

CREATE AN EGG TIMER

#R1AS14



Available on



Pre-requisites

- R1AS13 - Servos make things move!



Material

- 1 Programming board "**STM32 IoT Node Board**"
- 1 Micro-B USB Cable
- 1 SG-90 Mini Servo (1.6kg)
- Jumper Wires
- 1 small cardboard sheet (20cm*10cm)
- 1 Sturdy Wood Sticks (less than 10cm)

What is it?

Let's create a simple but useful object, an egg timer! This activity will enable to apply knowledge acquired on servos, as a system control solution.

Duration
35 minutes

Level of difficulty

Advanced

Extended activity



LEARNING OBJECTIVES

- Create a physical timer
- Use a servo to display data
- Make a calibration process to improve the precision of the timer



CREATE AN EGG TIMER

In this activity, we will create a simple but useful object, an egg timer using programming and DIY practices! After performing it, you will be a real French cook! To boil correctly an egg, French people use the rule called **3,6,9!** This rule gives the exact time in minutes for correctly bake an egg depending on your cooking objectives:

- 3 minutes for soft-boiled eggs - *Oeufs à la coque*
- 6 minutes for boiled eggs - *Oeufs mollets*
- 9 minutes for hard-boiled eggs - *Oeufs durs*



STEP 1 - MAKE IT



Prepare your electronic hardware

Wire correctly your board and your servo using the activity sheet #R1AS13 - Servos make things move!

Create the clock hand and attach it to the servo horn

Take the sturdy Wood Sticks and attach it to the servo horn.

i Servo horns are attachments that fit over the output shaft and allow you to mechanically link the servo output to the rest of your mechanism. Servos are usually supplied with an assortment of servo horns.

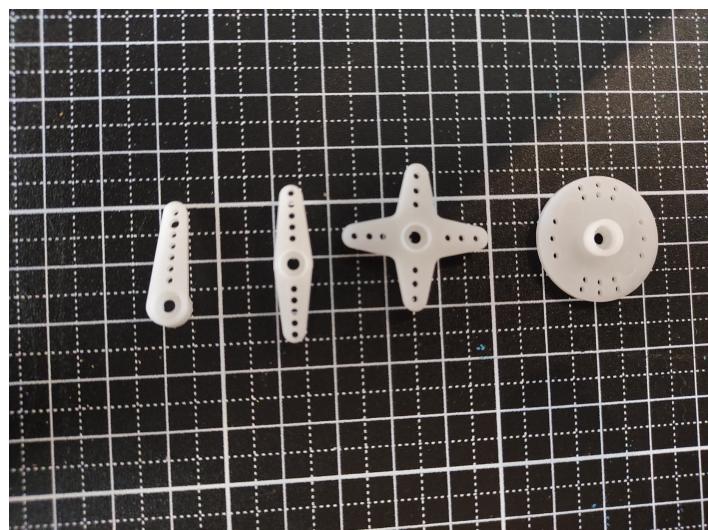
Unfortunately, the exact horns included are usually not specified and can vary.

And, since servo output shafts and their splines vary, horns are often incompatible between brands and models of the servo.

The easiest way to attach your clock hand is to use an elastic band but you can also use hot glue or scotch.

1

2



Create the clock hand and attach it to the servo horn

CREATE AN EGG TIMER



STEP 1 - MAKE IT



Create the timer front panel

On the cardboard, make a small hole of the size of your servo shaft. The hole should be on the middle of the longer side of your cardboard.

Put the servo behind and attach the clock hand on the shaft of the servo.

Turn the horn in the minimum position (angle 0°) and fix the servo so that the clock hand be horizontal. With a pen, make a small mark to indicate the 0s. Turn the horn in the maximum position (angle 180°) and make a small mark to indicate the 180s.

Connect the board to the computer

With your USB Cable, connect the board to your computer by using the **micro-USB ST-LINK connector** (on the right corner of the board). If everything is going well you should see a new drive on your computer called **DIS_L4IOT**. This drive is used to program the board just by copying a binary file.

Open MakeCode and create a new blank project

Go to the [Let's STEAM MakeCode editor](#). On the home page, create a new project by clicking on the "New Project" button. Give a name to your project more expressive than "Untitled" and launch your editor.

Resource: makecode.lets-steam.eu

Program your board

Inside the MakeCode Javascript Editor, copy/paste the code available in the **Code It Section** below. Before trying this program on the board, you can try it directly inside the simulator. If you click on the USER button, you will see your timer start. . If not already done, think of giving a name to your project and click on the "Download" button. Copy the Binary file on the drive **DIS_L4IOT**, wait until the board finish blinking and your servo will start to move!

Run, modify, play

Your program will automatically run each time you save it or reset your board (push the button labelled RESET). If everything is working well, your servo will start to move.

3



Create the timer front panel

4

5

6

7

CREATE AN EGG TIMER



STEP 2 - CODE IT



```
input.buttonUser.onEvent(ButtonEvent.Click, function () {
    for (let pos = 0; pos <= 179; pos++) {
        pins.D4.servoWrite(pos)
        pause(1000)
    }
    for (let i = 0; i < 5; i++) {
        pins.D4.servoWrite(0)
        pause(1000)
        pins.D4.servoWrite(180)
        pause(1000)
    }
})
```

How does it work?

The main part of the code is about the buttons interactions. These interactions are made with the `input.buttonUSER.onEvent` function.

When you click on the button **USER**, you will start the timer by changing the position of the servo to one degree each second.

When you have finished counting from 179 to 0, you start to move quickly your servo to signal the end of the timer.

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STEP 3 - IMPROVE IT



By [adding a servo](#), make a second indicator enabling to know the status of your egg cooking (raw, soft boiled, boiled, hard-boiled).

1



2



3



Change the final animation of the timer [by adding a buzzer](#) to make more sound.

The current version of the program is not calibrated, your timer will give you an approximate value. If you want to be a more scientific egg cooker, you need to [follow a calibration process](#). To calibrate a timer, [use a reference clock](#). You can easily use the clock of your smartphone for instance to measure the duration of the timer. To reduce the uncertainty, you will [repeat the measurement many times](#) (e.g. ten times is enough) to be able to calculate the average value and use a [cross product to find the correct delay value](#).

GOING FURTHER



Pulse Width Modulation - Learn more about the pulse width modulation digital signal
<https://learn.sparkfun.com/tutorials/pulse-width-modulation/all>



How to boil an egg perfectly - Learn how long to boil an egg to achieve the perfect consistency.
<https://www.bbcgoodfood.com/howto/guide/how-boil-egg-perfectly>



Countdown Timer - Make a countdown timer and see the seconds tick by on micro:bit watch.
<https://makecode.microbit.org/projects/watch/time>



Micro:bit Egg Timer - Make a fun timer to guarantee the perfect cooking time of eggs using 3D printing and micro:bit.
<https://www.myminifactory.com/object/3d-print-micro-bit-egg-timer-18361>



[Explore other activity sheets](#)



R1AS15 - Collecting data