

REX

**REX EVOLUTION SERIES
SUPER STAR TRANSFORMERS
8 IN 1**

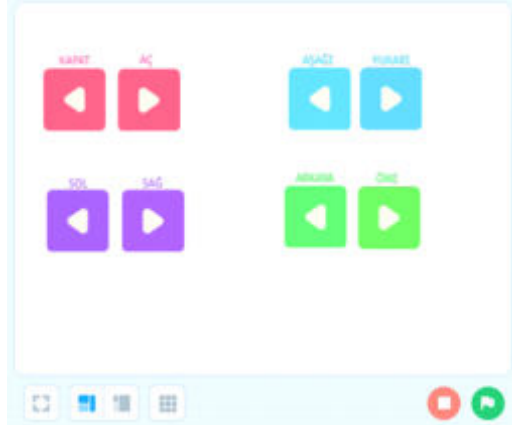
**mBlock
Stage
Controlled
Robot Arm**

mBlock

Author: Mustafa Kemal AVCI

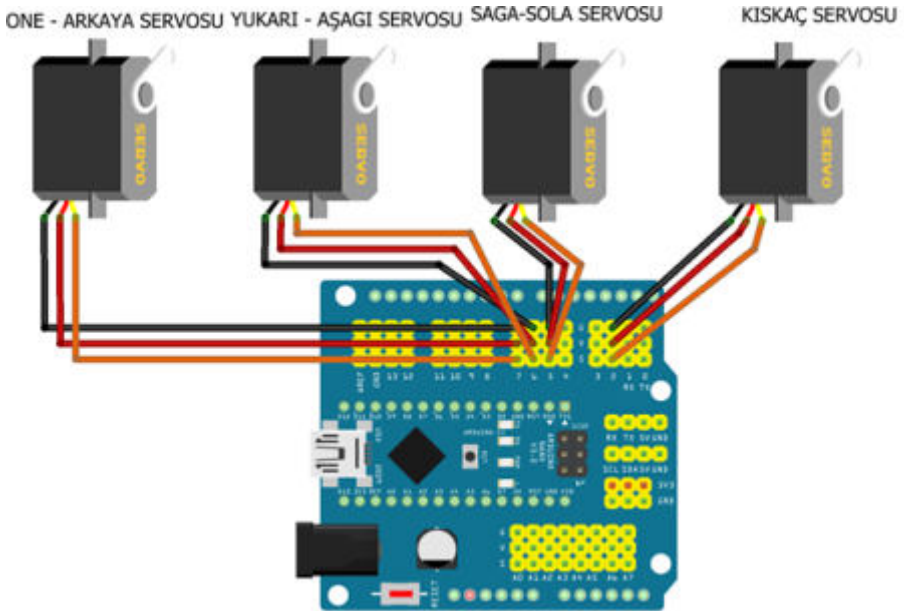
mBlock Sahne Alanı Kontrollü Robot Kol

You can control the Armbot from the computer. We will use the stage area of mBlock 5 for this. As in the image below, we will enable the Armbot to communicate with the buttons we will place on the stage, and enable the Armbot to respond to the commands we give from the stage.



After installing the Armbot, let's make the cable connections according to the connection diagram below.

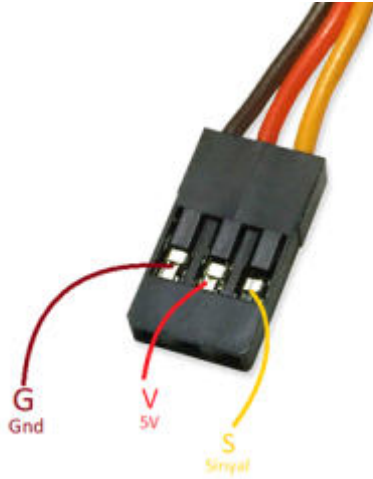
Connection Diagram



fritzing

mBlock Sahne Alanı Kontrollü Robot Kol

Let's connect the Sg 90 servo motors to the pins on the Arduino Nano shield, corresponding to the pins shown in the image below. Connect the servo motor to pin 2 to be used for holding and releasing, the servo to be used for right and left rotation to pin 5, the servo to be used for up and down movements to pin 6, and the servo to move forward and backward to pin 7.



Preparing the mBlock Stage

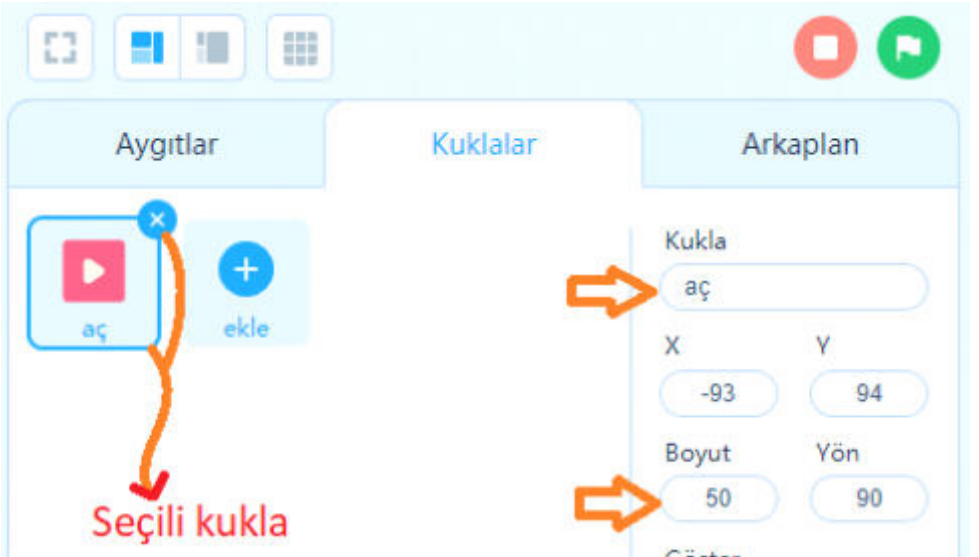
Let's delete the panda puppet on the mBlock 5 stage as shown below and click on the Puppets tab and click on the button shown to add puppets.



