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Tips to Make a Robot

Overview

Hold up!

If you plan to build or program a robot, you may want to review our Getting Started Guide first.

Getting Started Guide

Visit Getting Started Guide

Configure your PC for ARC

This section contains tutorials to help you configure a PC for use with ARC on a custom DIY robot.

After completing the Getting Started Guide, review these follow-up topics to improve reliability and performance.

They include recommendations for Windows configuration, storage and power management, networking, and running ARC on headless single-board computers.

Recommended tutorials

- Windows Lite for ARC
  Create a Windows image with unnecessary apps and services removed to optimize performance on single-board computers and embedded systems.

- Multiple EZ-B over WiFi
  Learn ways for a single PC to connect to more than one Wi-Fi–enabled EZ-B controller at the same time.

- Two Network Interfaces
  Configure a PC with two network interfaces so it can stay connected to the robot while also accessing the internet and cloud services (for example, cognitive services).

- Windows 10 Storage & Performance Tips
  Practical tips to improve Windows performance and free storage, especially important for embedded PCs such as Raspberry Pi, Rock Pi, LattePanda, and similar devices.

- Headless SBC (Single Board Computer)
  Instructions for configuring an embedded computer to run without a directly connected display (headless operation), including remote access and startup considerations.

- Powering SBC (Single Board Computer)
  Recommended power delivery methods and best practices for reliably powering single-board computers embedded in robots.

- Load project on Windows startup
  How to configure Windows to automatically launch an ARC project when the system starts, ensuring the robot resumes operation after a reboot.

- Initialize Servos
  Techniques to initialize servos into position without drawing excessive current or causing the EZ-B controller to reset.

Windows Lite for ARC

If you use ARC on an SBC, it is essential to optimize Windows. While we provide Windows performance tips, we also recommend using an ISO Windows Installer (Tiny10 or Tiny11) that removes unnecessary apps and services. This allows your SBC to run faster and use less RAM so that ARC will be much happier.

- Download Windows Tiny 10 for Synthiam ISO
- Download Windows Tiny 11 for Synthiam ISO

Tip: We recommend following the Windows performance tips guide after the installation of this ISO.

Windows Storage & Performance Tips

Introduction

Single-board computers (SBCs) used for robotics (for example: LattePanda, UP Board, Atomic Pi, Rock Pi X) often have limited storage and CPU capacity. Many models ship with only 16 GB or 32 GB of storage, and a default Windows installation can consume a large portion of that space. The steps below explain practical ways to free disk space and optimize Windows 10 for use as a dedicated robot computer.

This guide covers:

- Creating a local setup account during installation
- Disabling startup applications
- Disabling hibernation
- Using Compact OS to compress system files
- Uninstalling preinstalled apps (bloatware)
- Preventing automatic Windows updates
- Improving Virus & Threat Protection performance (with caution)
- Setting power to Best Performance

- Disabling visual effects
- Preparing the system to run headless as an SBC
- Reducing camera render workload in ARC
- Disabling Blockly, RoboScratch and script help in ARC
- Using Sophia Script or Win-Lite for further automation/tweaks

1. Local Account Setup During Installation

For a robot PC that will usually be offline, create a local Windows account instead of using a Microsoft account. A local account avoids cloud sync, OneDrive, and other background services that use CPU and disk resources.

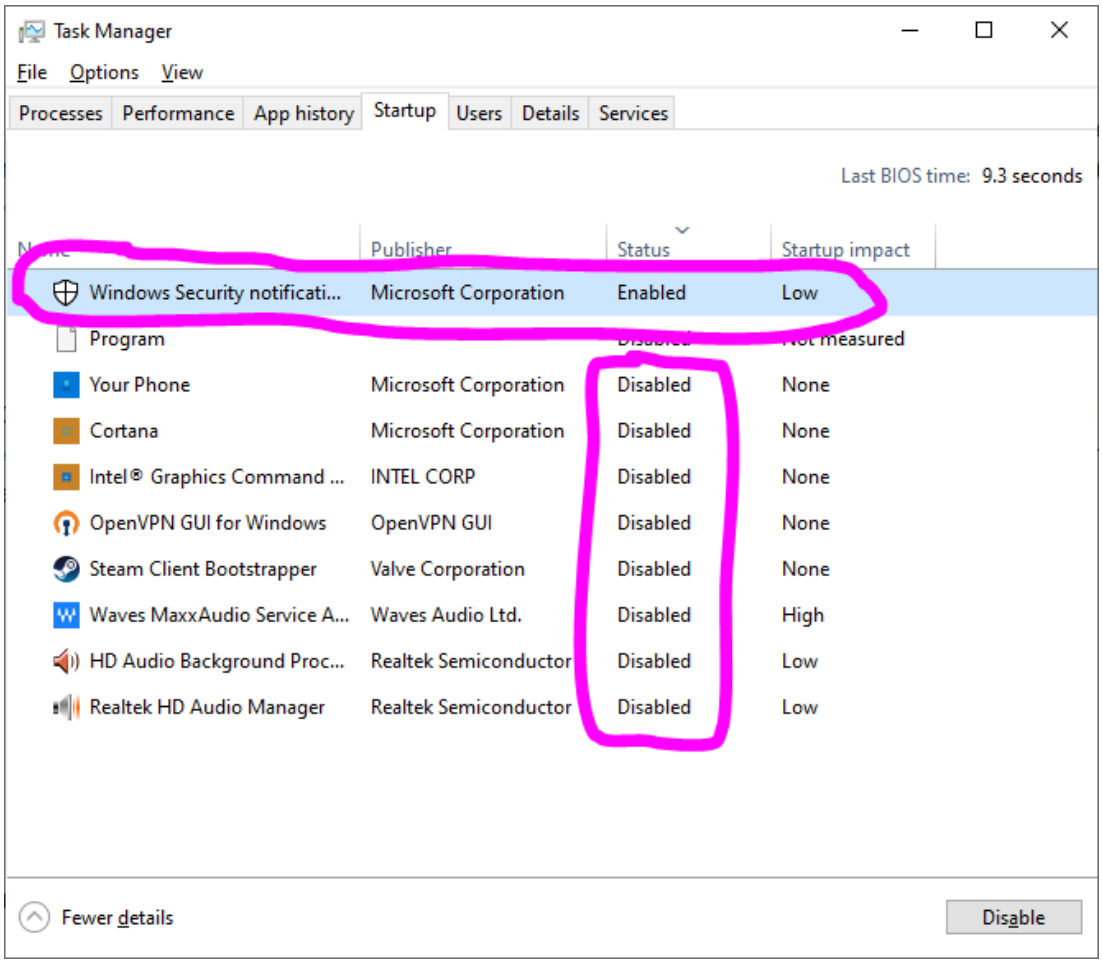
1. Install Windows without any network connection (disconnect Ethernet and Wi-Fi).
2. When prompted to connect to a network, choose *I do not have internet* (usually in the lower-left).
3. Create a local user account when prompted and continue the installation.

A local account reduces background traffic and storage used by cloud features.

2. Disable Startup Applications

Many apps add themselves to startup. On a dedicated robot PC, keep startup items to a strict minimum — only essential services and applications. Keep the Windows Security Notification icon enabled so you can see if Windows re-enables protection.

1. Open Task Manager with **Ctrl+Shift+Esc**.
2. Click **More details** if necessary.
3. Open the **Startup** tab.
4. Select each nonessential item and click **Disable**. Leave *Windows Security Notification* enabled.



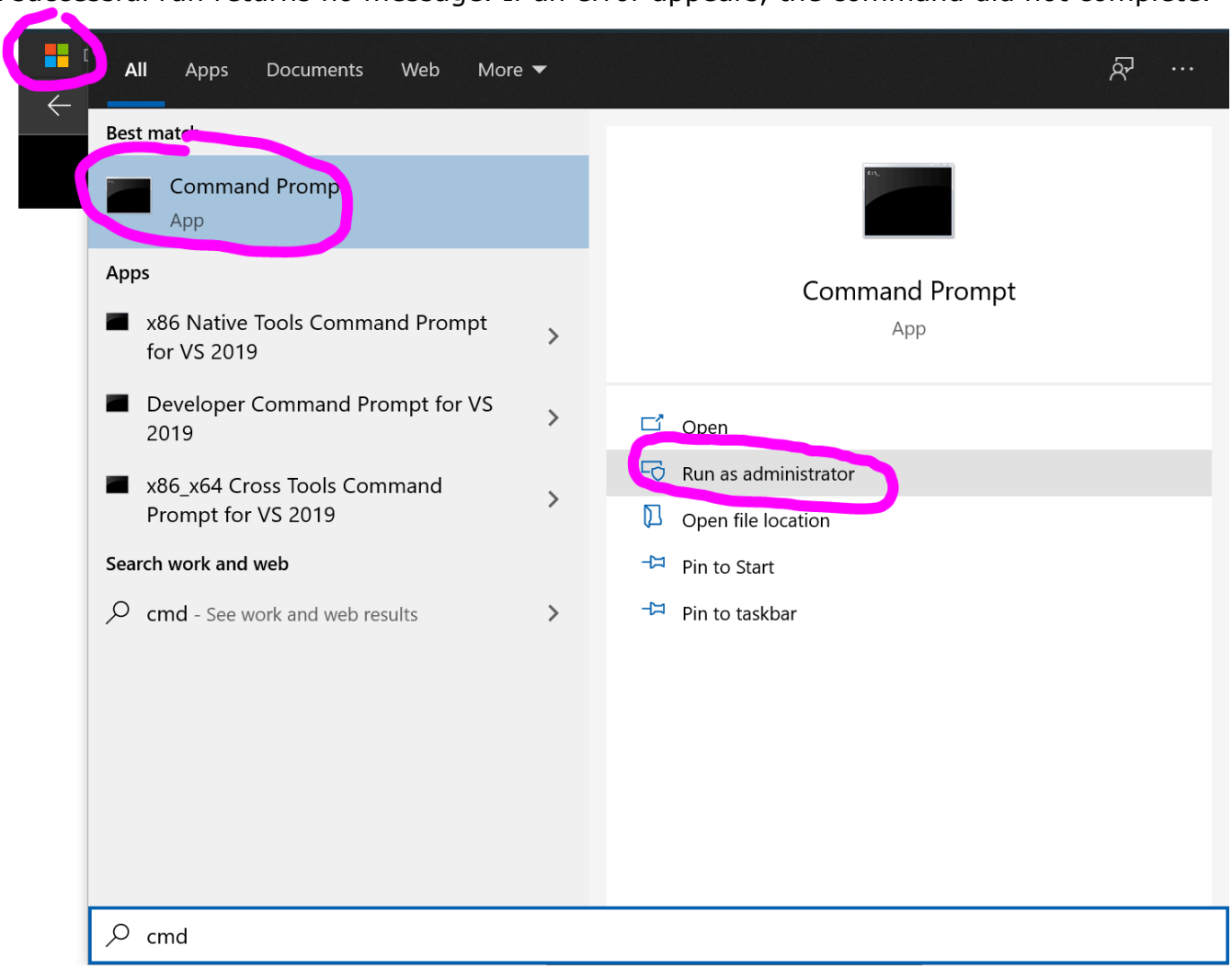
Task Manager → Startup. Disable unnecessary startup apps; keep Windows Security Notification visible.

