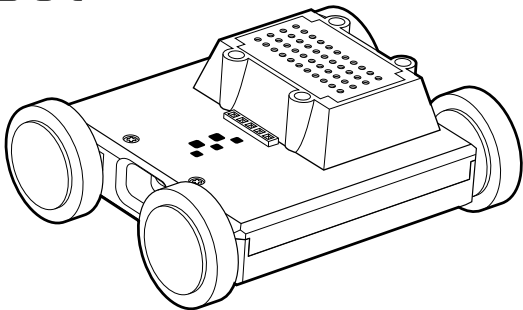


# Meet Your New ProtoBot

Smart, Playful & Made  
for Hands-on Learning

User Guide



Build Your Own Mini Robot

## FIND YOUR LANGUAGE

Scan with your phone to access the digital manual in more languages



English (GB)



Italian (IT)



French (FR)



German (DE)



Polish (PL)



Spanish (ESP)



Chinese (CN)



Japanese (JA)

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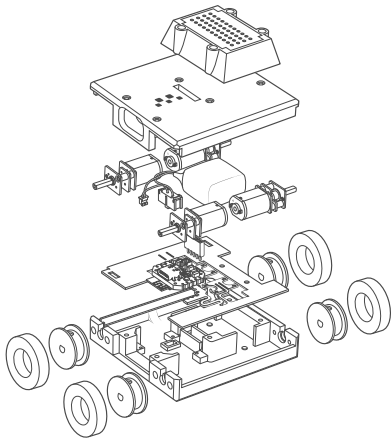
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## MEET PROTOBOT!

Your pocket-sized robot that's as fun to build as it is to control. Perfect for hands-on learning, playing, and experimenting with robotics.

## WHAT IS PROTOBOT?

ProtoBot is a pocket-sized robot you assemble yourself. Powered by four torquey motor-wheels and our CodeCell module. ProtoBot is fast, smart, and built for hands-on learning. Whether you're a beginner or an experienced maker, we'll help you get the full experience of building, coding, and experimenting with your own robot.





# WHAT IS IN THE BOX?

## Beginner Maker-Level Kit:

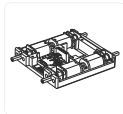
The electronics come pre-soldered. Just screw the parts together and bring it to life.



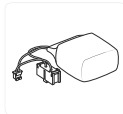
4 x Wheel Hubs +  
Silicon Tires



1 x ProtoBot Top  
Cover



1 x ProtoBot Base  
with CodeCell C6  
Drive and 4-motors



1 x 170 mAh 20 C  
LiPo Battery with  
Power Switch



1 x Optional  
Breadboard Mount



10 x M1.7 x 10 mm  
Self-Tapping Screw  
(Pointed tip)



4 x M1.6 x 4 mm  
Metal Screw (Flat  
tip)



1 x Mini Phillips  
Screwdriver

**Pro Maker-Level Kit:**

Assemble everything from scratch. You'll solder and screw every part together.



4 x Wheel Hubs  
+ Silicon Tires



4 x Motors



1 x ProtoBot  
Main Housing



1 x ProtoBot Top  
Cover



1 x CodeCell C6  
Drive



1 x ProtoBot  
Eye-Light  
flexible PCB



1 x 170mAh 20C  
LiPo Battery  
with power  
switch



1 x Optional  
Breadboard  
Mount



1 x 5-pin Female  
Header



10 x M1.7 x 10  
mm  
Self-Tapping  
Screw (Pointed  
tip)



8 x M1.6 x 3 mm  
Metal Screw  
(Flat tip)



4 x M1.6 x 4 mm  
Metal Screw  
(Flat tip)



4 x M1.2 x 5  
mm  
Self-Tapping  
Screw (Pointed  
tip)



1 x Mini Phillips  
Screwdriver

## REQUIRED TOOLS:

### Included in both kits



Philips screwdriver

### For the Pro Maker-Level Kit, you'll need:



Soldering Iron



Tweezers

**Safety Note:** Soldering irons get extremely hot. If you're new to soldering or underage, ask an adult for help.

### 3D-Printed Robot Shell (Optional):

ProtoBot's shell is open-source and 3D-printable.