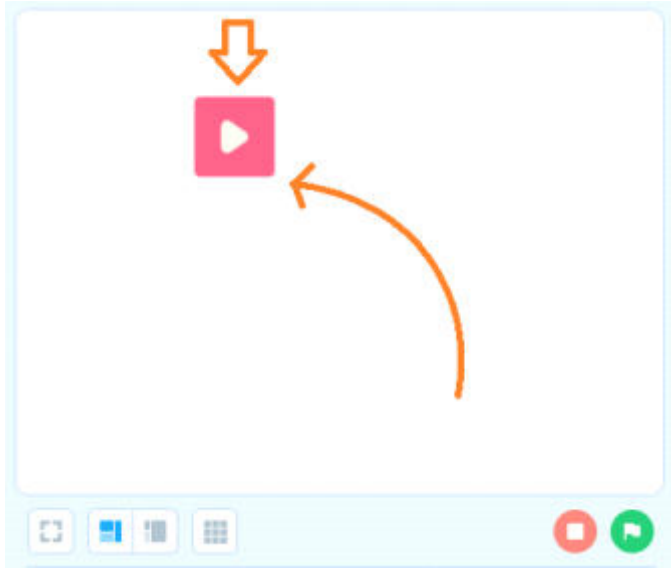
After pressing the add button, we write Game button in the search section in the upper left corner of the Puppet library that opens. We click on the pink colored puppet called Game button8 so that it is added to our stage.



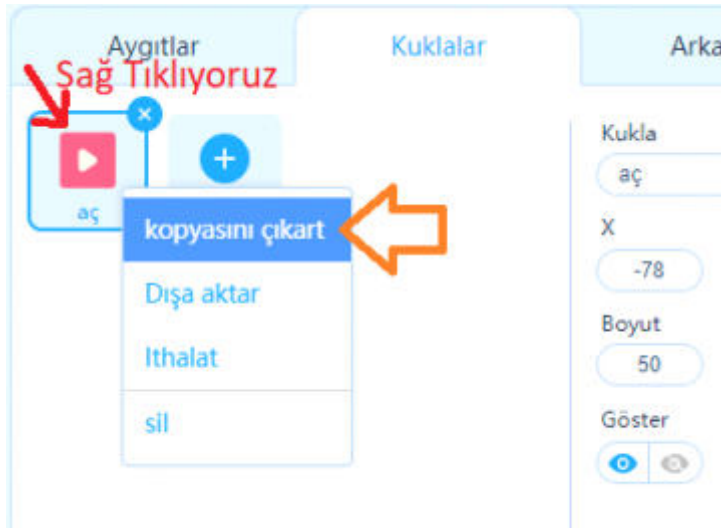
We choose our puppet and change its name to “open” and its size to “50” as in the image below. Since our puppet is selected, it is surrounded by an oval blue frame as below, and there is a white x symbol in a blue circle in the upper right corner.



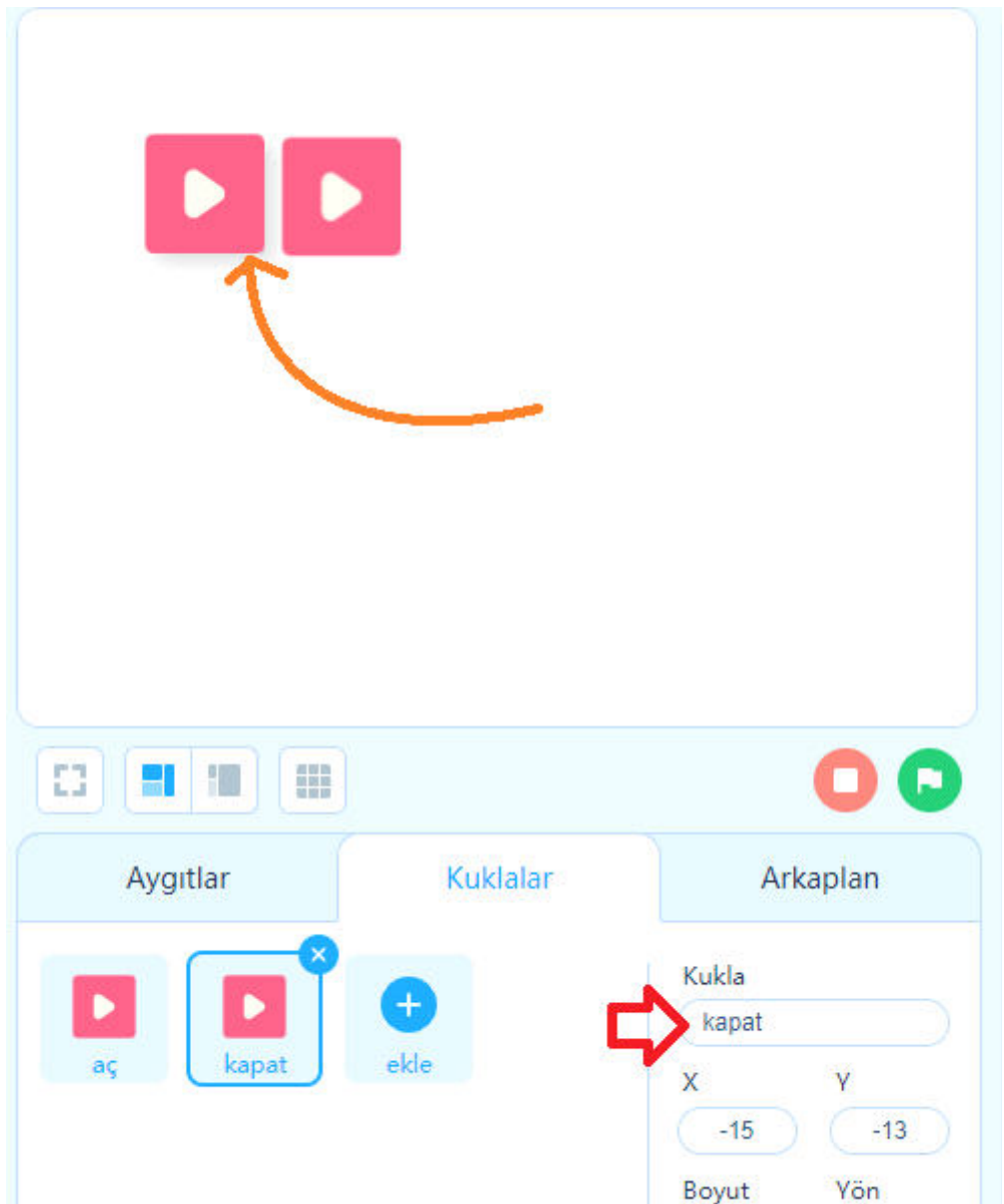
After setting the name and size of our puppet, we need to adjust its place on the stage. We come to the stage with the mouse and drag the puppet to the upper left corner of the stage, as in the image below.



