

ئون ئىككىنچى دەرس
ئانالوگ كىرىش ۋە چىقىش
Analog Read and Write

دوكتور ياسىن مەمەتجان

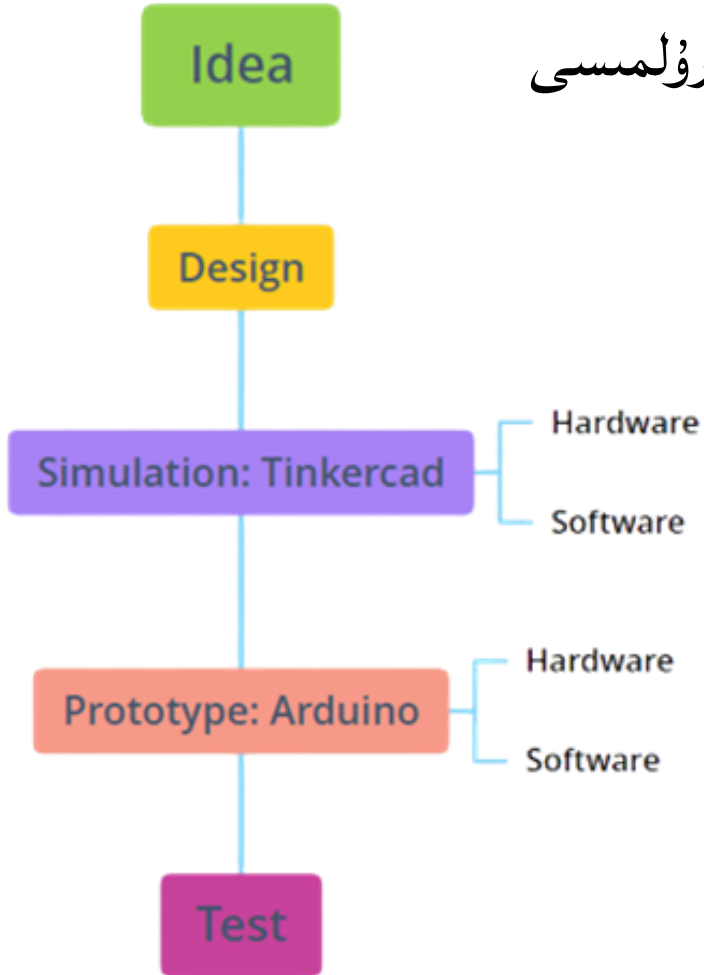
2023-04-09

مەڭگۈتەك تەربىيەلەش

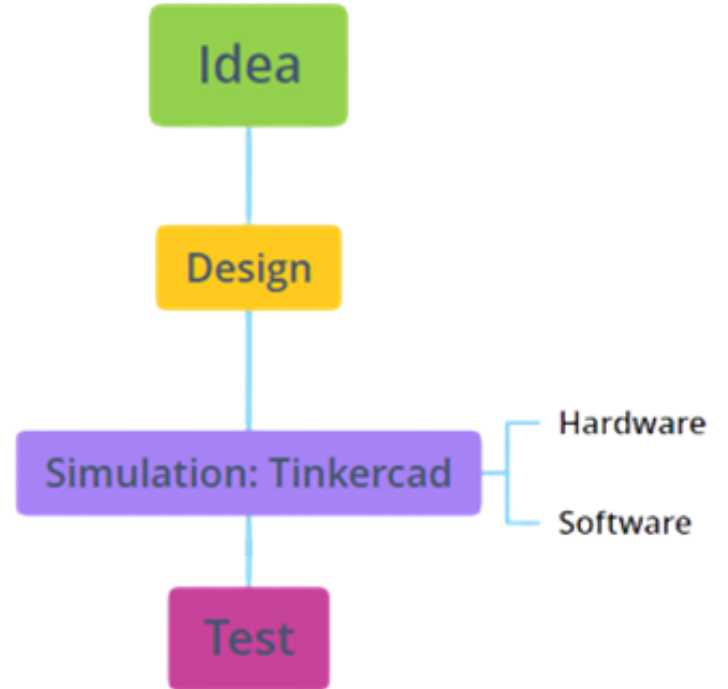
مەركىزى



دەرسىمىزنىڭ ئومۇمىي قۇرۇلمىسى



ئىدىيەدىن پروتوتىپقىچە



ئىدىيەدىن پروتوتىپقىچە

Idea to Prototype / Innovation

What

ئىدىيە

ئىشچىلارنىڭ بىخەتەرلىكىنى ئۆستۈۈش

Reason, Why

سەۋەب

ئىش ئورنىدا يارلىنىش

How

قانداق

كشىگە دەخلى قىلمايدىغان يېڭى لايىھە تۈزەش

Benefit

پايدىسى