You can reprint it in your favorite colors or modify the design however you like. You'll also find fun accessories and add-on models in our online library, ready to 3D print and attach to your robot. And of course, you can create your own models too – and share them with the community.

If you choose to print your own robot shell, simply scan the QR code below to download the STL files and get started.



### For best results, we recommend:

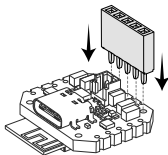
Dual-color printing - using white for the eye-area so the lights diffuse nicely.

If your printer doesn't support dual-colour, use a light-colored filament to ensure the LEDs shine clearly through the plastic.

## STEP-BY-STEP ASSEMBLY:

### Pro Maker-Level Kit Build Steps

1. Carefully take all the parts out of the package and lay them on a clean surface.
2. Start by finding the 5-pin female header and slide it into the CodeCell's bottom pins (below the battery plug).

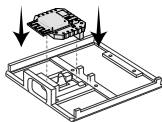


### Video Instructions

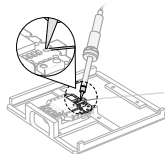
Follow these instructions or scan the QR code to watch the step-by-step assembly video.



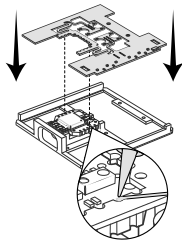
3. Set the CodeCell inside the top cover with the plastic-alignment-pins, ESP32 side facing up.



4. Solder the 5-pin female header onto the CodeCell. Make sure that the sensors are facing upwards.



5. Next align the flexible PCB with the CodeCell (tape-cover facing up) and solder the pads together. Once complete pop-out the boards from the cover.

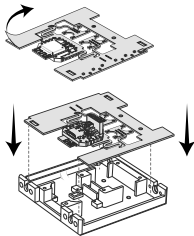


**Tip:** Connect the battery to the CodeCell's battery plug and turn on the switch. Verify that all LEDs start flashing. Once confirmed, remove the battery. If the LEDs do not flash, recheck the soldering.

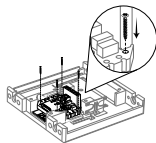
**Note:** Once this step is complete, you can break off the plastic alignment pins from the cover. They're only used to help with positioning and soldering.

6. Peel off the adhesive cover and press the flexible PCB firmly onto the housing, ensuring all areas, including the LEDs, sit securely in place.

**Tip:** To align, start from a corner and use the alignment circles to neatly position the flexible PCB. Gently bend the LEDs to a right angle.

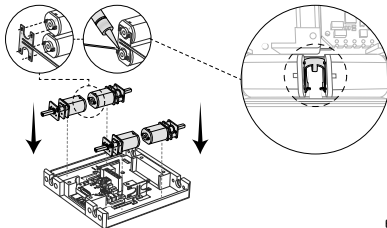


7. Screw the CodeCell in place with the help of four M1.2x5mm screws.

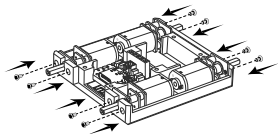


8. Slide each motor onto the flexible arm, while aligning the "+" marks. Solder the motor pins to the flexible PCB pads, and repeat for all motors, then gently fold them into their slots.

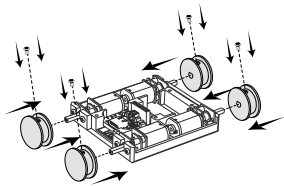
**Note:** Once folded into place, ensure that both flexible arms holding the motors are oriented toward the CodeCell.



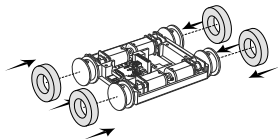
9. Unpack the eight M1.6x3mm screws and secure all four motors in place.