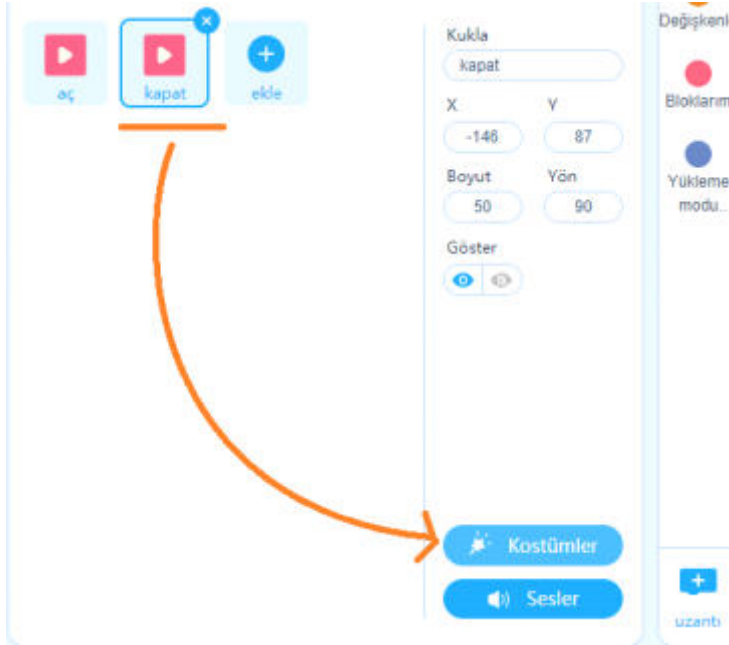
We will use this puppet to open the clamp. We will make a puppet called close, which we will use to close it right next to it. For this we will make a copy of this puppet. As in the image below, right-click on the open puppet from the Puppets tab and click on the duplicate option from the pop-up menu.



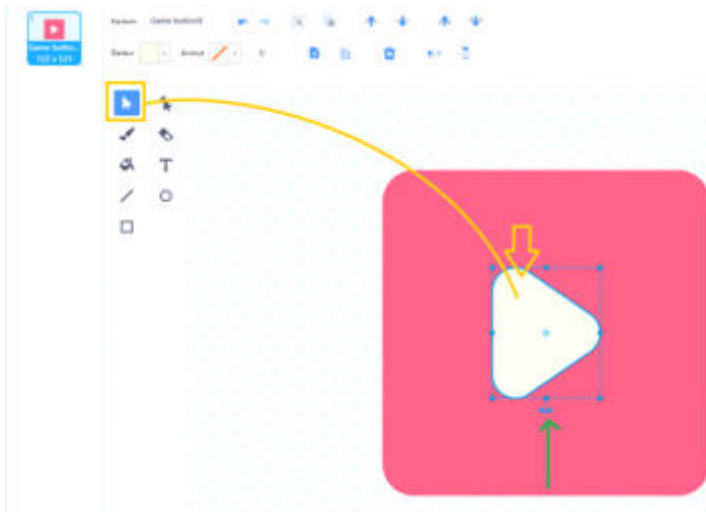
mBlock will automatically set the name of the copied puppet to open2. Let's change this name to close and drag and drop it to the left of the open puppet as in the image below.



We will turn the right-facing pointed edge of the white triangle on the puppet named close to the left. For this, we will change the appearance of this puppet by clicking the costumes button while the close puppet is selected.