3. Disable Hibernation

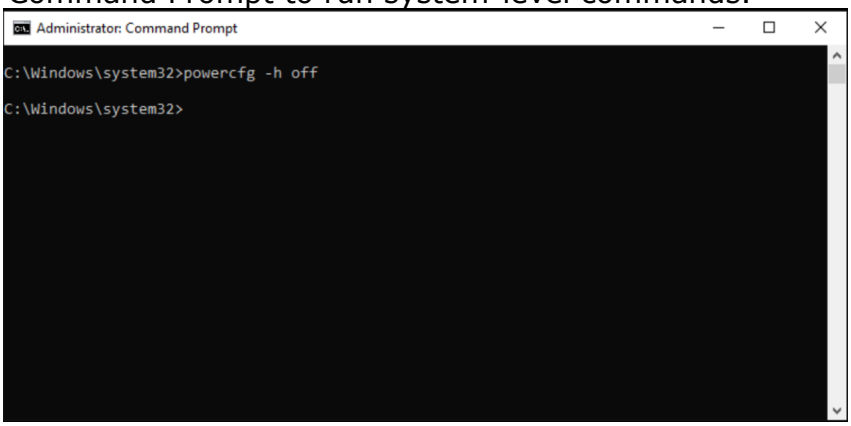
Hibernation reserves a file (C:\hiberfile.sys) roughly the size of your RAM. Robots generally do not need hibernation; disabling it frees that disk space.

1. Open the Start menu, type **cmd**.
2. Right-click **Command Prompt** and choose **Run as administrator**.
3. In the elevated prompt, run:
   `powercfg -h off`

A successful run returns no message. If an error appears, the command did not complete.



Open an elevated Command Prompt to run system-level commands.

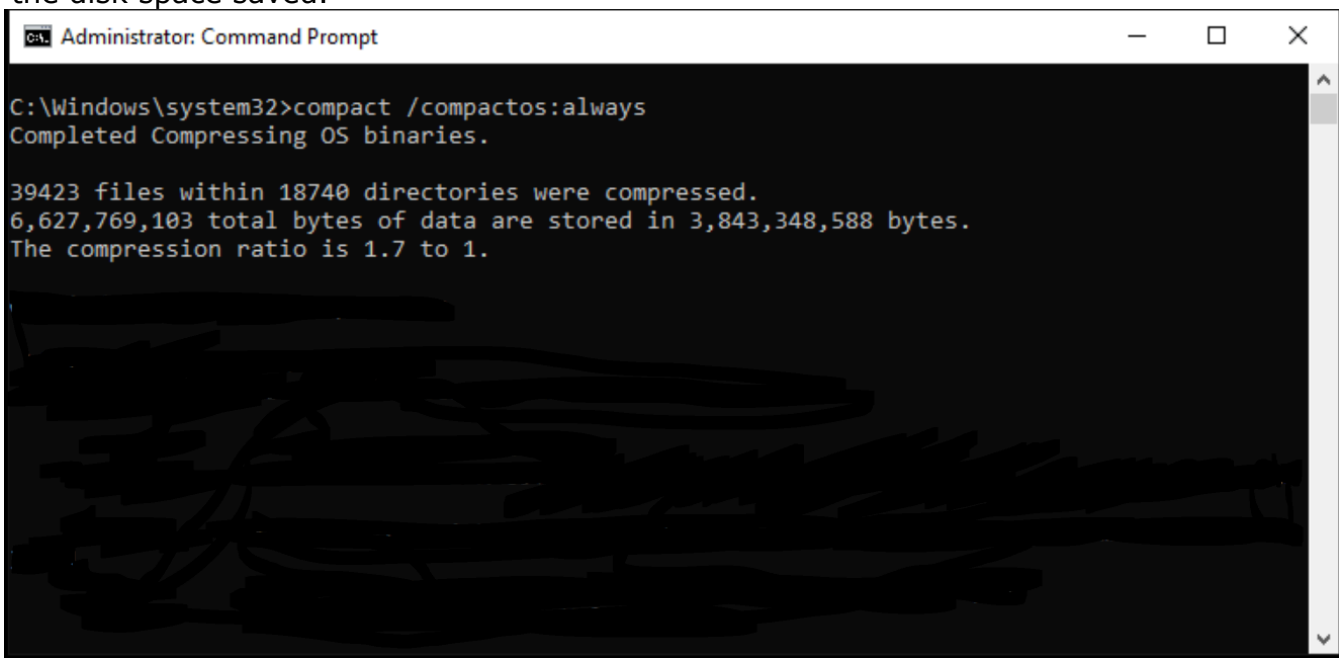


Disable hibernation to remove the hiberfile.sys and recover disk space.

4. Compact OS (Compress System Files)

Compact OS compresses Windows system binaries to reclaim disk space. This is especially useful on small SSDs or eMMC storage.

1. Open an elevated Command Prompt (Start → type **cmd**, Run as administrator).
2. Run:
   ```
   compact /compactos:always
   ```
3. Wait — the operation can take several minutes. When complete, a summary displays the disk space saved.

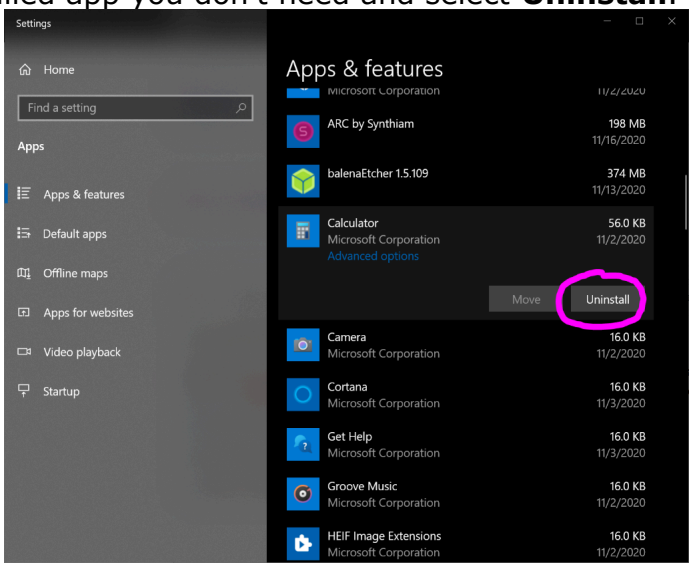


Compact OS frees space by compressing system files; results vary by system.

5. Uninstall Preinstalled Apps (Bloatware)

Windows 10 often includes many apps (Paint, Xbox, 3D Viewer, etc.) that are unnecessary on a robot PC. Removing these reduces disk usage and background services.

1. Right-click the Start menu and choose **Apps & Features**.
2. Click each preinstalled app you don't need and select **Uninstall**.



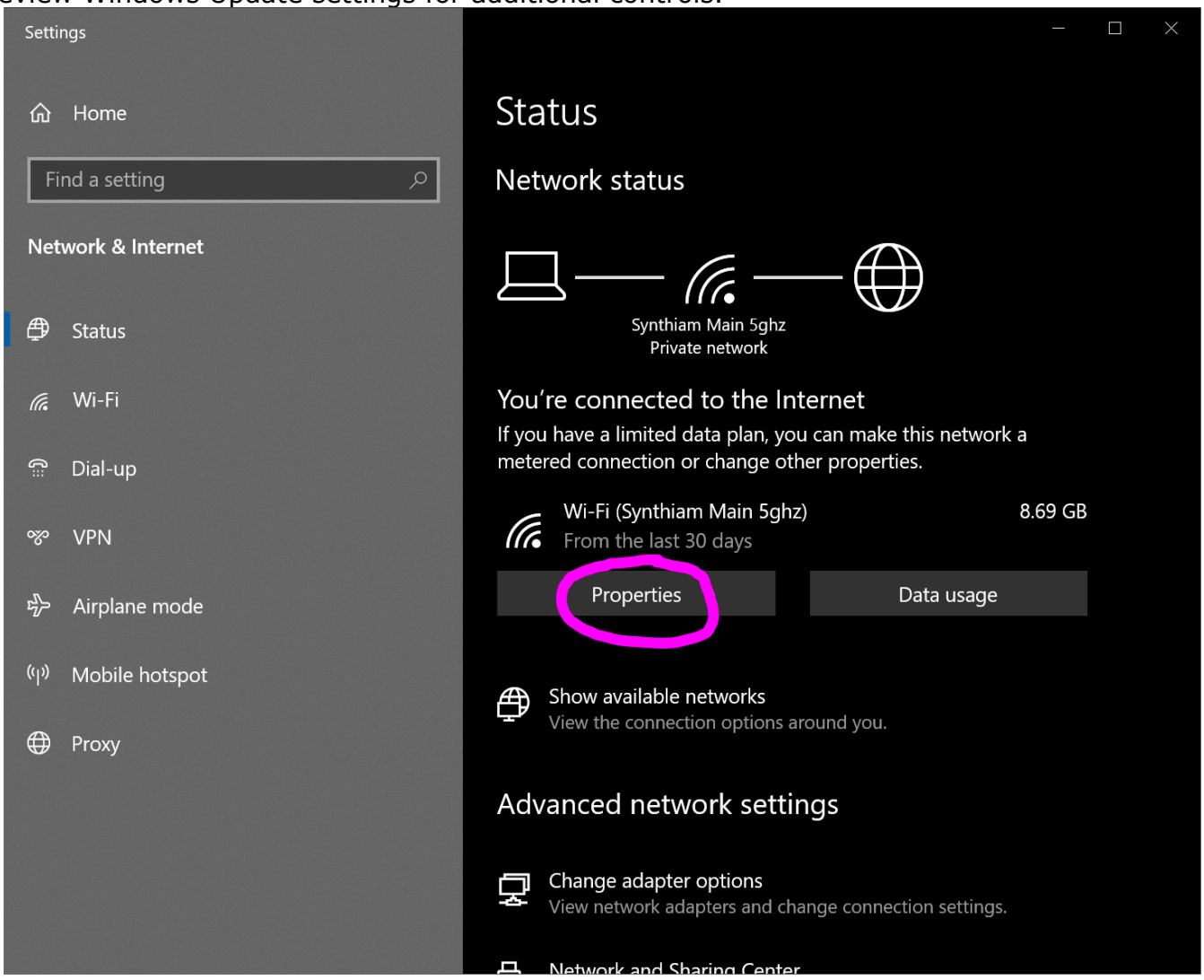
Use Apps & Features to remove unnecessary preinstalled apps.

6. Prevent Automatic Windows Updates

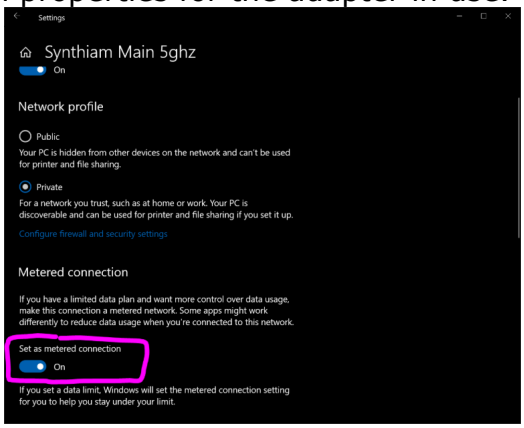
Windows Update can download large packages that consume disk space and may interrupt robot operation. For dedicated robot machines, set your network connection as metered to delay automatic downloads and checks.

