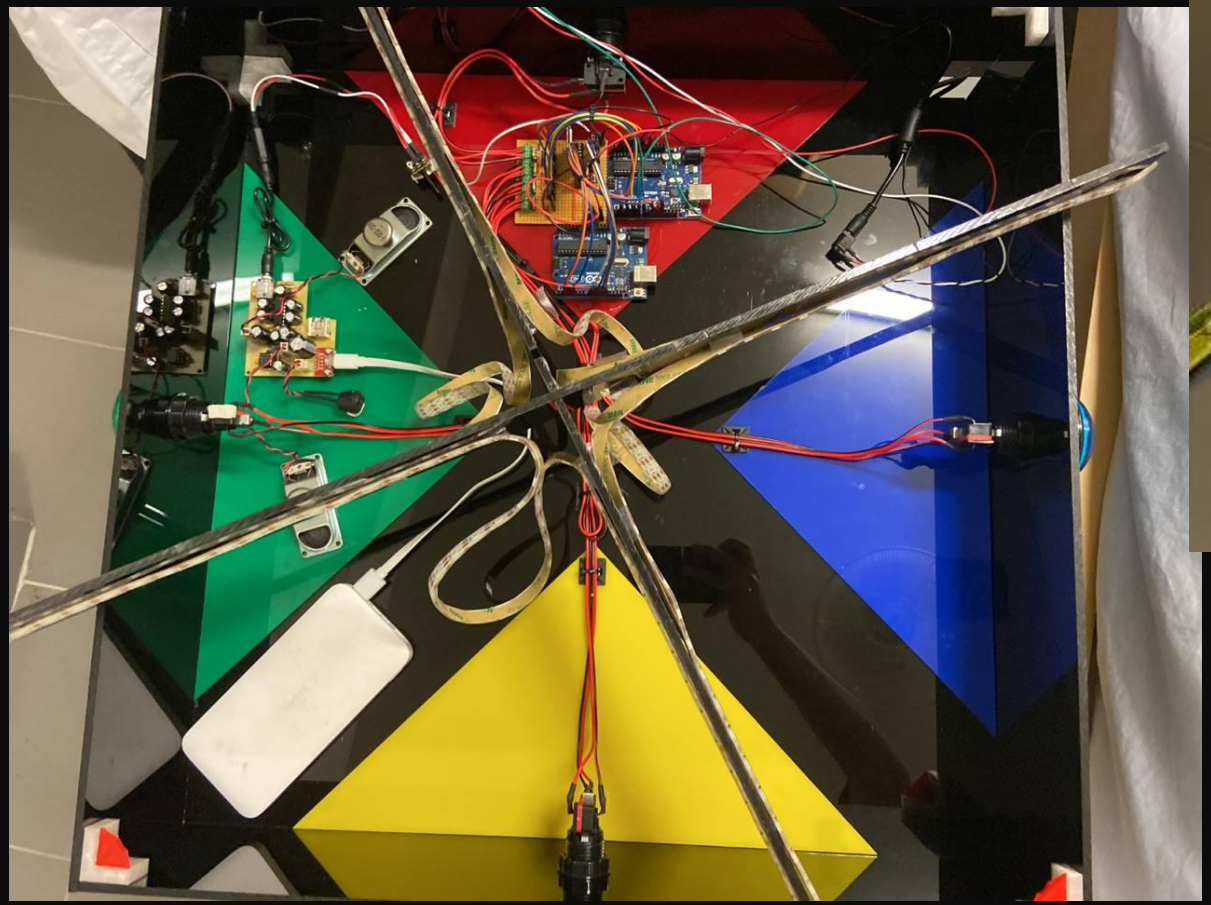
- What did it require?
- Coding side c++ knowledge
- 2 Arduino unos
- Multi-threading
- Memory allocation
- Speaker and lights library
- Binary numbers

[C5G1 Project Part 4 – 3.007 Design Projects (sutd.edu.sg)]