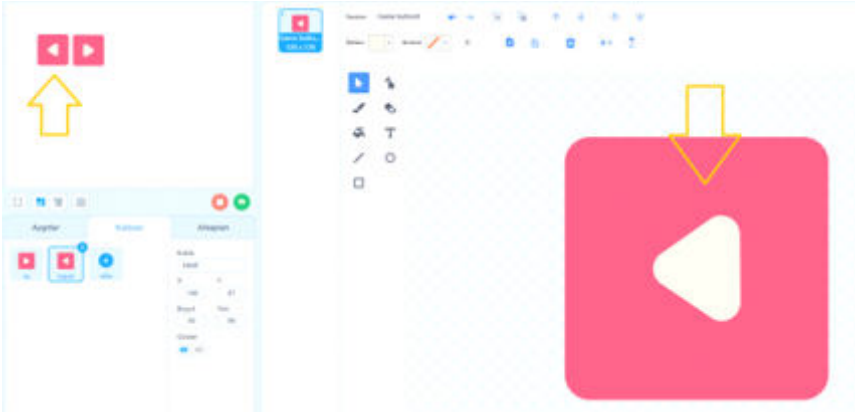


While the Select tool shown in the yellow square in the image below is selected, click inside the white triangular shape. A rectangular shape is formed with thin blue lines around the shape, and sizing circles appear at the midpoints of the edges and corners. Rotate the figure 180 degrees by holding the double-sided arrow icon indicated by the green arrow. Make sure that the right-facing pointed part of the triangle is facing left.

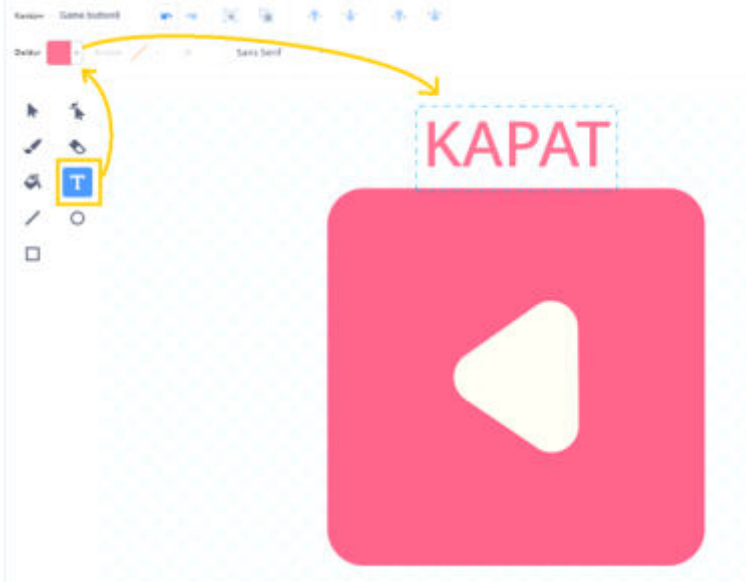


mBlock Sahne Alanı Kontrollü Robot Kol

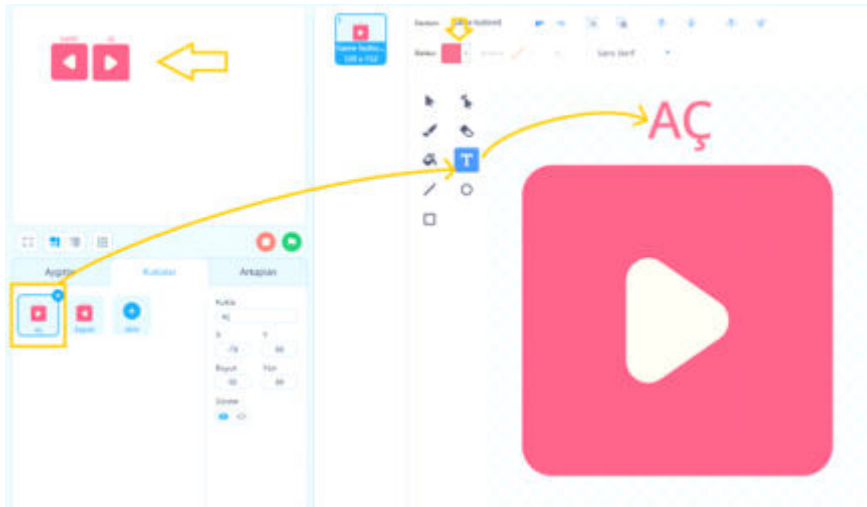
When you're done, the dummy should look like the one below.



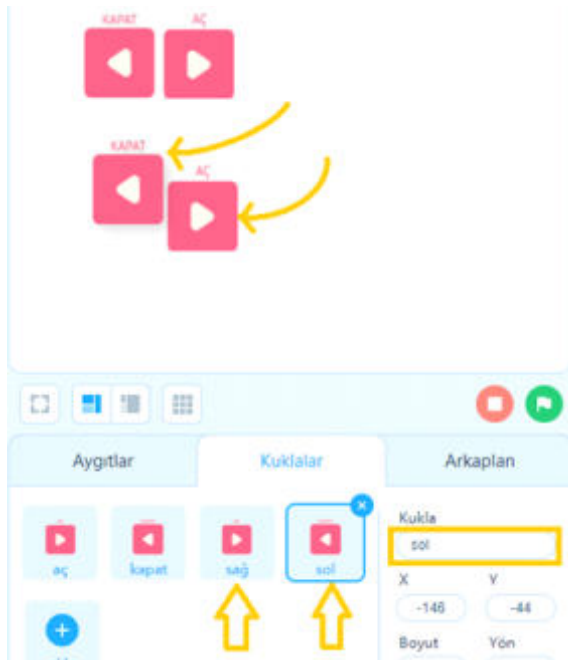
Now let's write the names inside the puppets. Now that we are editing our close puppet, we click on the type tool from the toolbox. We adjust the color from the Fill section. Then we click on the part in the image below and write CLOSE.