1. Right-click the Start menu and choose **Network Connections**.
2. Select the network adapter in use (Wi-Fi or Ethernet) and click **Properties**.
3. Enable **Set as metered connection**.

Note: Metered connections reduce automatic downloads but do not fully disable updates; review Windows Update settings for additional controls.



Open the network connection properties for the adapter in use.



Enable Metered connection to reduce automatic Windows Update downloads.

7. Virus & Threat Protection — Performance Considerations (Warning)

Warning: Disabling real-time antivirus protection improves I/O performance but removes protection against malware. Perform this only on a dedicated robot PC that will run only trusted software (for example, only Synthiam ARC). Never disable protection on a general-purpose or family computer.

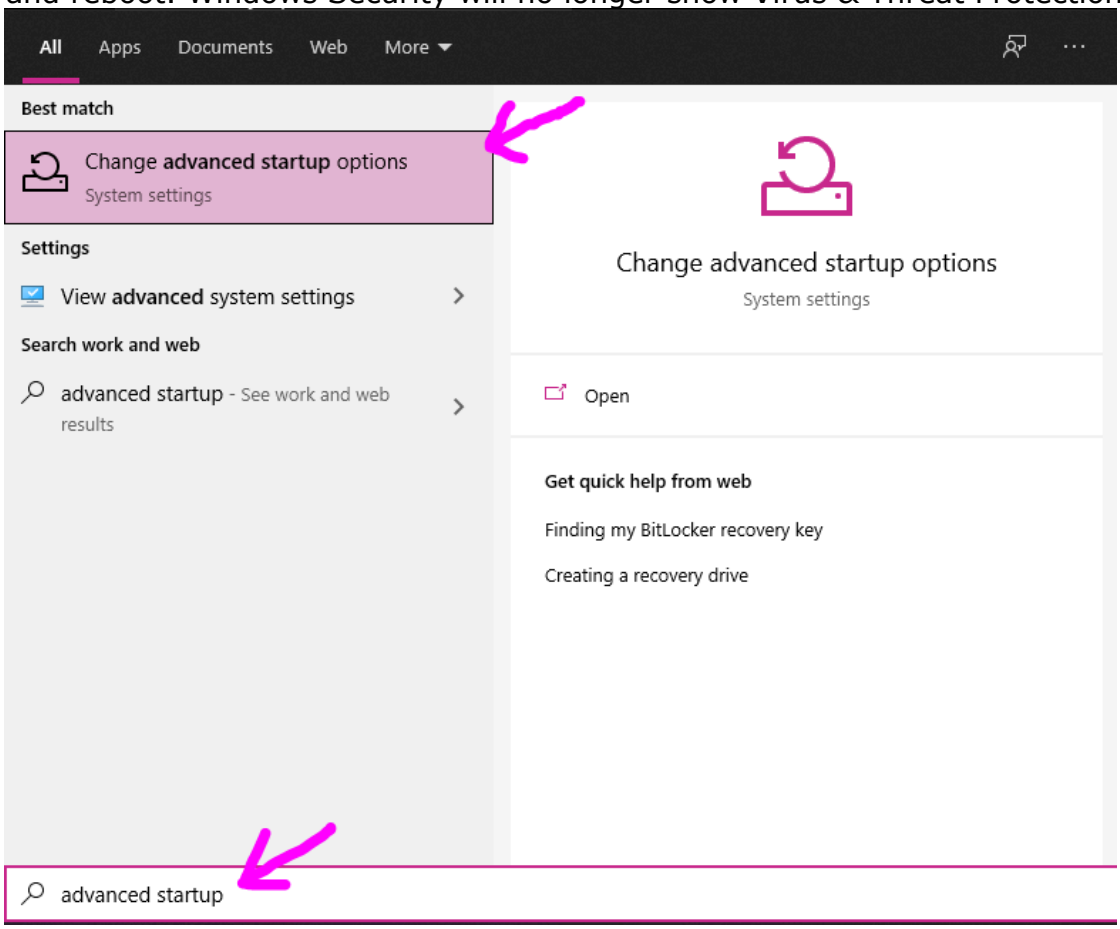
Windows Defender scans file I/O and can significantly slow installations and disk activity. The procedure below renames Defender folders from the Windows Recovery Environment so the service does not run. Re-enabling or reinstalling protection may be required if you later repurpose the machine.

1. Open Start and type **Advanced Startup** → select **Change advanced startup options**.
2. Under Advanced Startup, click **Restart now**.
3. After reboot, choose **Troubleshoot** → **Advanced options** → **Command Prompt**.
4. In the recovery Command Prompt, change to the C: drive and rename Defender folders:

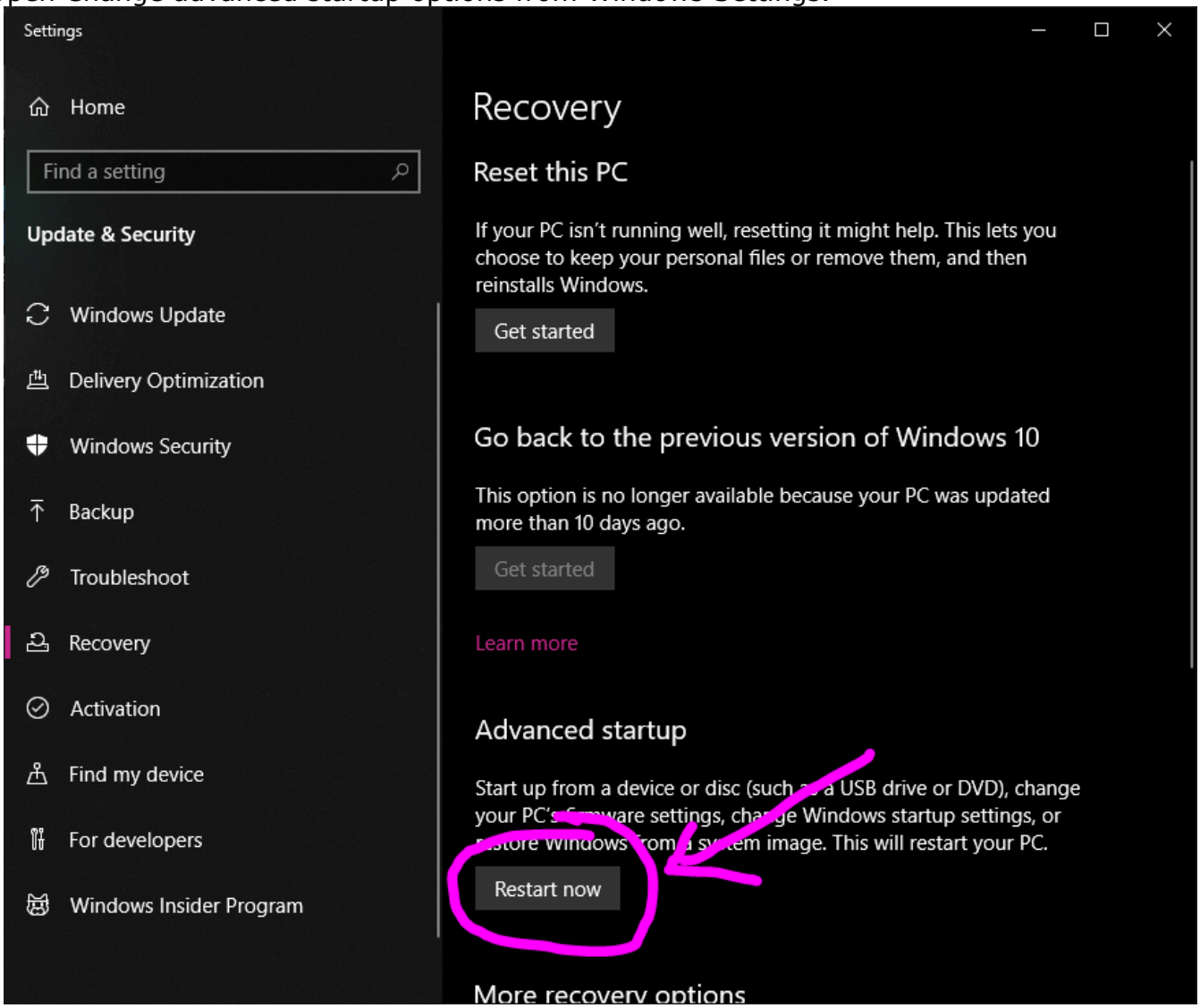
```
C:
cd "C:\Program Files"
move "Windows Defender" "Windows Defender.bak"

cd "C:\ProgramData\Microsoft"
move "Windows Defender" "Windows Defender.bak"
```

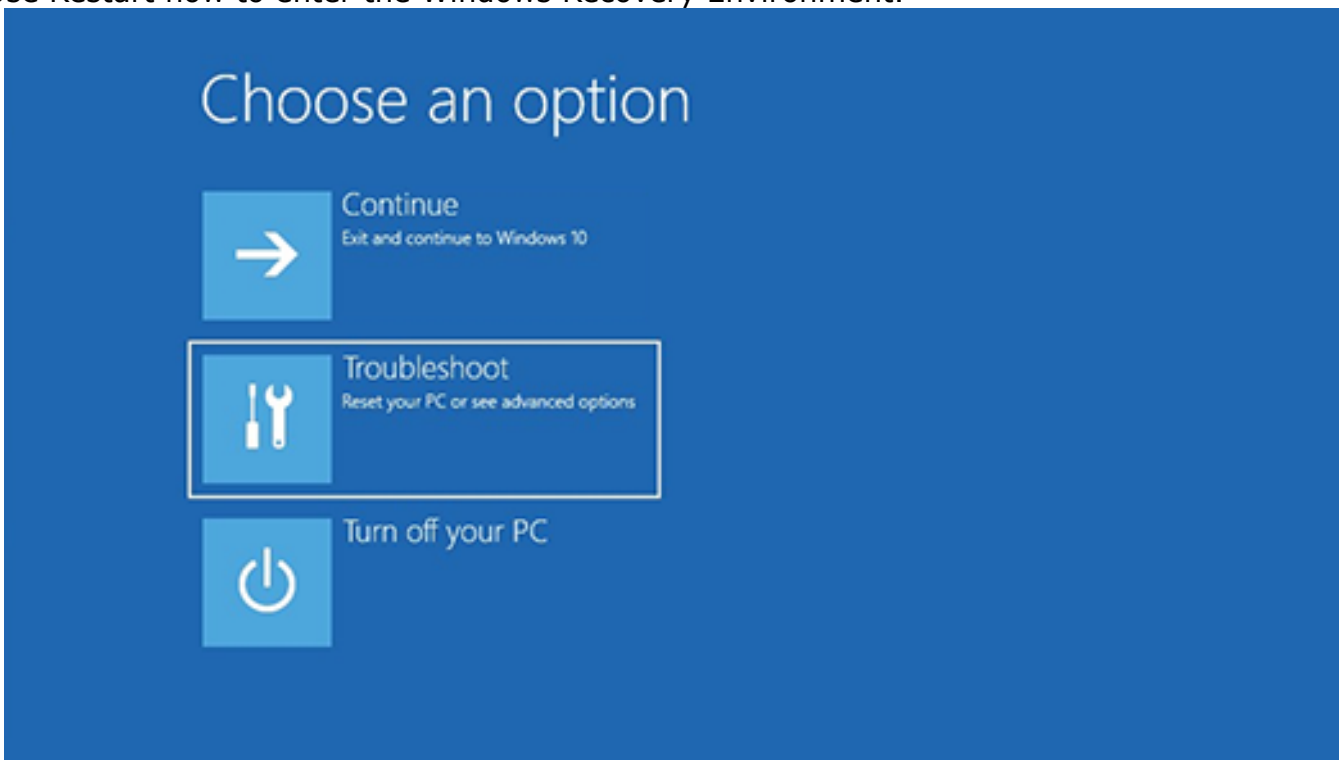
5. Exit and reboot. Windows Security will no longer show Virus & Threat Protection active.