يارلانغانلارغا تېز ياردەم بېرىش، ئالدىنى ئېلىش

ياخشى مەھسۇلات لايىھەلەشنىڭ ئون قاندىسى

يېڭىلىق

ئاددىي

پايدىلىق

گۈزەل

چىداملىق

كىچىك

ھەقىقىي

قوللىنىشچان

مۇھىتقا زىيانسىز

چۈشەندۈرگىلى
بولدىغان



ئانالوگ كىرىش ۋە چىقىش

ئانالوگ چىقىش ~

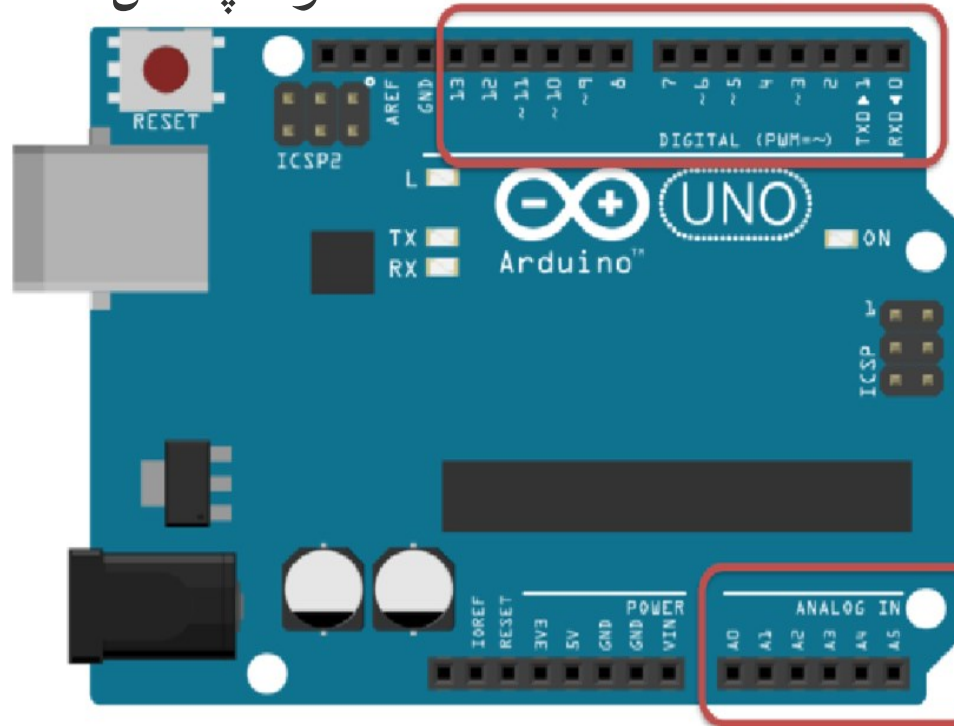
Digital Inputs and Digital Output

رەقەملىك كىرىش ۋە چىقىش
You can choose from the code if they are to be inputs or outputs

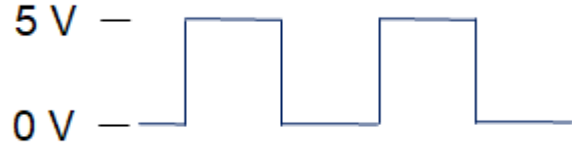
Those marked with ~ can also be used as "Analog Outputs", so-called PWM outputs