Without finishing the costume editing process, let's select the open puppet from the Puppets tab and write the phrase OPEN on the top of this puppet in the same way.

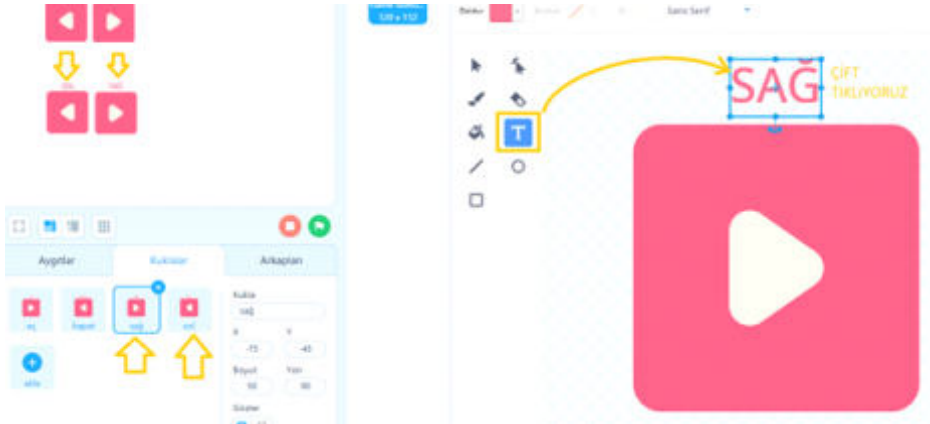


Now let's make the puppets that we will use for left and right turns. For this, we first copy the hungry puppet and name it "right". Then we make a copy of the close puppet and name it "left". Let's drag and drop our new puppets to be side by side just below our previous puppets, as in the image below.



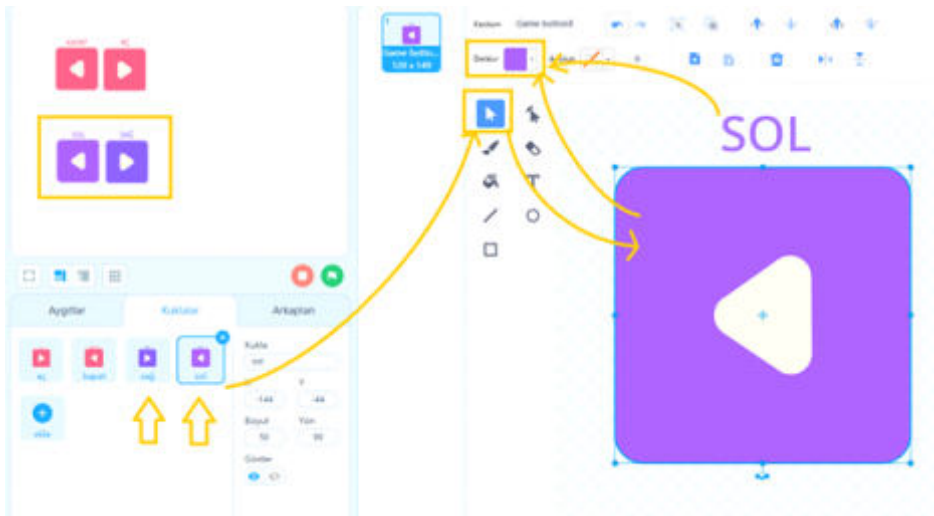
mBlock Sahne Alanı Kontrollü Robot Kol

We will change the text on our puppets named right and left. For this, let's go to the costume edit window. If it is not open, let's make it open by clicking the costumes button. For our puppet named left, when we click on the CLOSE text while the writing tool is selected, we delete the text and write LEFT. In the same way, we select the puppet named right, click on the text OPEN, delete the text and write RIGHT.



Let's change the colors of our new puppets. For this, let's open the costume editing window if it is not open.

After selecting our puppet named right, we click on the select tool and click on the pink colored square area. Then we make our color selection from the fill field. In the same way, we select the right text and set the color from the fill area. Let's perform the same operations on the left puppet as indicated by the yellow arrows and squares in the image below.



mBlock Sahne Alanı Kontrollü Robot Kol

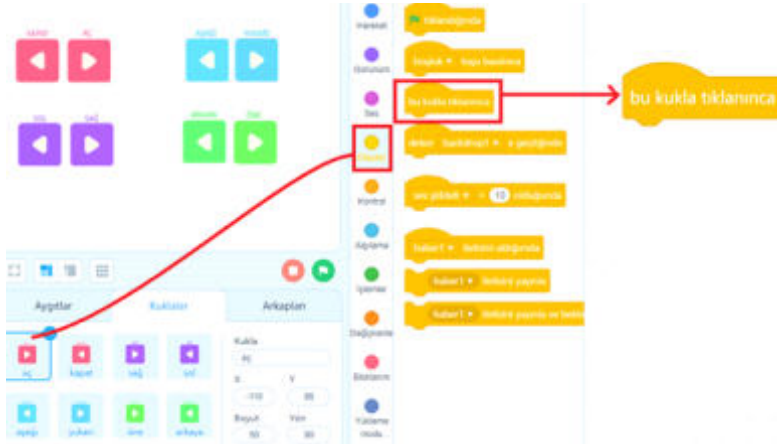
After creating the front, back, up and down puppets with the techniques we have used so far and adjusting the texts and colors, we get the stage design as in the image below.