Open Change advanced startup options from Windows Settings.

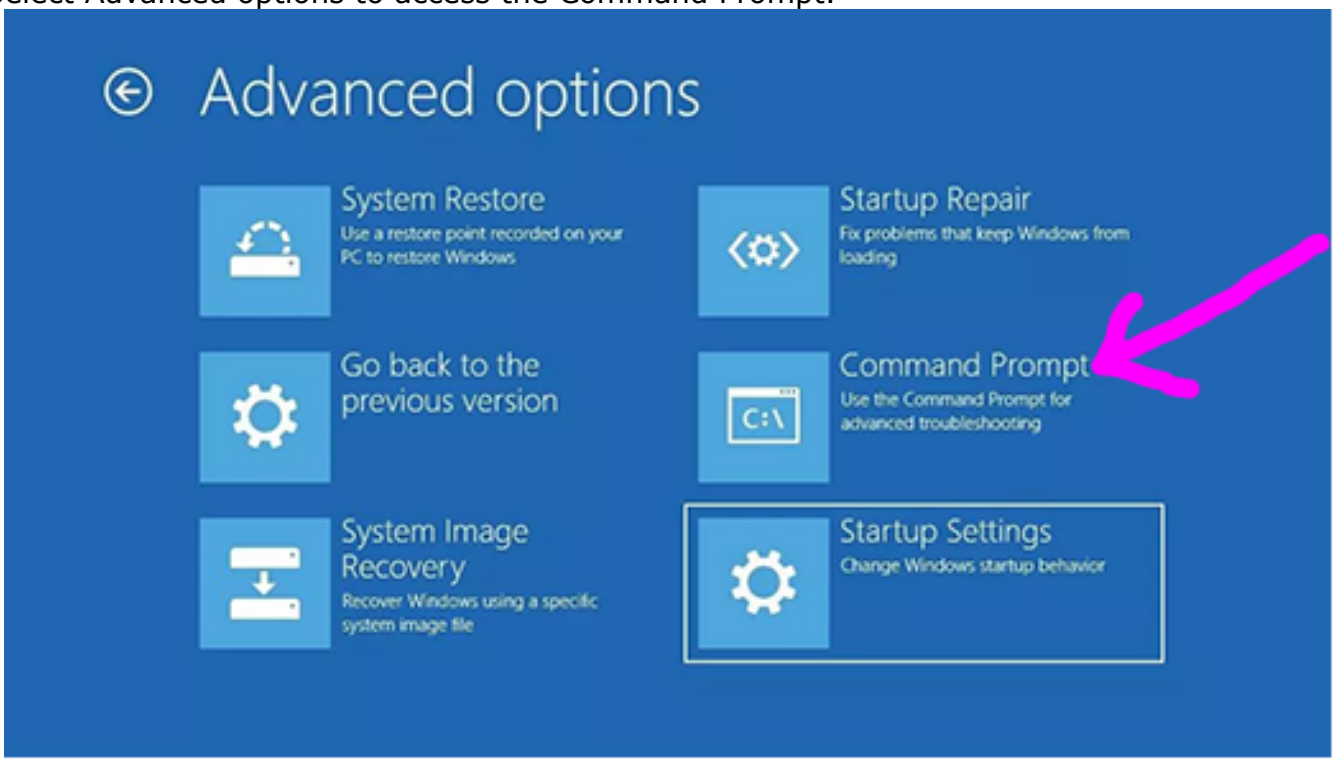


Use Restart now to enter the Windows Recovery Environment.



Choose Troubleshoot in the recovery environment.

Select Advanced options to access the Command Prompt.



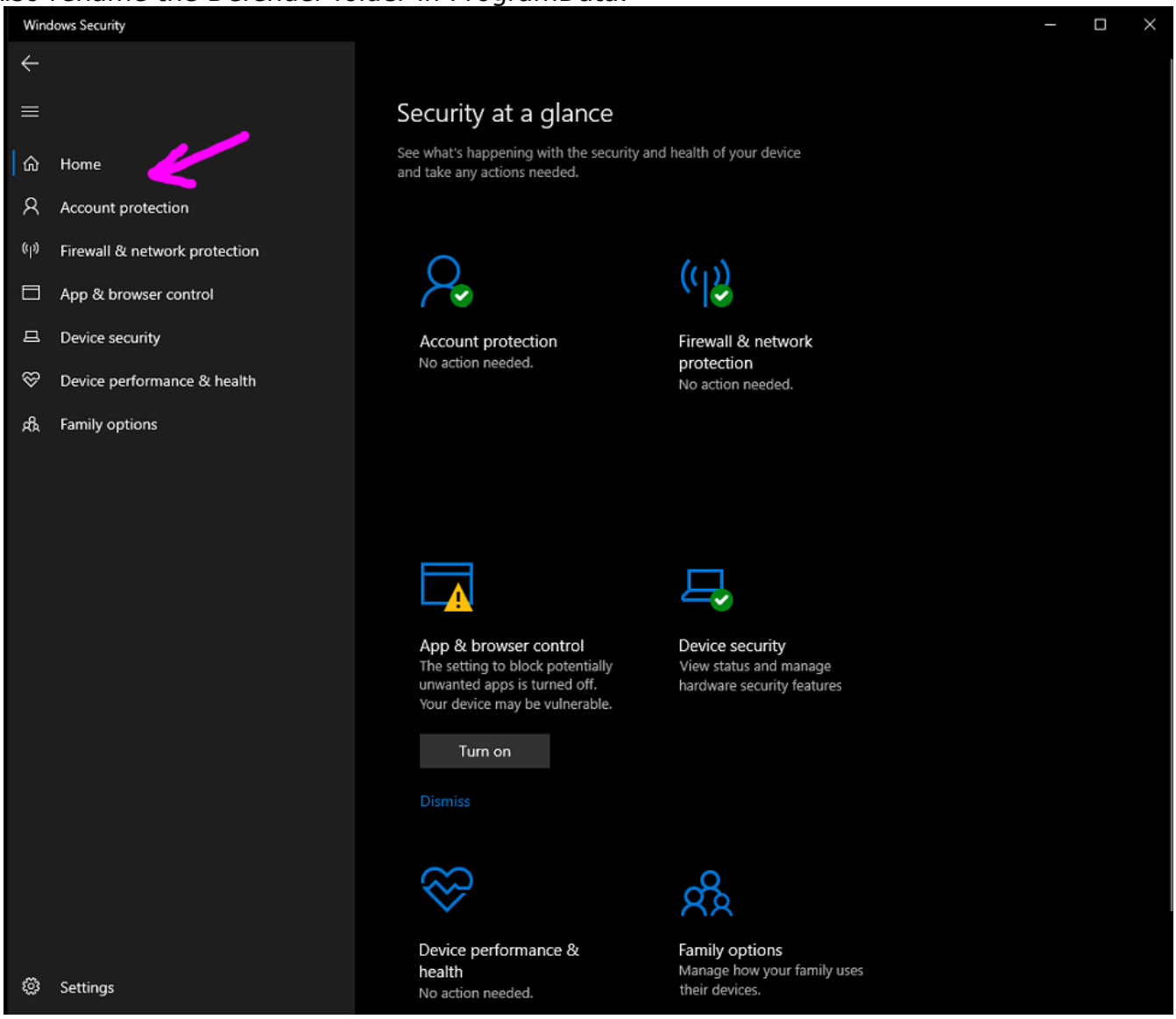
Open Command Prompt from Advanced options.



Rename Windows Defender folders in Program Files to stop the service.



Also rename the Defender folder in ProgramData.



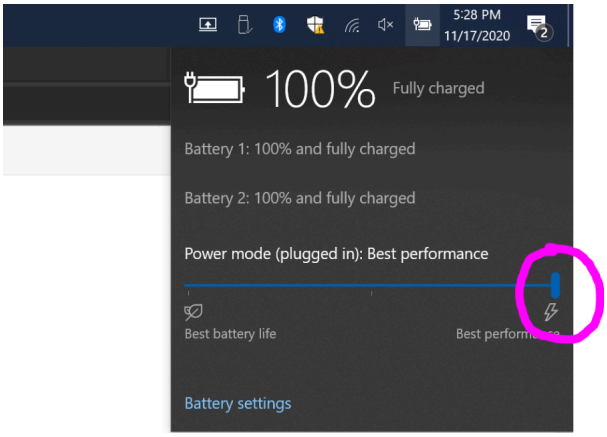
After reboot, Virus & Threat Protection will no longer be active in Windows Security.

8. Power — Best Performance

Set the power profile to Best Performance to avoid CPU throttling and background power-saving pauses.