10. Open the wheel pack, slide the hubs onto each motor shaft, and secure them with the provided screws.

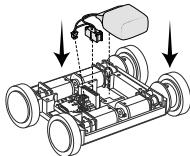


11. Stretch and fit the silicone tires over the hubs until they sit snugly.

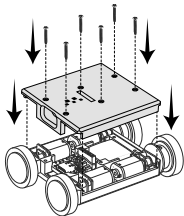


**Tip:** If a tire looks misaligned or off-center, gently roll the robot on a flat surface – it will self-align naturally.

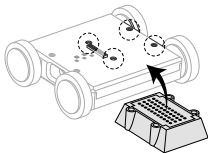
12. Place the power switch and battery into position, neatly routing the wires through the small side-gaps.



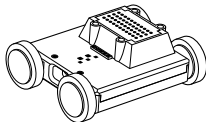
13. Attach the plastic cover with six M1.7 × 10 mm screws.



**Optional:** Use the four holes to fit the breadboard holder.



Your ProtoBot is now assembled and ready to use!



Next, you'll connect your new robot to the MicroLink App to start driving and discovering all that it can do.

To do this, skip to page 11 in the "Connect ProtoBot with the MicroLink App" section.

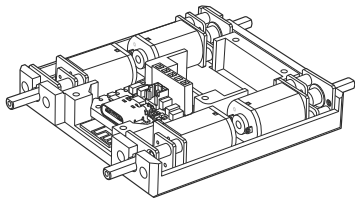
## Beginner Maker-Level Kit Build Steps

### Video Instructions

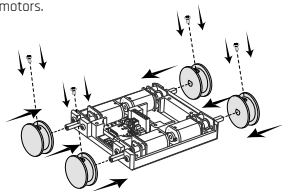
Follow these instructions or scan the QR code to watch the step-by-step assembly video.



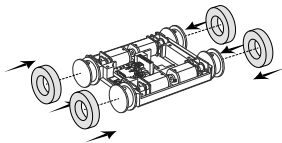
1. Open your kit and lay out all the parts on a clean table. The CodeCell and motors are already soldered in place.



2. Start by pushing a wheel hub onto each motor shaft and secure with an M1.6x4mm screw. Repeat the same step for all four motors.



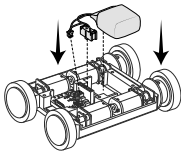
3. Stretch the silicone tires over the hubs. Repeat the same step for all four motors.



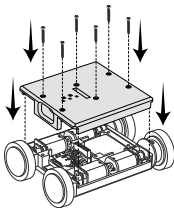
**Tip:** If a tire looks uneven, gently roll the robot on a flat surface – it will self-align naturally.



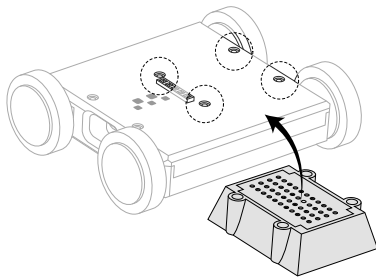
4. If not already positioned, place the power switch and battery in their slots and neatly route the wires through the small side-gaps.



5. Place the cover on top and secure it using six M1.7 × 10 mm screws.



Your ProtoBot is ready to roll! Optionally add the breadboard holder using the four holes.



## GETTING STARTED WITH THE MICROLINK APP:

1. Before turning on your robot for the first time, make sure it's fully charged. Follow the steps on page 23 in the “Charging Instructions” section.
2. Download the MicroLink App to configure and control your device. Scan the QR code to download the app:

For iOS (Apple Devices)



For Android (Google Devices)



**Note:** Ensure that Bluetooth is enabled on your smartphone before trying to connect the App.

3. Slide the “Power” switch to turn the ProtoBot on. Connect it to the “MicroLink” App and follow the instructions to begin controlling it.