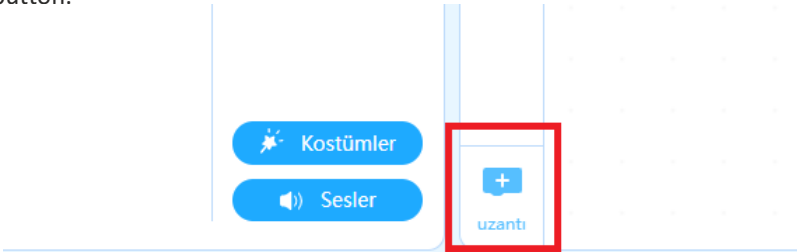
Now that our stage design and Armbot are ready, we can finally move on to the coding stage. First of all, let's do the coding of the puppets on the stage.

Coding mBlock Puppets

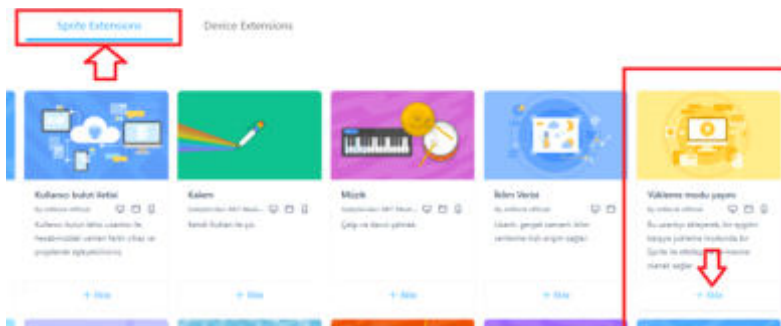
We'll send it to Armbot once it's released on the Puppets. This will also include a word for the action that the Armbot must do. This word should not contain Turkish characters. First, let's prepare the code for the "open" puppet. After selecting the open puppet, let's drag and drop the block when this puppet is announced from the Events category.



We need to add the Upload Mode Broadcast extension so that we can send the puppet to Armbot when it is announced. For this, let's open the reach center by clicking on the reacht button.

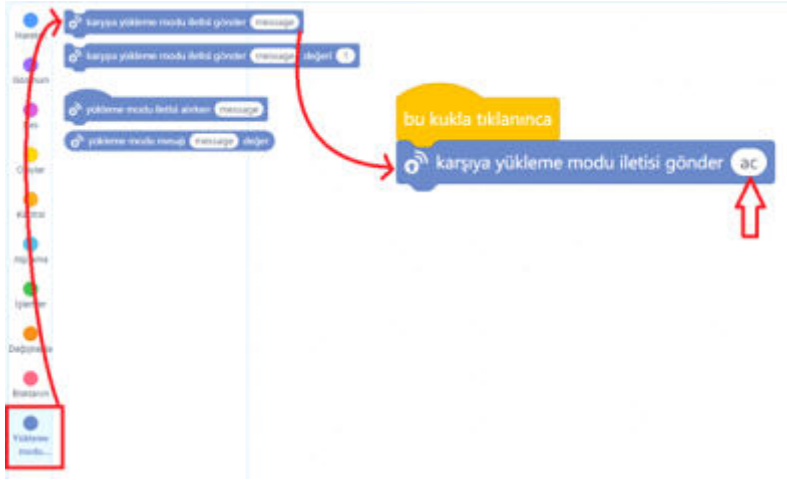


Find the Download mode broadcast extension from the extension library that opens and add it to your workspace with the add button.

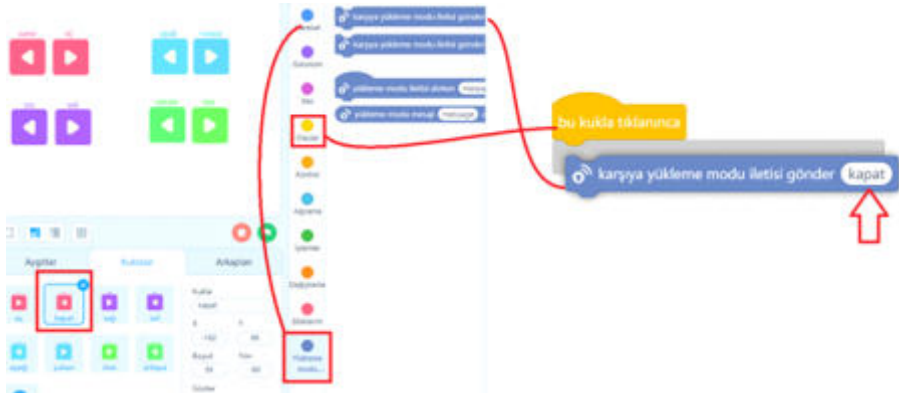


mBlock Sahne Alanı Kontrollü Robot Kol

Yükleme modu yayını uzantısı eklendikten sonra aç kuklamızın bu kukla tıklanınca bloğunun altına aşağıdaki görseldeki gibi ile gönderme bloğunu sürükleyip ile adı kısmına "ac" yazıyoruz.



Let's make our puppet named close send it with the name "close" when it is announced. For this, let's select the close puppet and drag and drop the block when this puppet is announced from the Event blocks. Next, let's take the posting block from the upload mode broadcast category and write "close" in the name field with .



Let's repeat this process for our other puppets. Let's complete our coding according to the names of our puppets and what they will send in the table below.

Kukla Adı	İleti adı
down	asagi
up	yukari
right	saga
left	sola
forward	one
backward	arkaya

That's it for our puppets to code. Now we can code the Armbot. We will use the same mBlock file for Armbot. No need to open a new mblock file.