System tray method

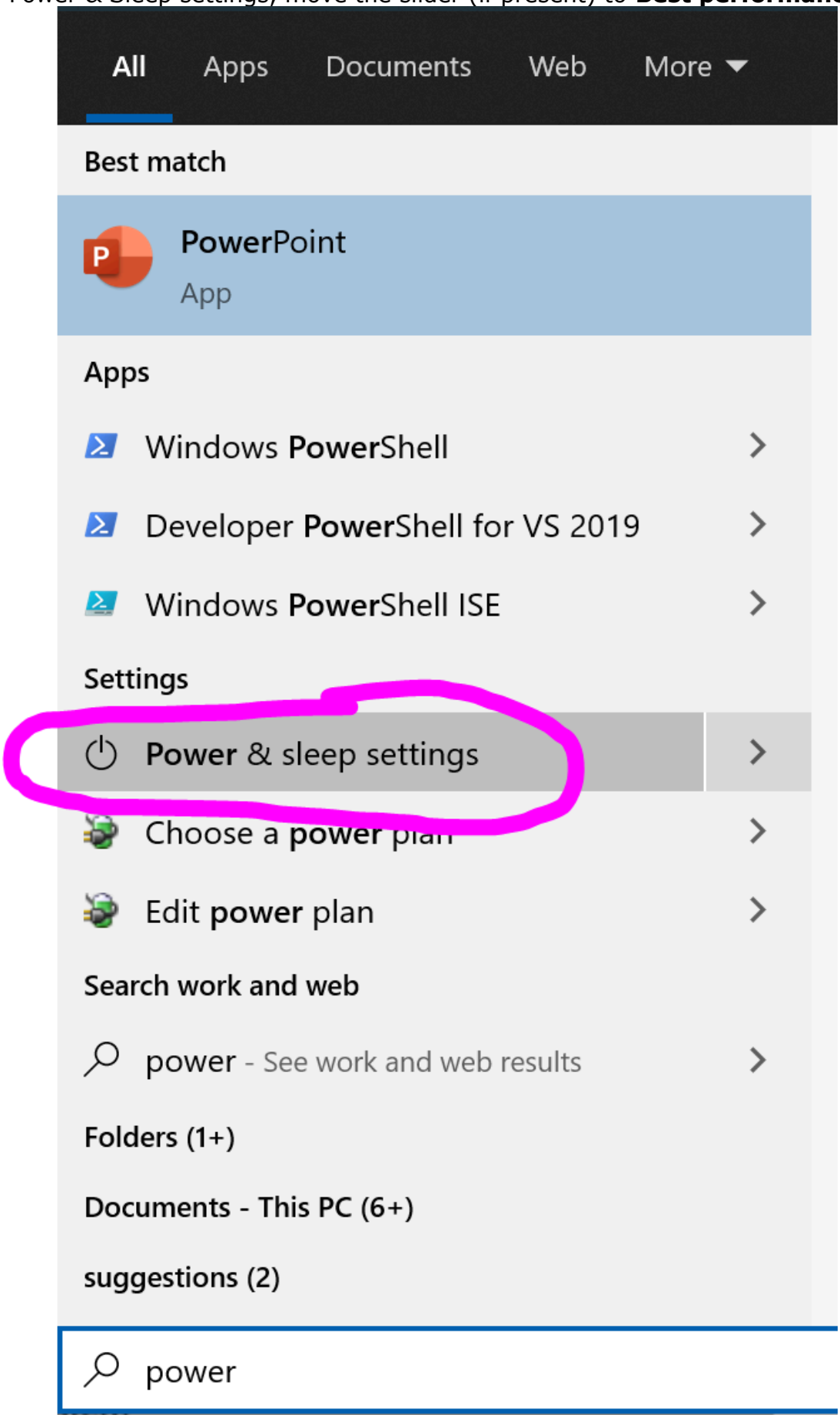
1. If a battery icon exists in the system tray, click it and move the slider to **Best performance**.



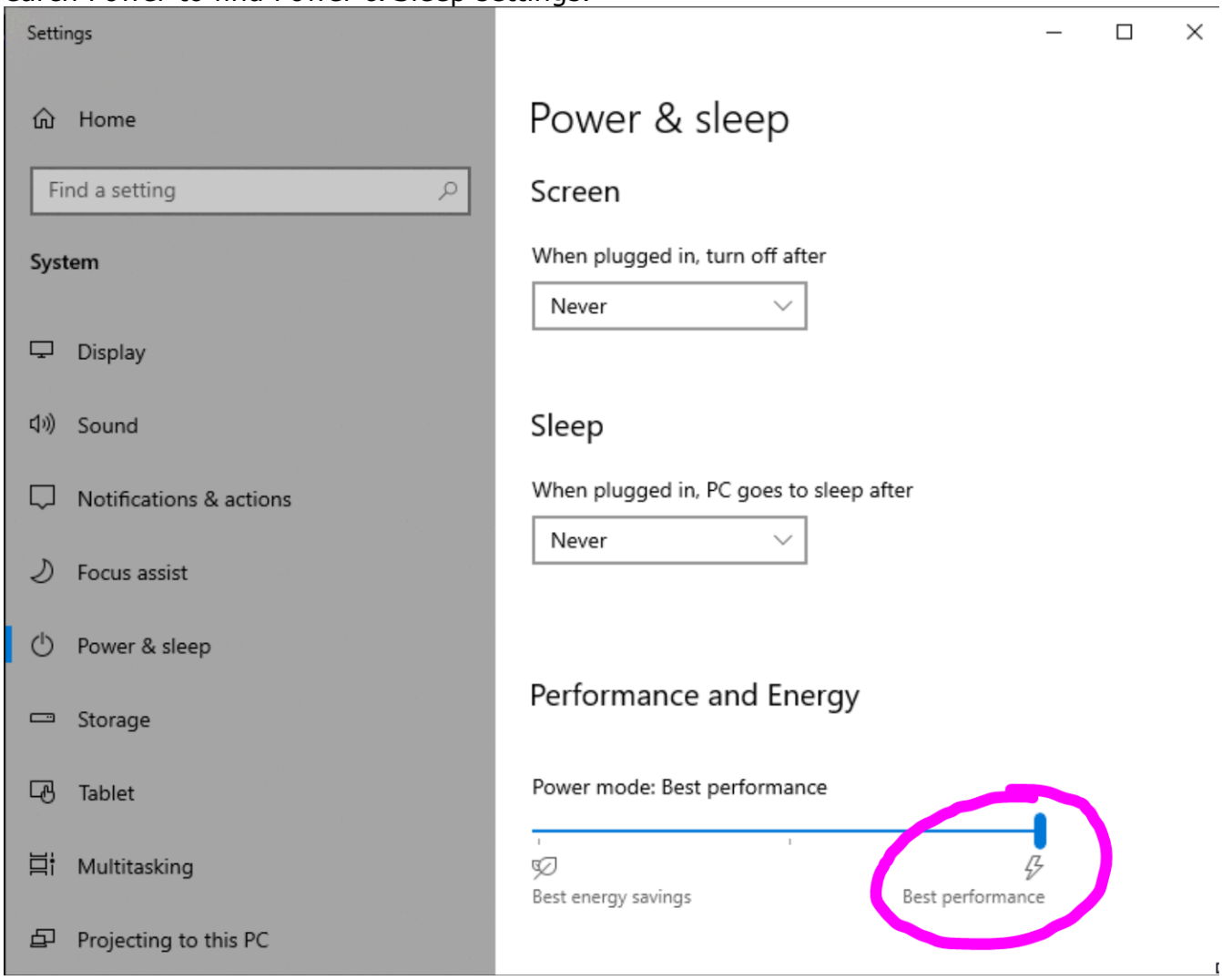
Drag the power slider to Best Performance when available.

Power & Sleep Settings

1. Open Start and search for **Power**.
2. From Power & Sleep settings, move the slider (if present) to **Best performance**.



Search Power to find Power & Sleep settings.

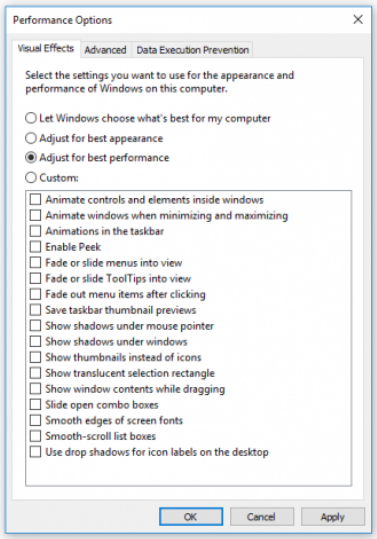


Set the slider to Best Performance in Power & Sleep when available.

9. Display Visual Effects — Adjust for Best Performance

Turning off visual effects reduces GPU and CPU load and lowers memory usage.

1. Open **System** → **Advanced system settings**.
2. On the **Advanced** tab, under Performance, click **Settings**.
3. Select **Adjust for best performance** to disable animations and effects.

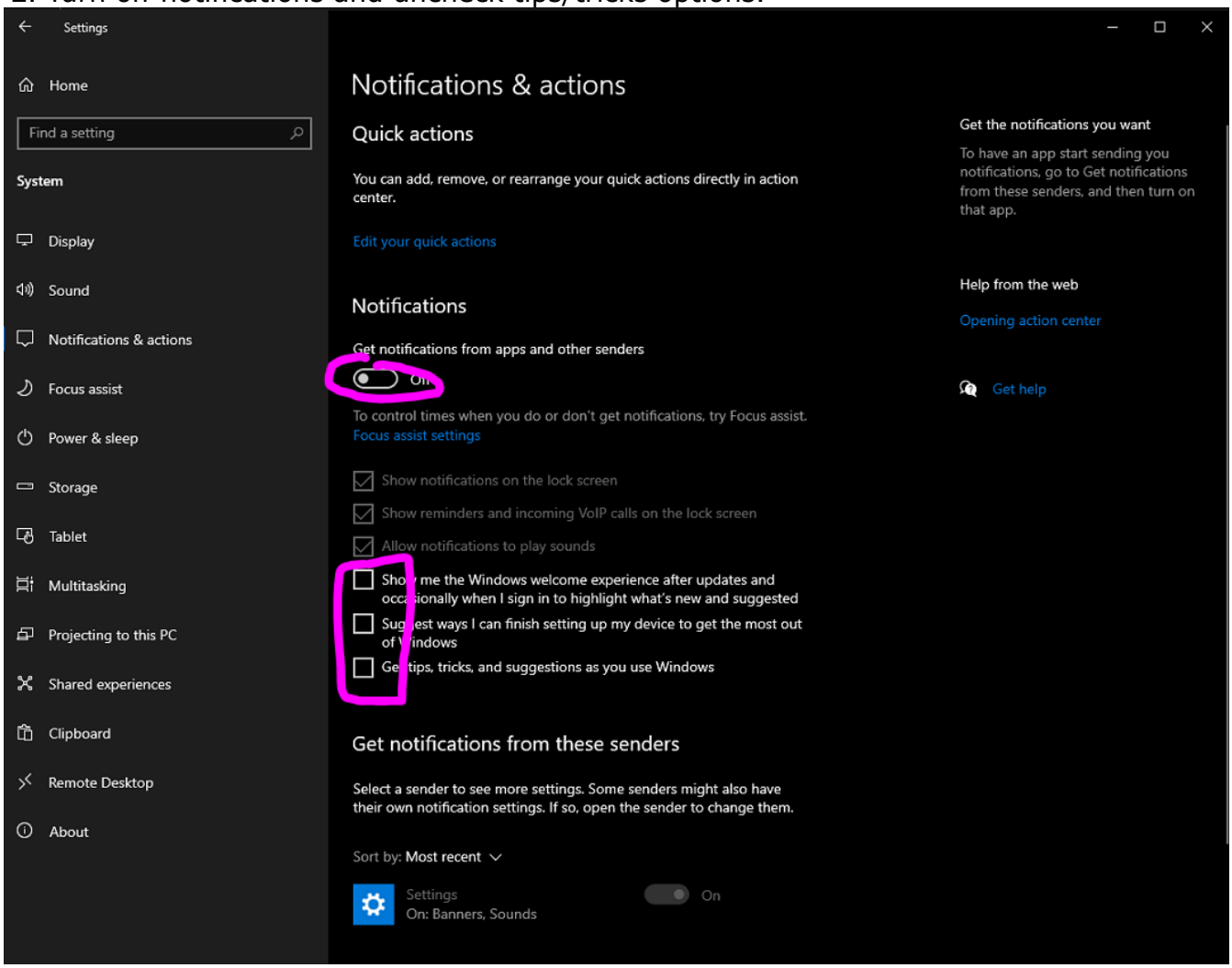


Performance Options → Visual Effects. Choose Adjust for best performance.

10. Disable Notifications & Actions

Disable Windows pop-ups (notifications and tips) so the robot is not interrupted by messages or prompts.

1. Open **Settings** → **System** → **Notifications & actions**.
2. Turn off notifications and uncheck tips/tricks options.