ئانالوگ كىرىش

Analog Inputs



نككى خىل سگنال



رهقه ملىك سگنال



ئانالوگ سگنال

بىز بۈگۈن ئۆگىنىدىغان قومماندىلار



digitalWrite()



analogWrite()



digitalRead()



if() statements



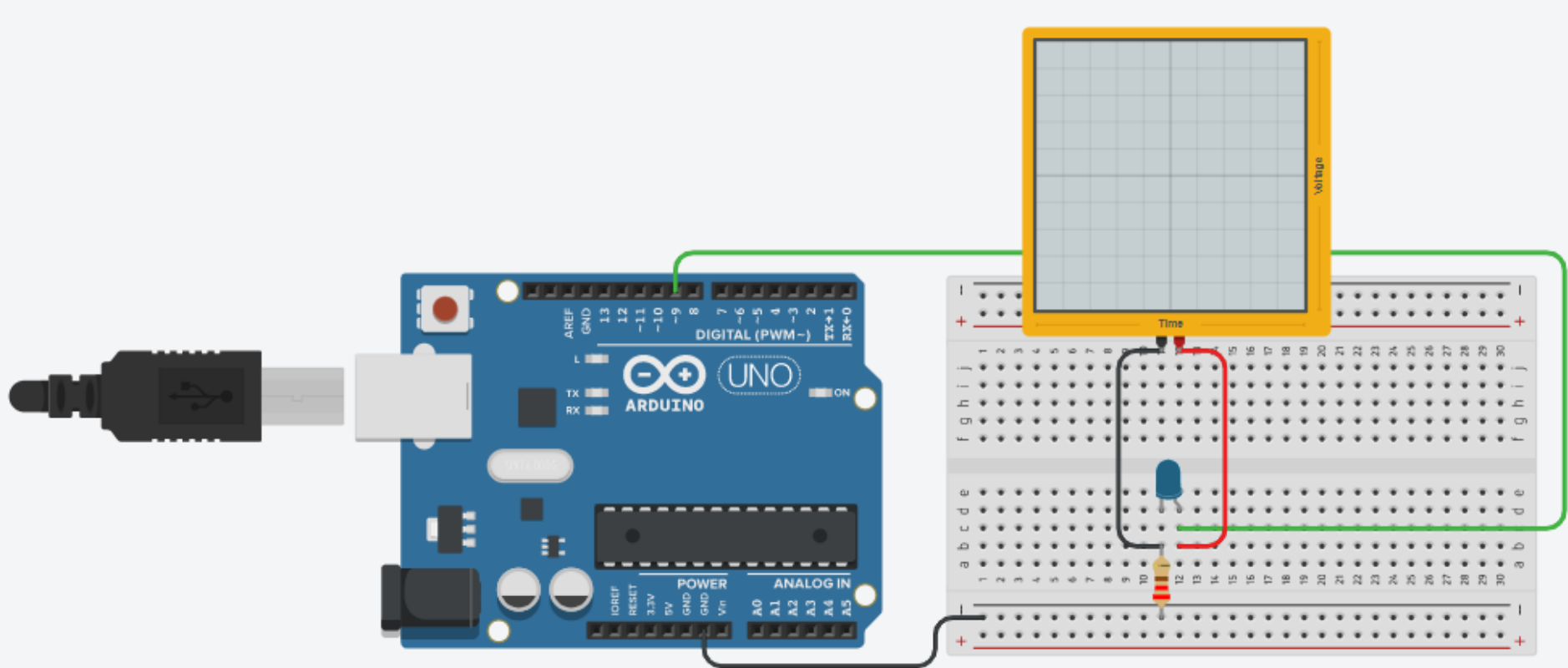
analogRead()