## WHAT PROTOBOT CAN DO:

After building, connect ProtoBot to the free MicroLink App (Android / iOS) to start learning how to control it and automate its behaviour.

### App Features:

- **Drive** – Control it with a joystick
- **Automate** – Create actions with block-based coding
- **Shape** – Move in circles, squares, or infinity loops
- **Rewind** – Retrace the path you just drove
- **Avoid** – Detect and stop before obstacles
- **Balance** – Try to stay upright for a few seconds
- **Dodge** – Detect overhead obstacles and duck
- **Record** – Log data from external I<sup>2</sup>C sensors (temperature, humidity, etc.)

ProtoBot's software is open source and fully compatible with Arduino.

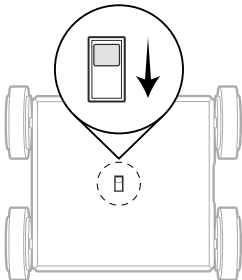
You can download its library from the Arduino IDE and experiment with sensors, data logging, or customize its hardware using the included expansion header.

**Note:** Scan the QR code to access our github library.

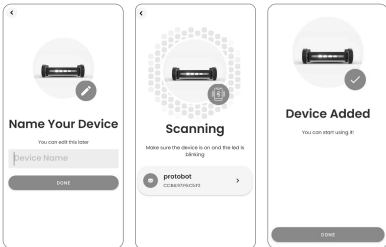


## CONNECT PROTOBOT WITH THE MICROLINK APP:

1. Slide the “Power” switch to turn on your ProtoBot.



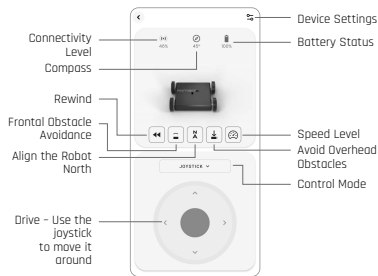
2. On your smartphone or tablet, make sure Bluetooth is turned on.
3. Open the MicroLink App, press the “Add” button and click on the ProtoBot. Then allow it to scan for available devices.
4. Once detected, select your ProtoBot from the list and assign it a custom name for easy identification.



After pairing, the ProtoBot is ready to drive.

# OPERATING THE PROTOBOT:

## A. MICROLINK APP INTERFACE DESCRIPTION:



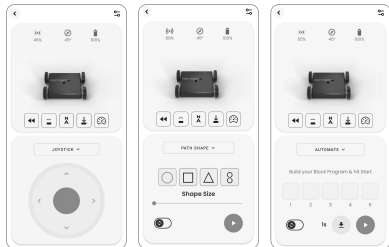
- 1. Connectivity Level:** Indicates the signal strength between ProtoBot and the mobile device. A higher percentage ensures a stronger wireless connection.
- 2. Compass:** Displays ProtoBot's current orientation in degrees. Useful for directional tracking and navigation tasks.
- 3. Battery Status:** Shows the current battery level and charging state. Ensures to monitor usage time and plan for recharging.
- 4. Rewind:** The robot will try to drive back to the previous starting location.
- 5. Frontal Obstacle Avoidance:** It will try to avoid obstacles when an object is detected in front.
- 6. Align the Robot North:** Resets ProtoBot's orientation to face true North. Helps you align the robot's starting position, especially when using multiple ProtoBots.
- 7. Avoid Overhead Obstacles:** It will try to avoid obstacles when an object is detected above (to use this make sure sensor is facing up).
- 8. Speed Level:** Adjusts the operating speed to your preferred setting.
- 9. Control Mode:** Allows switching between control modes like Joystick, Path Shape, or Automation.
- 10. Drive (Joystick):** Use the joystick to control ProtoBot's movement in up/down & left/right directions manually.
- 11. Device Settings:** The Settings menu in the MicroLink app allows you to personalize and optimize how your ProtoBot behaves.