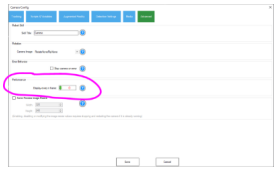


Disable notifications and tips to avoid pop-ups during robot operation.

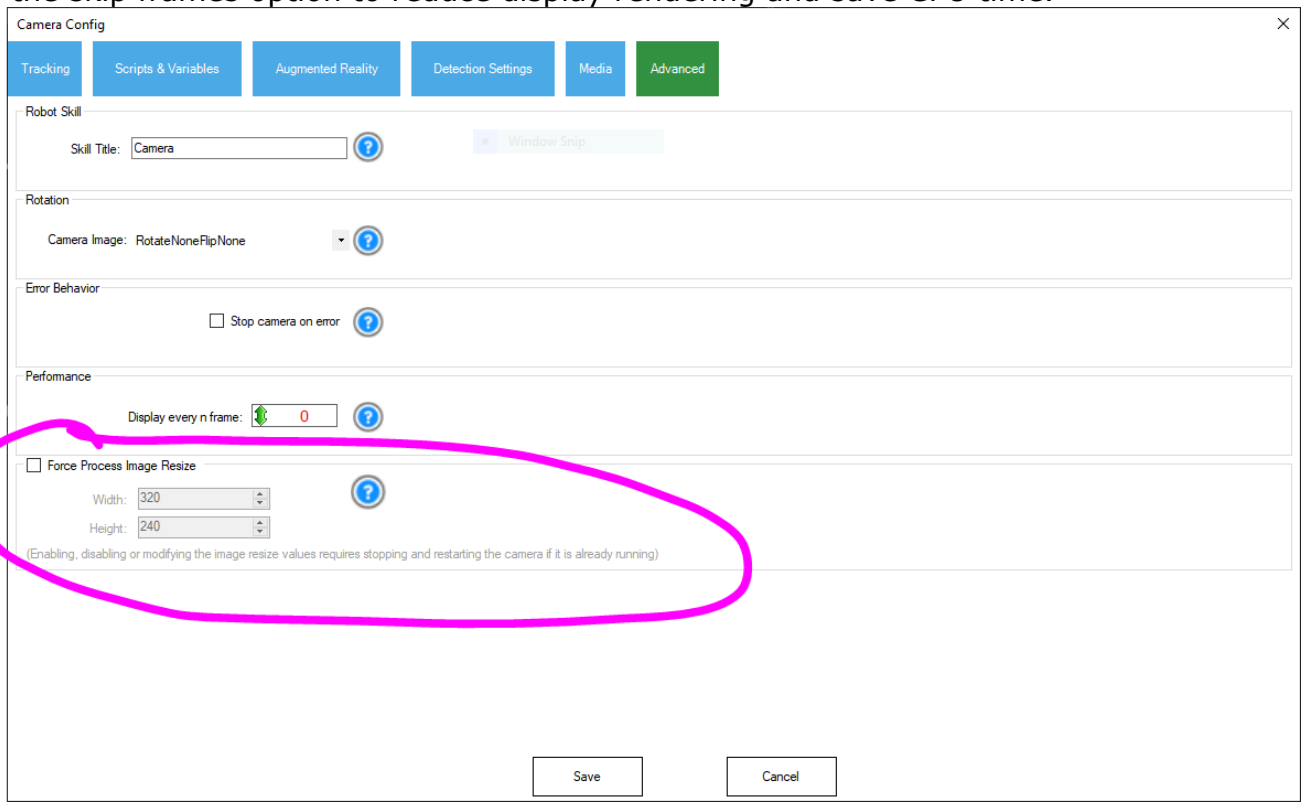
11. ARC Camera Render Performance — Save CPU

Displaying a high frame-rate camera feed on a low-power CPU consumes significant resources. ARC provides options to skip frames for display and to downsize images used for processing. These reduce CPU load without affecting tracking accuracy.

1. Open the Camera Device configuration in ARC and go to the **Advanced** tab.
2. Adjust the **skip frames** option so fewer frames are rendered on-screen (processing still receives frames as needed).
3. If tracking is still heavy on the CPU, lower the processing output resolution to reduce per-frame computational cost.



Use the skip frames option to reduce display rendering and save CPU time.

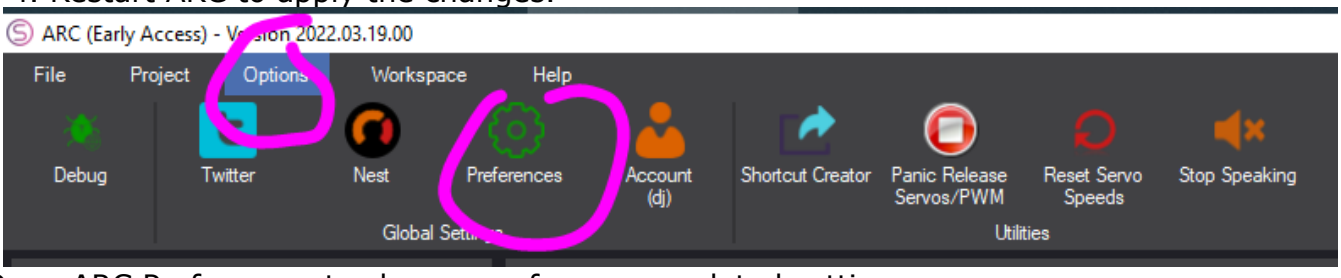


Downsize the image used for processing to further reduce CPU load.

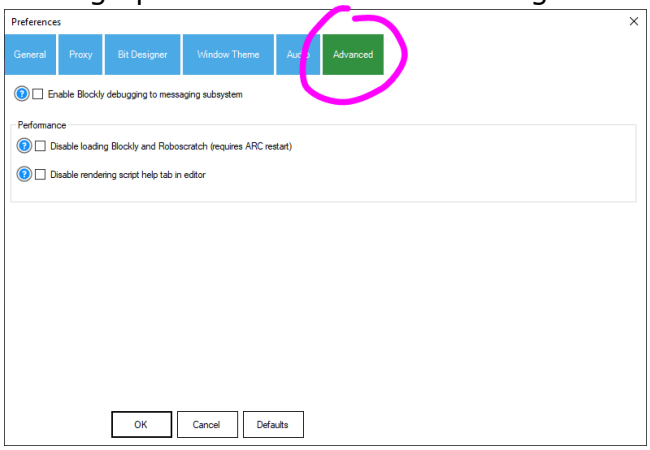
12. Disable Blockly, RoboScratch & Script Help in ARC

Blockly and RoboScratch rely on large browser engines and can be memory- and CPU-intensive. Disabling these UIs (and script help) reduces resource usage on embedded systems.

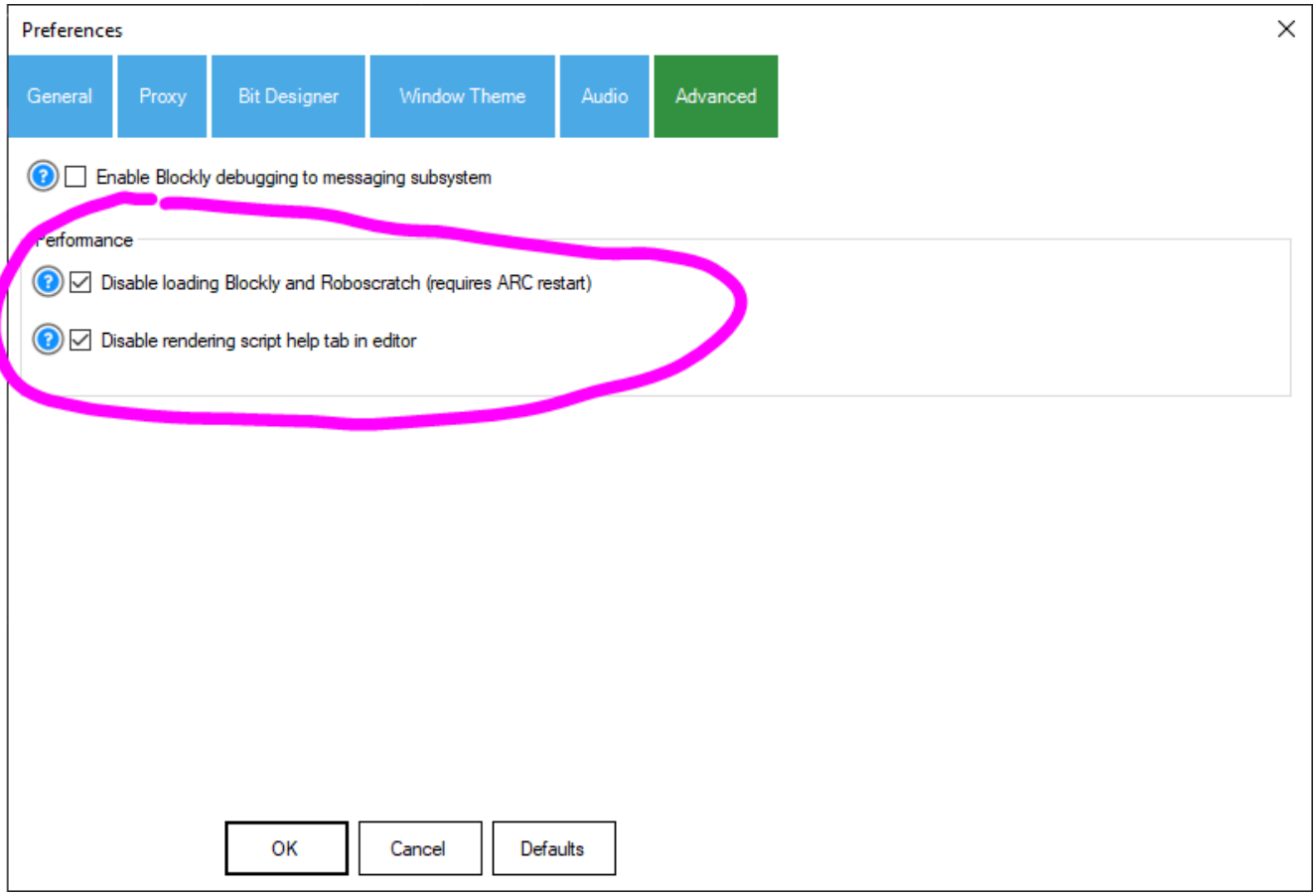
1. Open **ARC Preferences**.
2. Go to the **Advanced** tab.
3. Enable the options to disable Blockly, RoboScratch, and script help.
4. Restart ARC to apply the changes.