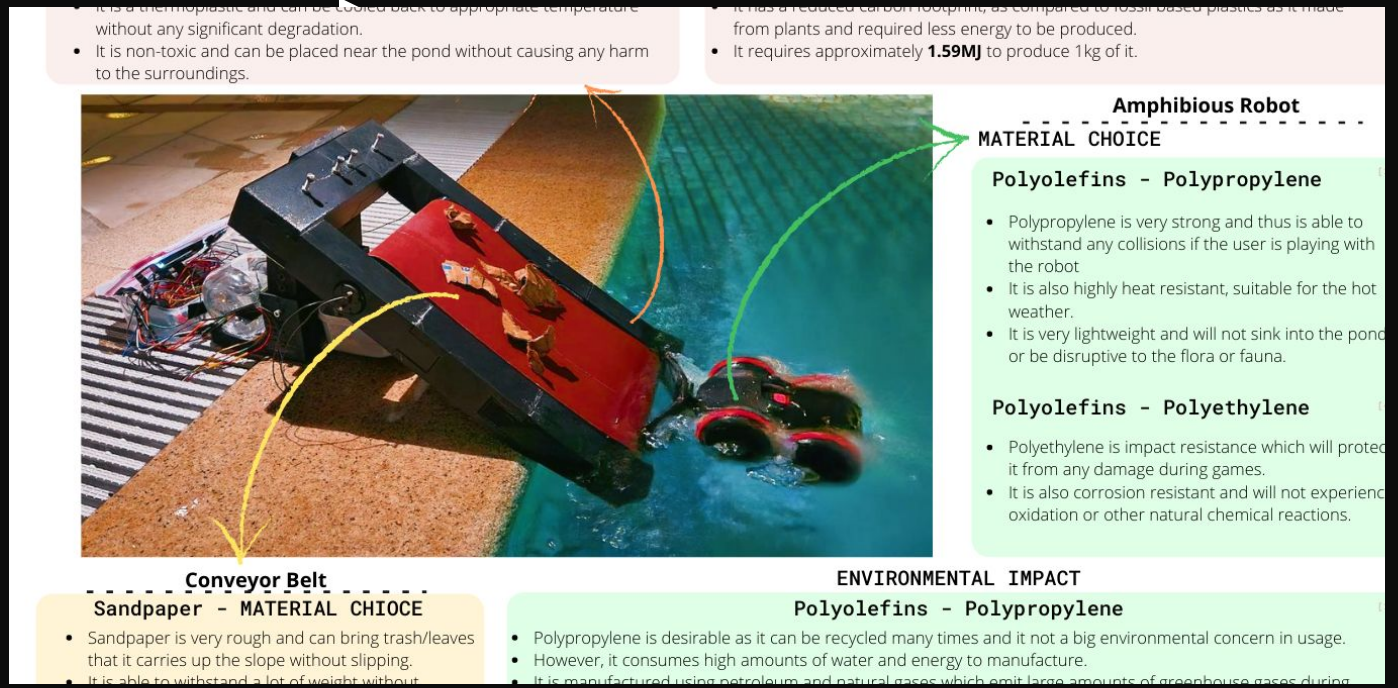
Ideas



Ideas

- YongLiang's project
- Floating Robot game

- What did it require?
- Coding side c++ knowledge
- Arduino mega
- Weight sensor and bluetooth modules
- Lcd and game screens
- Scoreboard
- Firebase



[Remote Controlled Koi (RCK) – 3.007 Design Projects (sutd.edu.sg)]

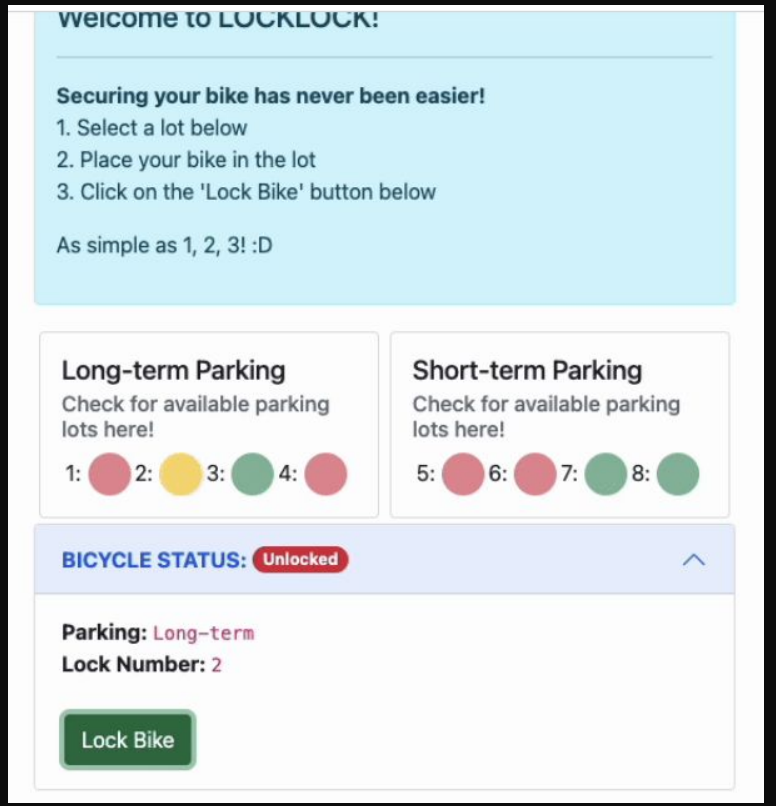
Ideas

Ideas

- Beckham and Fernanda's project
- Bicycle Lock

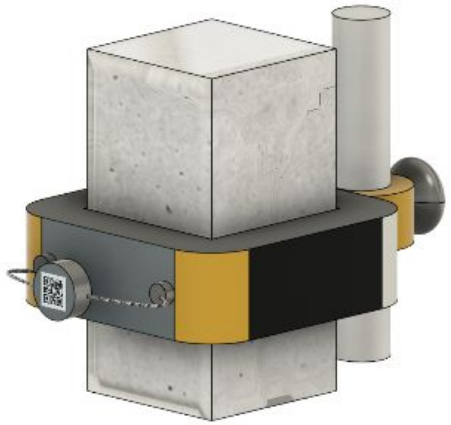
- What did it require?
- Coding side c++ knowledge
- Arduino uno
- Wifi modules and firebase module
- Web application - firebase and django framework (html, css, js)

SC04 Group 5 Part 4 – 3.007 Design Projects (sutd.edu.sg)



Ideas

2) Height adjustable bicycle lock attached to the poles



Telegram handle

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- @designacademysutd - channel