Serial communication

analogWrite مسالڻرى

سۇسلاش - Fading



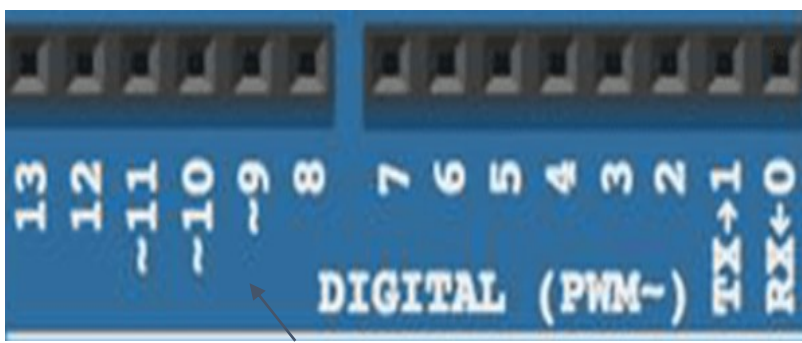
سۇسلاش - Fading

```
int brightness = 0;

void setup()
{
  pinMode(9, OUTPUT);
}

void loop()
{
  for (brightness = 0; brightness <= 255; brightness += 5) {
    analogWrite(9, brightness);
    delay(50); // Wait for 50 millisecond(s)
  }
  delay(1000); // Wait for 1000 millisecond(s)
}
```

The image shows a sequence of Scratch-style code blocks for controlling an LED's brightness. The first block is a 'do' loop: 'count up by 5 for brightness from 0 to 255 do'. Inside this loop, there are three blocks: 'set pin 9 to brightness', 'wait 50 milliseconds', and a right-turn arrow block. Below the loop is a 'wait 1 secs' block.



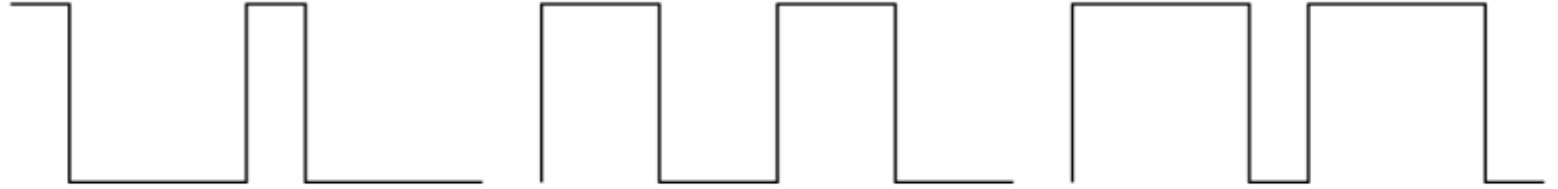
Digital I/O (Input/Output) رهقه مملك كرش