Coding the Armbot

After completing the installation of the robot, we must first run the servos one by one and check their starting positions. Then we will determine the widest and narrowest angles of each servo and make it act within this range. If we force the servo to an angle where it cannot rotate without determining the range, it will draw too much current and cause it to break down or cause other servo motors to malfunction.

Go to the Devices tab and add R.E.X from the device library. Then let's start to adjust the servo motors.



We drag and drop the block when the rex starts from the events category.



First of all, we need to determine the angle ranges in which our servos make their movements one by one.

We must have set it up so that the fully open state of the servo on the D2 pin is 0 angle. But sometimes we don't pay much attention to it during installation and there may be different angles. As in the image below, we should test the angles of each motion servo by changing our servos and their angles and uploading the code.



Arduino nano'yu bilgisayara bağlayıp bu kodu yüklediğimizde servonun hareketi gözlemleyelim. 75 derece kısılcının kapanması için kullanacağımız açıdır. Kısılcı açmak için ise 15 derecede olması yeterlidir. Bunu deneyerek en uygun açı aralığını tespit edip bir kenara not edin. Daha sonra Armbot'un kodlanmasında kullanacağız.

Tüm servo hareketlerini yukarıdaki görseldeki kodu pin nosunu ve açı değerini deneyerek aralıklarını belirlemeliyiz.

mBlock Sahne Alanı Kontrollü Robot Kol

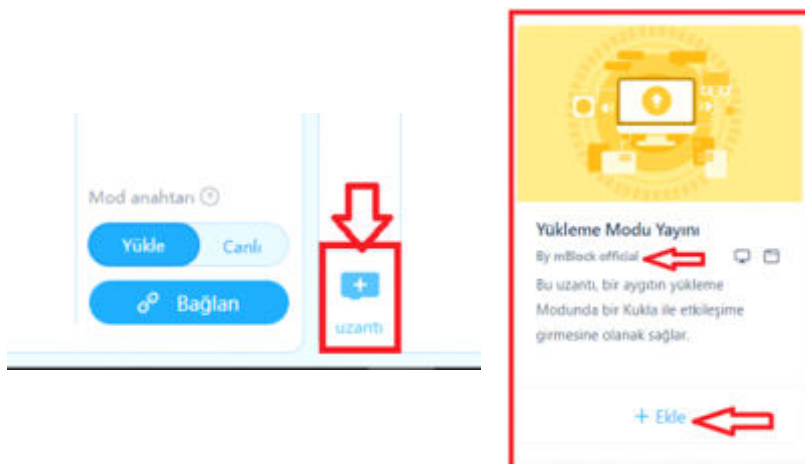
In the table below, the angle ranges of the servos used in our installation are given. Your servos may differ from these ranges. Build this angle chart for your own robot by trying only one servo at a time.

Action Name	Servo Pin No	Angle Limits	Beginning Angle
On - off	D2	15-75	75
down - up	D6	0-40	40
forward - backward	D7	40-0	0
right - left	D5	15-85	45

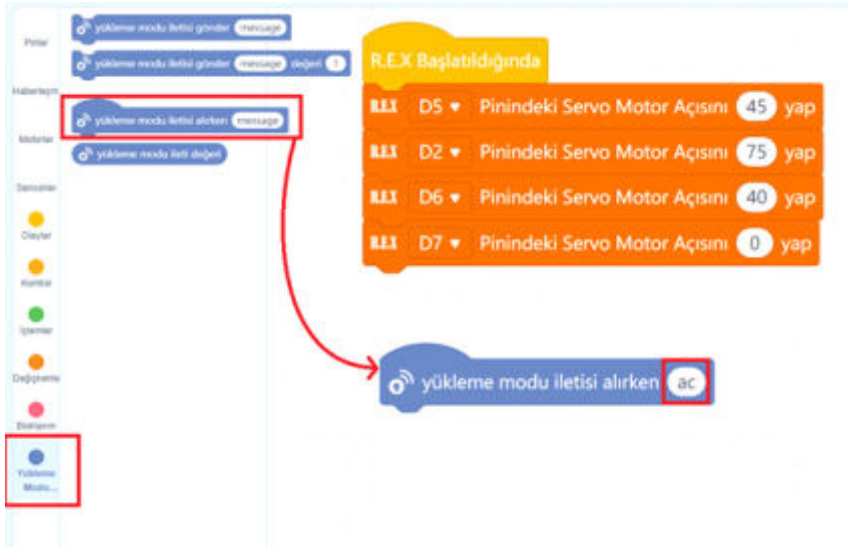
When the armbot starts, all the servos must be in the initial position. So, let's drag the Servo pins on the motors blocks for each motor and leave them as in the image below. Then, let's write the angles of the servos from your own data as in the data in the table above.



Armbot mBlock needs to receive messages from puppets on the stage. For this, let's go to the extension center of REX and add the Download Mode broadcast.



We drag the "message" block and drop it to the place in the image below while it is taken from the upload mode broadcast category with the upload mode. Then we change the name part to "ac". Our puppet named hungry on this block stage will listen to the song named "ac" that he will send when it is announced.



We were using the servo motor on pin D2 to open and close the gripper. We want the servo to reach 15 degrees with the "ac" command. We use it by making the necessary changes in the servo block from the Motors category as in the image below.



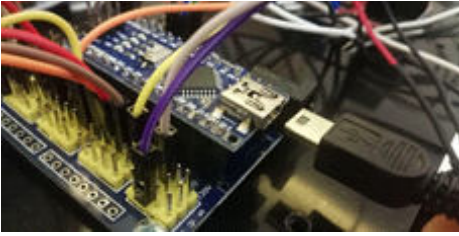
In order to close the gripper, let's prepare the code that will listen to the "close" sound from the puppet on the stage and set the servo motor connected to the D2 pin to 75 degrees, as in the image below.