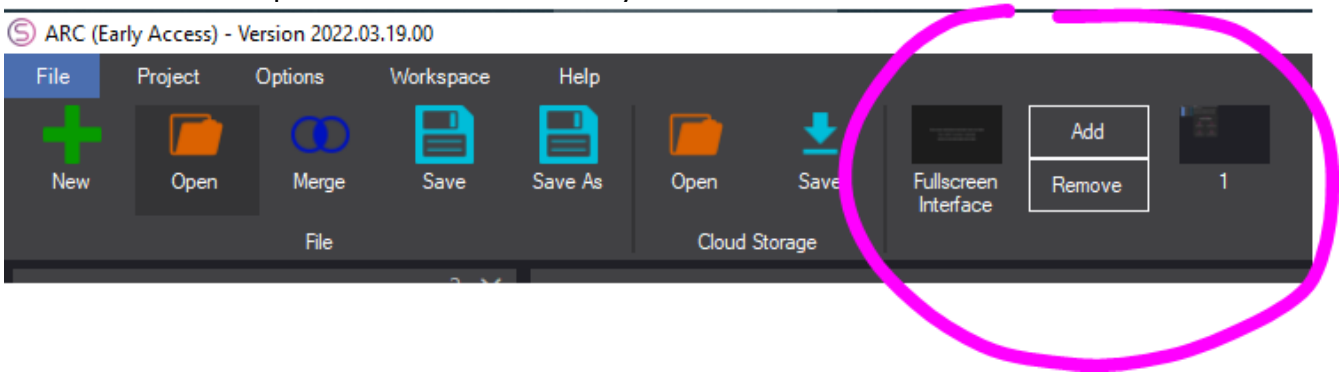
Open ARC Preferences to change performance-related settings.



Go to the Advanced tab in ARC Preferences.



Check the disable options to remove Blockly and RoboScratch interfaces.



After restarting ARC, the UI will be simplified and use less memory/CPU.

13. Prepare as a Headless Single Board Computer (SBC)

After storage and performance tuning, prepare the machine to run headless (without a monitor or keyboard). Headless operation is typical for deployed robot SBCs.

Follow the Synthiam Headless SBC guide:
Headless SBC (Single Board Computer)

14. Optional: Delete Scheduled Tasks (Advanced)

Removing scheduled tasks can free resources but may break drivers or services that depend on them. This is an advanced option and should be used only when you understand the potential impact.

1. Open an elevated Command Prompt (Run as administrator).
2. Run:
   ```
   schtasks /delete /tn * /f
   ```

15. Sophia Script for Windows (Fine-tuning)

Sophia Script for Windows is a comprehensive PowerShell collection of tweaks that can automate many fine-tuning tasks for Windows 10/11. It includes numerous safe configuration options and can automate many of the optimizations described above.

Get Sophia Script

16. Win-Lite PowerShell Script (by Synthiam)

Win-Lite is a Synthiam-provided PowerShell script that disables several Windows features for single-purpose robot installations running only ARC. Do not run this on development or general-purpose PCs.

Download Win-Lite.zip

If you receive an error about scripts being disabled, run this command first. It allows scripts only within the current PowerShell session:

```
Set-ExecutionPolicy -Scope Process -ExecutionPolicy Bypass
```

17. Disable Defender & Updates PowerShell Script (by Synthiam)

Disable-Defender-Updates-LTSC is a Synthiam PowerShell script intended to optimize **Windows 10 Enterprise LTSC** systems used as single-purpose robot deployments running **Synthiam ARC**.

The script disables non-essential Windows components including:

- Microsoft Defender (real-time protection and services)
- Windows Update and automatic update services
- Background telemetry and diagnostic tasks
- Delivery Optimization and related network activity

Warning: This script is intended only for dedicated robot or appliance-style systems. Do **not** run it on development machines, personal computers, or any system that requires regular security updates.

Download Win-Lite Script (disable-defender-updates-ltsc.ps1)

If script execution is disabled, run the following before executing the downloaded script (this applies only to the current PowerShell session):

```
Set-ExecutionPolicy -Scope Process -ExecutionPolicy Bypass
```

A system reboot is required after running the script for all changes to take effect.

18. View CPU / RAM / Energy Usage

To generate a report that analyzes CPU, energy, and memory usage (including problematic processes and drivers), run:

```
powercfg /energy
```

This command creates an HTML energy report detailing processes and drivers that impact power and performance; review it to find additional optimization opportunities.

These steps are intended to optimize a dedicated robot computer. Always keep backups and test changes in a controlled environment before deploying to production robots.

Multiple EZ-B over WiFi

If you have a single PC wanting to connect to more than one Wi-Fi-enabled EZ-B, there are a few ways to do so. The type of EZ-Bs with Wi-Fi capability are:

- ESP32
- ESP32Cam
- EZ-Robot EZ-B v4
- EZ-Robot IoTiny
- Raspberry Pi

1. Use EZ-B as Access Point/Router

This uses one EZ-B configured as an access point, and all other EZ-Bs, including the PC, connect to the primary EZ-B. The primary EZ-B will assign IP addresses to the client devices (other EZ-Bs and PC). This means the main EZ-B is in Access Point Mode. The other EZ-Bs are in client mode and configured to connect to the main EZ-B.

2. Use Home Router

The PC and EZ-B's are all in client mode, connecting to a router, such as your home router. The router may or may not have internet access, which is entirely optional but beneficial if using any Synthiam cloud or 3rd party services.

Discover EZ-Bs

Some EZ-Bs will have a broadcast that allows them to be easily discoverable by ARC. This is

helpful when the IP Address is unknown. The type of EZ-Bs that have a broadcast is the EZ-Robot EZ-B v4 and EZ-B IoTiny.
In ARC, press the SCAN button in the connection control to discover EZ-B's.

When discover mode is first pressed, Windows may prompt for access to the network. You must select Allow access, or the feature will not work.

Lastly, there are two options when scanning for EZ-B's on the network. If the EZ-B supports broadcasting, ARC will display the IP in the right as the discovery occurs in real-time. Otherwise, a network scan of the IP Address range can be used on the left.

Connect By Name

The EZBs that are wifi enabled may have a broadcast ability. This allows each EZB to be given an unique name. Your Init script can connect to the EZB by its name rather than IP Address.

Connect To EZB By Name

Two Network Interfaces

For EZ-Robot Users

Using an EZ-Robot product containing an EZ-B v4 or IoTiny, they have two tutorials on their website, depending on the type of connection needed. However, this tutorial may have more detailed information than what is available on their website
EZ-B USB WiFi Dongle
EZ-B WiFi Modes

WiFi-enabled EZBs may be put into one of two available modes (AP or Client). Some cloud-based robot skills require an internet connection, such as PandoraBot, Microsoft Cognitive Emotion, Microsoft Cognitive Vision, or Bing Speech Recognition. While connecting a WiFi EZB to a local network in Client Mode is possible, some users may prefer to add a second WiFi network adapter to their PC. Adding a dual WiFi adapter is the easiest solution to maintain an internet connection and the robot simultaneously.

Alternatively, some users may use an Ethernet cable plugged into their PC for internet access while using a WiFi connection to the EZB. While this tutorial covers how to connect with dual WiFi antennas, Ethernet users may find the "Possible Network Conflict" section helpful in diagnosing connection problems.

Adding a second WiFi adapter to the PC is great for traveling with their EZB. Using a dedicated WiFi adapter to connect to the EZB makes direct connecting easier than mucking about with client network passwords, etc.



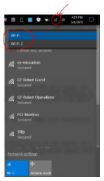
What Kind Of WiFi Adapter?

The most straightforward secondary WiFi adapter connects via USB. They are simple USB dongles that, once connected, provide a second WiFi network interface for your computer. This means you can connect to two WiFi networks at the same time... One to the internet via your router, and the second directly to the EZB. USB WiFi adapters can cost as low as new $1 from eBay or slightly more if purchased at your local computer store (staples, best buy, etc.). Here is an eBay search of new 802.11n USB WiFi adapters sorted by lowest price: Search eBay.



How Does It Work?

This is the easiest part - connect the WiFi adapter to your PC. Once the drivers are automatically installed by Windows Update, your computer will now have two wireless devices when the WiFi icon is selected from the system tray. The first WiFi device in the list will be the local WiFi adapter within the computer. The second WiFi device in the list will be the newly inserted USB device. I recommend using the second WiFi device for connecting to the EZB.



Possible Network Conflict

The EZB uses the default network of 192.168.1.0. There may be a slight chance that your home network and the EZB are configured for the same TCP/IP Network. There cannot be the same network across two or more adapters without getting into too much technical detail about TCP/IP Networking. Imagine two streets in your city with the same name and house number as yours. There would be no way for the mail service to know which physical house to deliver the mail. This means one of the two houses will get all of the mail. The same scenario applies when two WiFi devices have the same network.

You will know if a network conflict occurs because the ARC will not connect to the EZB even when the WiFi is connected -or- The computer will not reach the internet while connected to the EZB even though both WiFi devices are connected correctly. Also, you can view the IP Addresses of all network devices by typing the following in the CMD.EXE console window.

1. Press WIN + R
2. Type: *cmd.exe* and press enter
3. In the console window, type: *ipconfig* and press enter.

No Conflict

(click for full size)

Conflict

(click for full size)

The image above shows the addresses of two network devices with *ipconfig*. The red circle shows the network part of the address and is marked with A. These numbers must be different between network devices. They cannot be the same. There is no network conflict in the image marked with an A, as the network part of the address is different. However, the picture marked with B has a network conflict.

Change EZB IP Address

Depending on the type of Wi-Fi-enabled EZB, the method of changing the default IP address

varies. It is most likely easier to change the IP address on your local router for the network to 192.168.0.1. However, if you wish to change the IP Address of the EZB, you can do that as well.

***NOTE:** *If you change the default IP Address of the EZ-B, you will also have to enter the new address in ARC when connecting -or- use the SCAN tool in both the Camera and Connection controls to discover the new IP Address of the robot.*

ESP32

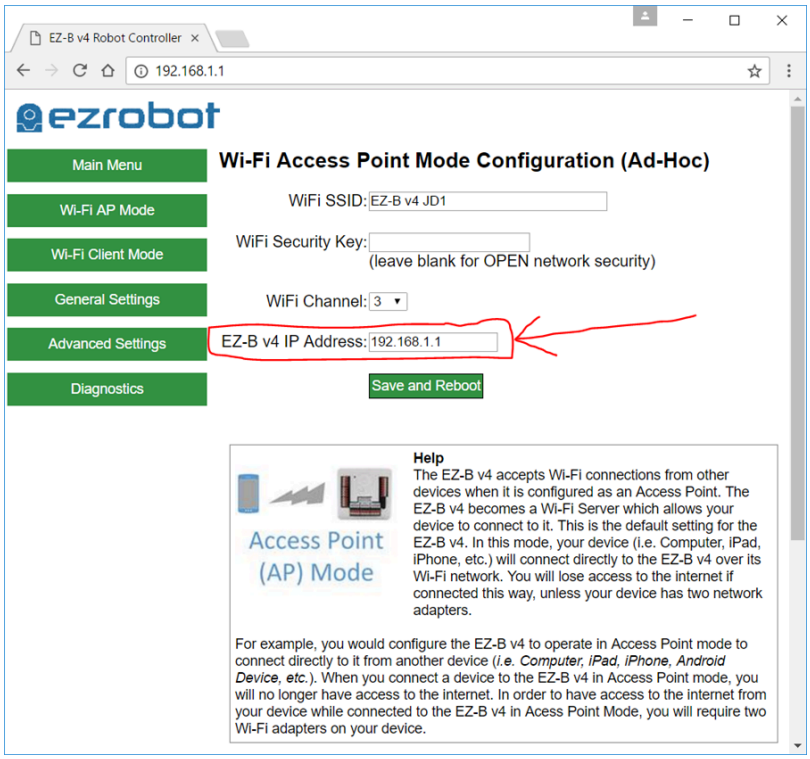
At the top of the ESP32 or ESP32Cam, the EZB source code is the default value. Edit the source code and change the default network. Re-upload the source file to the ESP, and the EZB will use the new IP Network.