`analogWrite(3,64)`

`analogWrite(3,127)`

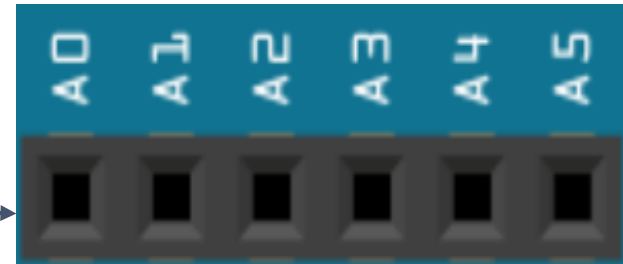
`analogWrite(3,191)`

PWM



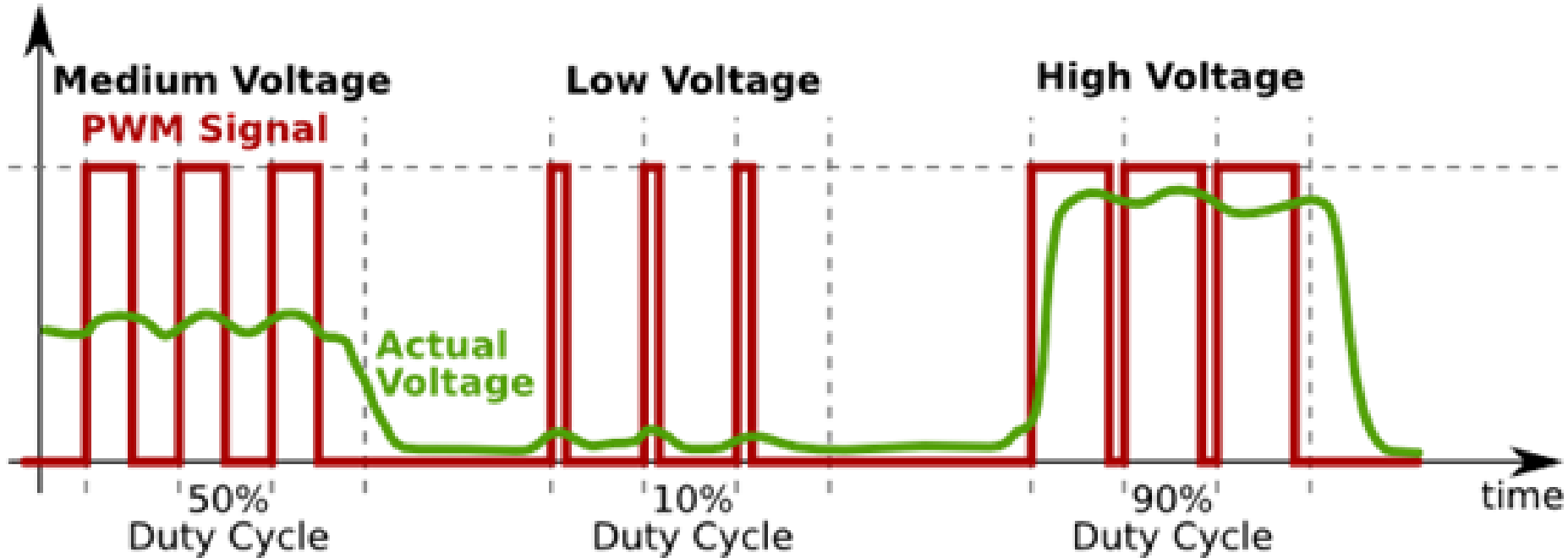
دولقون كهگلكنى مؤدولياتسيهلهش

ئانالوگ چقش ~



Analog input pins

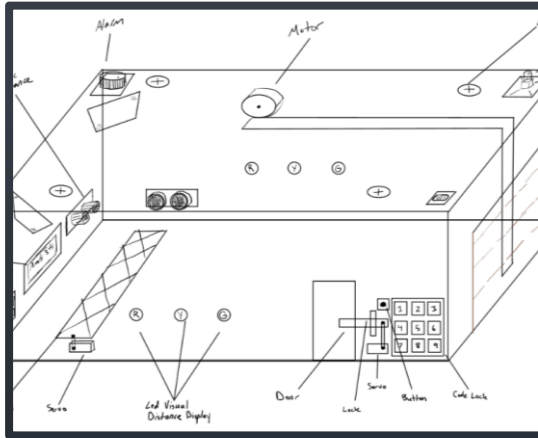
دولقۇن كەڭلىكىنى مۇدۇلياتسىيەلەش



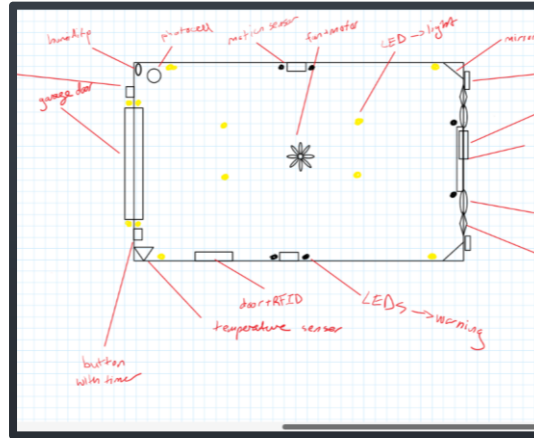
Solutions space

		Solutions					
		Solution 1		Solution 2		Final Solution	
Criteria	Weight	Score	Partial Score	Score	Partial Score	Score	Partial Score
Cost	0.10	3/5	0.060	6/10	0.060	7/10	0.070
Ease of use	0.10	3/5	0.060	4/5	0.080	1	0.100
Reliability	0.20	3/5	0.120	12/15	0.160	3/5	0.120
Safety	0.15	9/10	0.135	6/10	0.090	8/10	0.120
Code Complexity	0.20	8/10	0.160	7/10	0.140	9/10	0.180
Hardware Complexity	0.20	9/10	0.180	7/10	0.140	9/10	0.180
Security	0.05	1/6	0.008	1/3	0.017	2/3	0.033
Sum	1.00		0.723		0.687		0.803