Let's create our codes for the Armbot, which will respond to 8 different units from 8 different puppets in total with this system. When our work is done, the image of our codes should be like the one on the right.

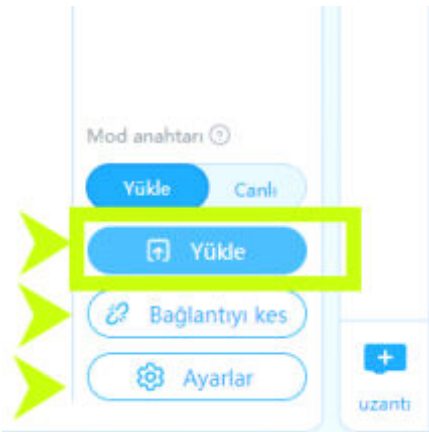
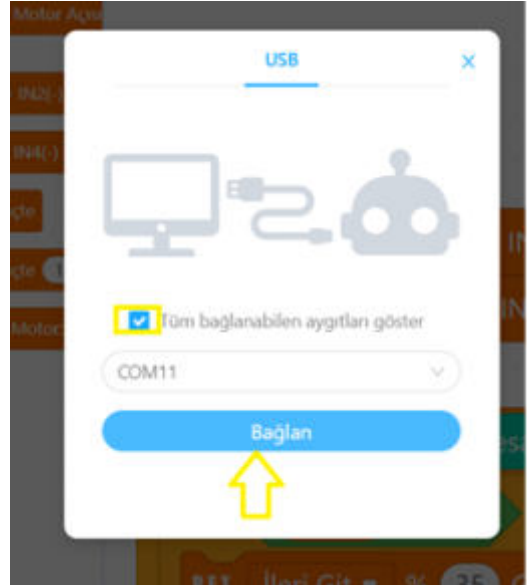
We have completed our codes, now let's upload the codes to the Armbot and test whether the Armbot receives the messages sent by the puppets on the stage.





We can now upload the codes we have prepared to our robot. We connect one end of the usb cable to Arduino nano and the other end to our computer.

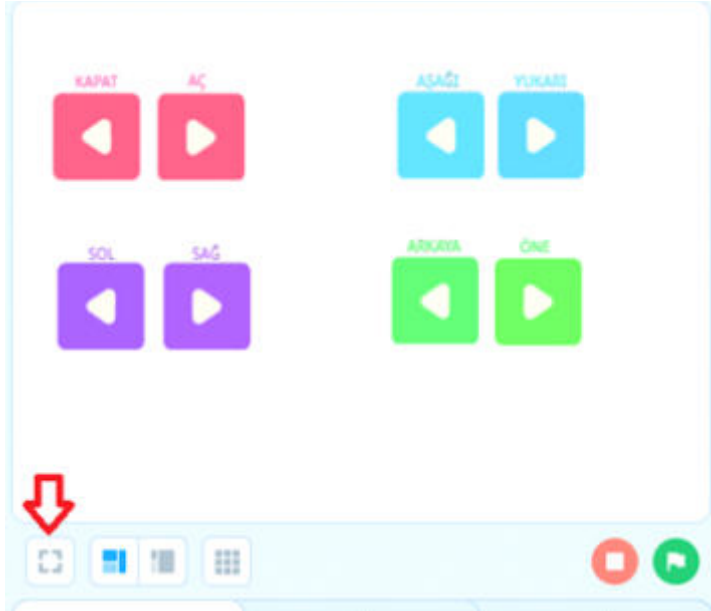
We tick the option Show all connectable devices to highlight the Connect while the installation mode is running. The mBlock software will automatically insert the COM port number that your CH340 chip card is connected to. If connection is not possible, you can select other COM port numbers from the drop-down list.



Once connected, “disconnect”, “settings” and “Install” buttons will be active. Let's upload the code to our robot by clicking the upload button.

Operating the System

Do not disconnect the Armbot from the computer after the code is loaded. As soon as he explains to the puppets on the stage, the Armbot will begin to perform his movements.



You can switch the stage to full screen view and control the Armbot.

Possible Problems and Solutions

If the Armbot sometimes stops detecting commands, fluctuations in the current may affect the wireless communication. Make sure the motors are running smoothly and your battery is fully charged. You may have a faulty servo motor. Replace your servo motor, which groans at every angle and makes noise even when there is no load, with a spare one.

If the armbot is constantly moaning and trembling, it does not detect the turn commands; Make sure that the starting positions and moving angles of the servos are set correctly. If the servos are set to angles where they cannot rotate, they may tremble. This also affects the movements of other servos.

If the Armbot does not move after you click on the puppets; Compare with the messages that Armbot listens, paying attention to the absence of Turkish characters in their names and the case of upper and lower case letters. Check that Armbot is connected to mblock. If all the servos work at the same time and open forward as soon as you turn on the armbot, make the order of the blocks as in the example. Try removing the download mode broadcast blocks and adding and installing them one by one. It can also be caused by a faulty servo.



youtube.com/robotistan

FORUM



forum.robotistan.com

BLOG



maker.robotistan.com

Robotistan Electronics Company

Mustafa Kemal AVCI (Content) - Fadıl PALA - Mehmet AKÇALI (Editor) - (Mehmet Nasır KARAER
(Graphics) - Mert ALTUNTAS (Translation)
info@robotistan.com - www.robotistan.com
Phone: 0850 766 0 425