

ENGINEERING A BLOOMING FLOWER!

WHAT YOU'LL NEED:

(ON TOP OF PREVIOUS INSTRUCTIONS)

MICROBIT INSTRUCTIONS:

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Microsoft MakeCode: <https://makecode.microbit.org/>

Linear Actuator: <https://kitronik.co.uk/products/2595-linear-actuator>

- GLUE GUN
- BAMBOO STICK/WOODEN STIRRER
- LINEAR ACTUATOR PACKAGE
- CARDBOARD BOX
- CROCODILE LEADS + JUMPER WIRES
- MICROBIT + MICRO USB CABLE

An Introduction to Automating the Blooming Flower

In these instructions, you will learn how to automate your blooming flower mechanism by attaching a servo motor to the mobile collar.

Using a micro:bit, you will be able to program the flower to open and close.

Step 1: Attach the Rod to the Mobile Collar

Secure the tip of a straight rod to the mobile collar, ensuring it runs parallel to the flower stem. A bamboo stick works well, but any strong, lightweight material will be suitable. This rod will transfer the motion from the servo motor to the collar.

Step 2: Install the Linear Actuator Mechanism

Mount the linear actuator mechanism onto the horn of your servo motor. Ensure the screws are secure but not overtightened, allowing the rack to move up and down.



Step 3: Prepare the Electronics Housing

Choose a suitable electronics housing. This could be a cardboard box, such as a mobile phone box, or any container of your choice.

Poke one large central hole in the top of the box, wide enough to fit both the straw (flower stem) and the rod side by side.

Ensure the hole is large enough for the rod to move freely up and down, reducing friction and stress on the motor, while still keeping the stem stable.

Important!

Secure the straw in place by adding a small amount of hot glue around it where it passes through the hole. Do not glue the rod as it must remain free to slide up and down so it can move the collar and drive the blooming motion.

Important!

Be careful not to let any glue spill into the moving parts of the actuator or rod assembly, as this can clog the mechanism.

Step 4: Connect the Rod to the Servo Motor

Attach the other end of the rod firmly to the rack of the linear actuator's servo motor. As you do this, make sure the flower is in the open position, so the mechanism can complete a full range of movement once powered.

Attach the servo motor to the internal walls of the electronic housing box, preferably with hot glue to form a strong bond. Next, connect the servo to the micro:bit using male jumper wire to crocodile clip adaptors:

Yellow wire - Signal (Pin 0) , Red wire - Power (3V), Brown wire - Ground (GND)

Alternatively, you can use male-to-male jumper wires and attach the crocodile clips directly to them. Ensure all connections are secure to maintain a stable signal and power flow.

Step 5: Position and Secure the Electronics

Place the micro:bit, along with the wiring, inside the electronics housing box. Use double-sided tape or blu tack to hold the components in place.

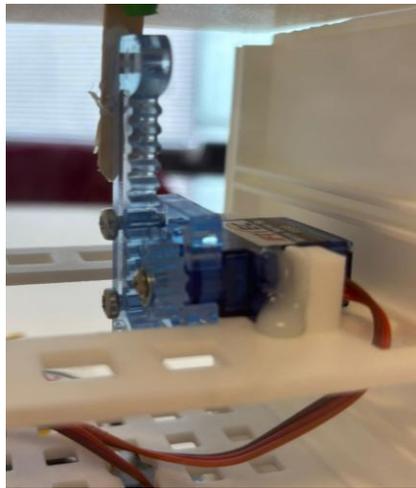
Neatly tie down or bundle any wiring inside the box to create a tidy finish. If required, cut an additional hole in the housing to allow the USB cable to exit for programming or power.



Secure the rod to the mobile collar – wrap the connection in tape.



Hot glue the paper straw to the top of the box – but not the mobile rod!



Close-up of mounting the linear-actuator mechanism inside the electronic housing.



Fixing the mobile rod to the linear-actuator mechanism. The hot glue is away from the gears!

Optional Upgrade: Add Independent Power and a Switch

You can improve your circuit by adding a battery pack and a switch, allowing you to power your mechanism without relying on a USB connection.

For improved performance, especially with larger builds, you may choose to power the micro:bit and servo motor separately by adding an extra battery pack. Use a double-pole switch (often called a DPDT switch) to control both power supplies from one switch.

This is because servo motors can draw high currents, sometimes more than the micro:bit can provide. While this simple mechanism should operate fine from a single supply, an upgraded project may benefit from independent power.

If adding a switch, make sure to provide a mounting hole on the side of your housing so it can be operated externally.

Coding Your Automated Flower

1. Open Microsoft MakeCode and create a new project.
2. Go to Extensions, search for “servos”, and add it to your project.
3. Set up Button A:

From the Input category, drag an “on button A pressed” block onto your workspace.

From the Servos category, drag a “set servo [P0] to [angle]” block inside it.

Select P0 (since your signal wire is connected there).

Set the angle to the position that opens the flower (e.g., 180°).
4. Set up Button B:

Duplicate the Button A block, but change it to “on button B pressed”.

Set the angle to the position that closes the flower (e.g., 0°).
5. Check the actuator position before running the code:

Make sure the linear actuator is positioned at the bottom before activating your program, so the servo can complete a full travel range without straining.
6. Download your code:

Connect the micro:bit to your computer via USB.

Click Download in MakeCode, and transfer the file to the micro:bit.

Now, pressing Button A will move the servo to open your flower, and pressing Button B will move it back to close. Have fun testing and customising your design! 🌸

💡 Tip 💡

Try experimenting with your code to add pauses between opening and closing, or even between different servo angles. This can create a slower, more natural blooming motion 🌸



Can you think of a more efficient way to program this? Try looking at the Loops category!  Loops