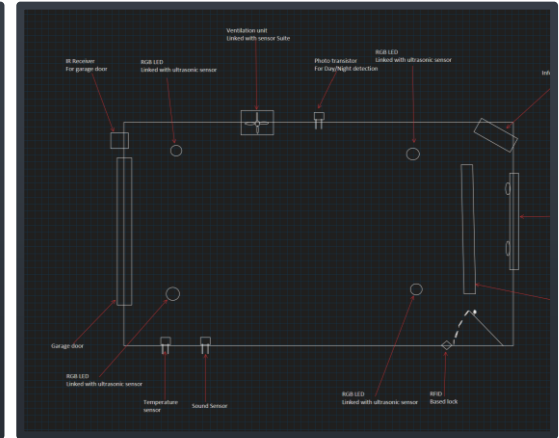
Final solution

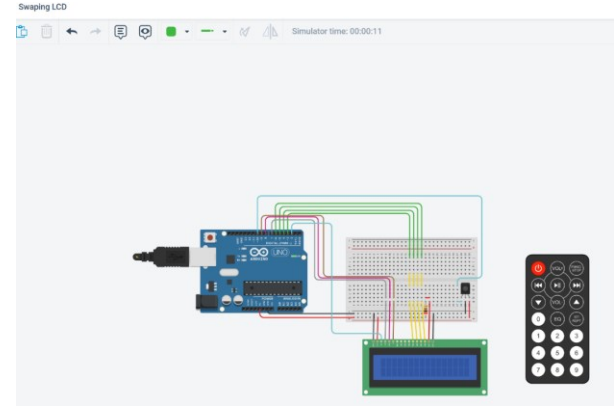
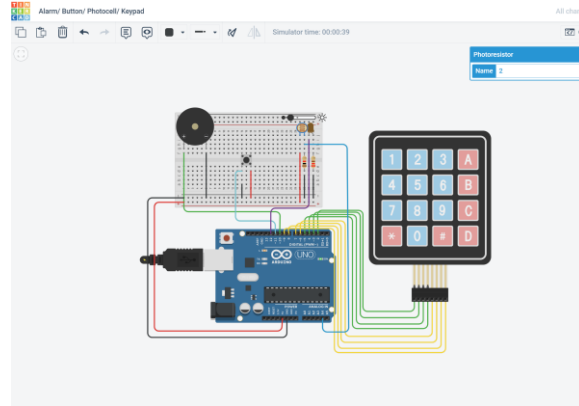
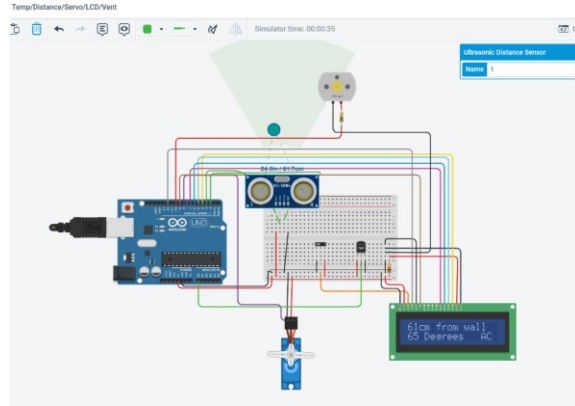