Raspberry Pi

Raspberry Pi has a network configuration interface by launching *sudo raspi-config* from a command shell. Select the network settings and enter a new IP Address.

EZ-Robot EZB v4 or IoTiny

You may change the IP Address in the EZ-B v4 Web Configuration Interface on the EZ-B v4.x/2 or IoTiny. If you have an IP/Network Conflict, you will have to disconnect from the internet to remove the network conflict and reconnect to the EZ-B v4 to view its web server configuration. Once you have disconnected from the internet and reconnected to the EZBs WiFi, visit the default address of *https://192.168.1.1* in a web browser, select WiFi AP Mode, locate the IP Address, change it to 192.168.10.1, and press SAVE.



Control More Than One Robot

Synthiam ARC (ARC) is a versatile robotics programming and control software designed to manage and operate individual robots. If you need to control more than one robot using a single computer, you can easily achieve this by running multiple instances of Synthiam ARC simultaneously. Each instance will be dedicated to controlling a specific robot. This support document provides a step-by-step guide on how to run multiple ARC instances to control multiple robots efficiently.

Prerequisites:

Before proceeding with running multiple ARC instances, ensure that your computer meets the minimum system requirements for the software. Each instance of ARC will consume additional system resources, so it's essential to have a computer with sufficient processing power, memory, and storage.

Step-by-Step Guide:

1. Install Synthiam ARC:
If you haven't already installed Synthiam ARC on your computer, download and install the latest version from the official website

2. Connect the Robots:

Ensure that each robot you want to control is connected to your computer using the appropriate communication protocol (e.g., Wi-Fi, Bluetooth, USB, etc.). Verify that each robot is properly recognized and controllable within a single instance of ARC.

3. Launch Multiple Instances of Synthiam ARC:
To run multiple ARC instances, follow these steps:

a. After installing ARC, locate the Synthiam ARC icon on your desktop or in the Start menu.

b. Double-click on the Synthiam ARC icon to launch the first instance of the software.

c. To launch another instance for controlling another robot, simply double-click the Synthiam ARC icon again. This action will open a new, separate instance of ARC, independent of the first one.

d. Repeat the previous step to launch as many instances of ARC as there are robots you wish to control.

4. Configure Each ARC Instance:
Upon launching each ARC instance, you will have a dedicated environment to control a specific robot. Customize each instance as required, adding the appropriate robot connection and control configurations.

Tips for Smooth Operation:

1. System Resources: Running multiple instances of ARC will consume additional system resources, especially CPU and memory. Ensure your computer can handle the load of controlling multiple robots simultaneously.

2. Robot Identification: To avoid confusion, name each instance or robot appropriately within ARC to distinguish between different robots.

3. Window Management: Arrange the ARC windows on your computer screen to avoid overlap and ensure efficient monitoring and control of each robot.

4. Consider Multitasking: When running multiple ARC instances, be mindful of multitasking. Avoid running other resource-intensive applications simultaneously to maintain smooth performance.

Conclusion:

By following this straightforward guide, you can effectively control multiple robots using separate instances of Synthiam ARC on a single computer. Running individual ARC instances allows you to have dedicated control over each robot,
facilitating efficient and streamlined robotic programming and operation. Enjoy exploring the endless possibilities of robotics with Synthiam ARC! If you encounter any issues or have further questions, please refer to the official
Synthiam support resources or community forums for assistance.

Headless SBC (Single Board Computer)

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- Headless HDMI Resolution

Definition

Headless is when an SBC (*single board computer*) is installed in a robot without a monitor, keyboard, or mouse.
Mounting an SBC on the robot, such as a LattePanda, Rock Pi X, Up Board, Atomic Pi, etc., provides the freedom for your robot to roam autonomously. The computer will most likely not have a monitor, keyboard, or mouse when running headless. Meaning you have to interact with the computer remotely over a remote desktop connection. There are a few things to consider when setting up a computer for a headless robot.
***Note:** We recommend reviewing our Windows 10 Performance Tips before continuing these steps.

Do Not Disconnect Power to Shutdown

Never flip the switch on a robot computer while it is running. Doing this multiple times can corrupt the file system, as any unsaved data is lost.

- Use the Windows Shutdown option in the start menu.
- Use a JavaScript or Python command in ARC like ShutdownPC().

Disable Windows Password

When installing Windows, you can leave the password blank. If you already set a password, you can remove it:
Press the Windows key or Start Menu and type "*Change Password.*"
Enter your current password and leave the new password field blank.

Remote Terminal Connection

There are several options for sharing the desktop remotely from another computer or device. Here are two of the options we recommend.

- **Tight VNC:** For third party across any device, we recommend using Tight VNC for remote access. By default, it uses TCP port 5900, allowing you to connect remotely via your router's public IP address.
- **RAS (Remote Access Service)**: ARC has a built-in remote access service which allows sharing not only the display but the audio input and output. Read more about it HERE

Connecting to Headless Robot by IP Address

Use the IP address of your robot to connect. On the same network, run `ipconfig` in Command Prompt.

Speak IP Address

The ARC skill can announce the IP address when a network connection is established.

Get Local IP Address

Get Remote IP Address

If connecting remotely, forward port 5900 TCP to the robot's local IP.

Headless HDMI Resolution

When no monitor is connected, Windows may default to a low resolution. To fix this, use an **HDMI Dummy Emulator**, such as this one on Amazon.
Once connected, adjust the resolution in Windows.

Powering SBC (Single Board Computer)

There are several ways to power a robot. But, how do you power the onboard computer? Well, the easiest and most elegant solution is mobile power banks. These are readily available on Amazon or your nearest electronic store (including Walmart!). This particular unit featured in the video is powering a Rock Pi/X.

This Amazon Battery Pack boasts 25amps and can power the Rock Pi/x for almost 12 hours.

Single-board computers (SBCs) are powered with 5v from either USB, USB Micro, or USB-C connections. This high amperage battery pack style makes it an ideal solution to power any SBC.
There is no need for soldering; all you have to do is connect a USB cable between the battery pack and SBC.

Load project on Windows startup

The shortcut creator is a wizard for saving a shortcut to an EZB file. A script can also be configured to run when ARC loads with the specified file. You can load ARC when Windows starts, load a project and start a script. You can execute connections to an EZB and initialization by running the script automatically. Use this wizard to create a shortcut to load a project when Windows starts.

*Note: *The current project will need to be saved before using the shortcut creator. This is to ensure a valid ARC project file for the shortcut creator to use.*

**Note: *Windows must be configured to auto-login as the current user without a password for the shortcut creator to auto-load the project when Windows starts. To understand more about that, look at running a robot SBC headless support page.*

The shortcut creator can be found in the Options ribbon menu.

When the shortcut creator is loaded, there will be numerous steps to follow to define the shortcut options. Press the NEXT button after completing and verifying each step.

Step 1 - ARC Location

Verify the location of the ARC.EXE executable. This will be detected automatically, but it is worthwhile verifying.

Step 2 - ARC Project Location

The wizard will display the file location of the current project. The file shown is the file that will load into ARC when the shortcut is executed. Verify the filename and path is correct

Step 3 - Auto-Start Script

When ARC loads the project, you can configure a scripting robot skill to execute automatically. Use this script to connect to the EZBs and initialize the robot. The scripting robot skills will be detected and listed in this drop-down. Select the script that you wish to auto-start from the drop-down.

Step 4 - Shortcut Hotkey

You can configure a key combination (hotkey) to load this project when the key is pressed automatically. This means you can hit a combination of keys at any time in Windows, and the project will load with ARC.

Save Shortcut

Now that everything has been configured for the shortcut, you can save it. When the Save Shortcut File button is pressed, the default folder will be the Windows Startup folder. If you save the project in this folder, you will load the shortcut every time Windows starts. This is useful for embedded PCs within the robot or dedicated PCs for a robot.

Tips

The final step for the wizard is a list of tips to improve the performance of Windows for ARC and your robot. Pressing this button will open the web browser to a list of tips to get the most out of the computer. This includes information for configuring a dedicated embedded robot computer or improving performance.

Initialize Servos On Startup

Some robots may have servos that brownout or reboot the EZB on start-up. The first solution is to ensure the robot gets enough power.
To complement the power requirements of the robot, we also have a suggestion that will initialize each servo into position individually rather than together at once.

Choosing Power Type

Why Do Servos Require Initialization

There are two types of servos, hobby-style and smart servos. The hobby-style servos are most common, and they do not report their position to the EZB. Instead, a hobby servo responds to position requests from the EZB. This means that the servos will "jump" to their position on start-up. If the servos are resting at a random position of 120, and you specify to move to position 90, they will JUMP to 90 no matter what speed is set.
When servos jump into position all at once, the combined current draw can exceed the power supply, which causes a voltage dip, and the EZB will brownout or reboot.
This is because hobby-style servos are not "Smart" and therefore do not report their position on power-up.
How Servos Work

Work Around

There is a workaround to ease the current draw of servos initializing. The most straightforward workaround is to initialize each servo individually into a position when the EZB starts up. You can create a script, naming it something like "INIT", and run it when the EZ-B receives a connection from ARC.

***Note:** We will use JavaScript for the code examples

Servo Limits

Optionally, you may wish to specify limits that servos can move. This can be defined as a script command to set the min and max servo positions per servo.
Ideally, we recommend specifying the limits in an init script. The JavaScript command for setting the min and max positions is listed below.
Check the manual in the support section for the respective command using your preferred programming language.

```
Code:
// Specify the min position of servo D0 to 10
Servo.setMinPositionLimit(d0, 10);

// Specify the max position of servo D0 to 100
Servo.setMaxPositionLimit(d0, 100);
```

Example #1

In this example, servos ports are not linear, or the init positions are different per servo/ joint. Also, tweak the sleep() time to give each servo enough time to move into position. It may require one full second (1000 ms) per servo.

```
Code:
// Initialize every servo into their startup position

Servo.setPosition(d0, 90);

// Specify the min position of servo D0 to 10
Servo.setMinPositionLimit(d0, 10);
// Specify the max position of servo D0 to 100
Servo.setMaxPositionLimit(d0, 100);
sleep(500)
Servo.setPosition(d1, 10);
sleep(500)
Servo.setPosition(d3, 90);
sleep(500)
Servo.setPosition(d4, 110);
sleep(500)
Servo.setPosition(d6, 90);
sleep(500)
Servo.setPosition(d7, 50);
sleep(500)
Servo.setPosition(d9, 75);
sleep(500)
Servo.setPosition(d10, 90);
```

Example #2

In this example, the servo initialization positions are all the same degree positions, and the ports are linear. So we can loop through each servo and set the port and position.

```
Code:
// Initialize every servo into their startup position
for (var port = 0; port < 10; port++) {

  Servo.setPosition(port, 90);

  sleep(500);
}
```

How To Run Scripts When EZB Connects

The above example mentions having the script execute when the EZB receives a connection from ARC. You can add scripts to the ARC Connection Control, and they will be executed when the connection is established.
There can be a script per EZB so that each EZB will have its script based on the connection. You can either edit & paste the above code examples into the Connection Control script or put the code in a separate script and have the connection control execute it. To have a script execute another script, check out the ControlCommand() syntax.

Connection Control Manual