Solution 1



Solution 2

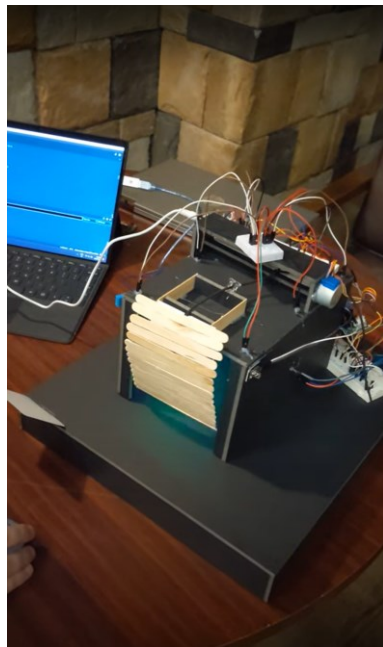
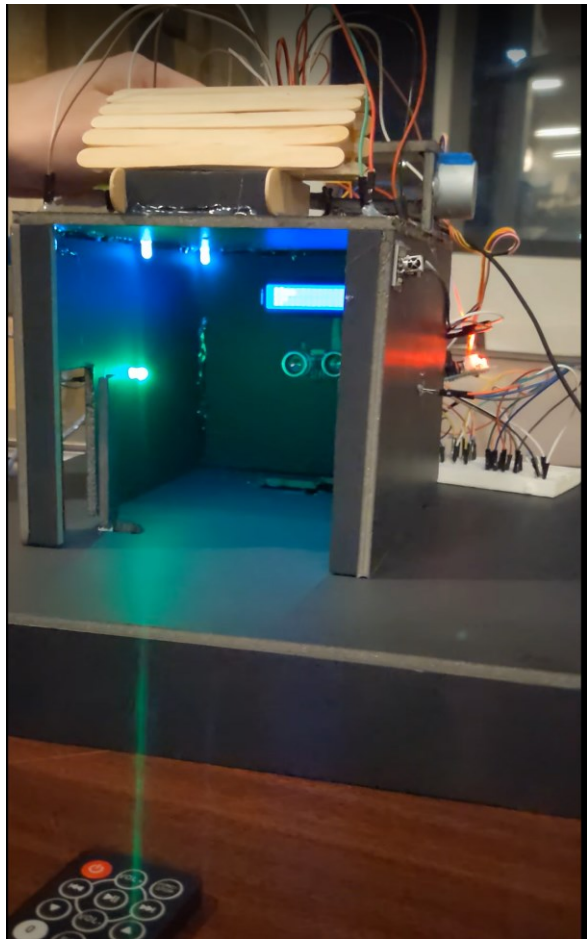




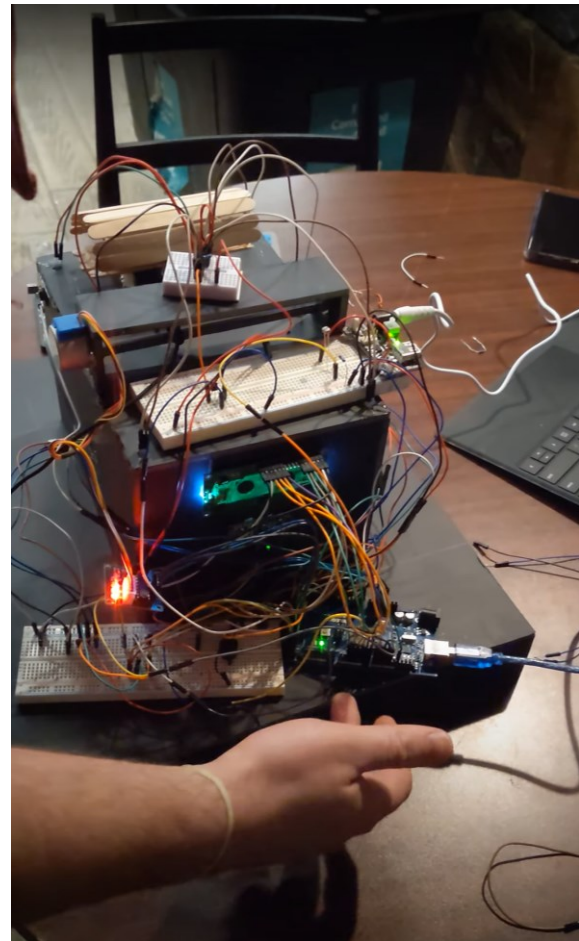
Prototyping

In person prototyping





First build



تۈگىدى

سوئالڭىز بولسا، تورىتىمىزدىكى
ھەر بىر دەرسنىڭ سوئال
!!سورايدىغان يىرىگە يېزىڭ