## B. SWITCHING BETWEEN CONTROL MODES:

To change the control modes of ProtoBot, tap the “Control Mode” button a dropdown menu will appear; then select your preferred control mode.

There are three control modes:

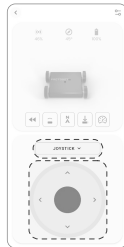
1. Joystick (Default Mode)
2. Path Shape Mode
3. Automate Mode



## 1. Joystick (Default Mode):

When ProtoBot connects to the App, it starts in “Joystick” mode by default. It can also be selected from the “Control Mode” option. Joystick Mode offers manual control. Use the on-screen joystick to drive the robot in real time:

- Press and hold the “Up” arrow to move forward.
- Press the “Down” arrow to move in reverse.
- Press the “Left” arrow to make the robot spin anti-clockwise.
- Press the “Right” arrow to make the robot spin clockwise.

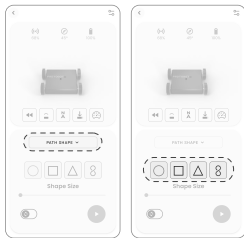


## 2. Path Shape Mode:

Tap the “Control Mode” dropdown option in the MicroLink App, then select the “Path Shape” mode. This allows ProtoBot to follow a predefined driving pattern and is bound to a selected path shape.

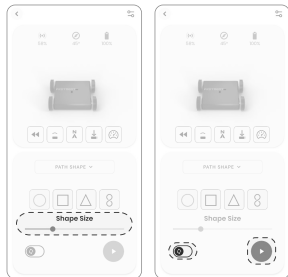
Choose from the following four motion patterns:

- **Circle:** Tap the circle icon to make ProtoBot move in a circular path.
- **Square:** Tap the square icon to follow a square path.
- **Triangle:** Tap the triangle icon for a triangular path.
- **Infinity Loop:** Tap the infinity icon to follow an infinity-loop (figure-eight) path.



Adjust the size of the driving path using the “Shape Size” slider. Move the slider left or right to decrease or increase the size of the selected shape according to your preference.

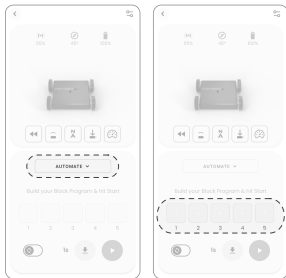
Tap the “Play” button to start driving the selected path shape. Tap it again to stop. Use the “Loop” toggle to repeat the chosen shape continuously.



### 3. Automate Mode:

Tap the “Control Mode” option in the MicroLink App, then select “Automate” mode from the dropdown menu. Then, build a custom block program.

Tap + to add actions in each slot (1-5). This enables you to build a custom sequence of actions for ProtoBot by selecting and arranging up to five programmable blocks.



### Block Programs:

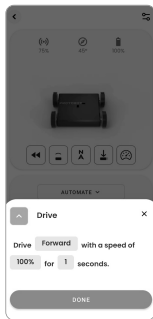
#### 1. Motion:

These control ProtoBot's basic movement.

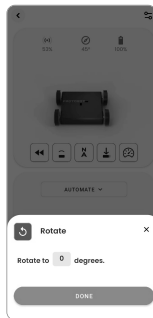
- **Drive:** Moves the robot forward or backwards for a specific time.
- **Rotate:** Rotates the robot to a defined angle (e.g., 90°, 180°).
- **Wait:** Make the programmed action pause for a specific amount of time before moving on to the next command



Set the drive by selecting the direction, setting the speed, and entering the duration to drive the robot accordingly, then press "Done".



Set the rotation by selecting the desired angle to rotate the robot to the specified position, then press "Done".



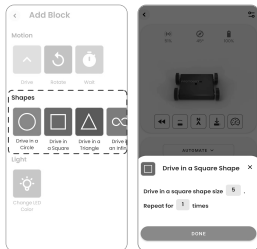


## 2. Shape:

These shapes direct ProtoBot to follow a geometric path. Each shape can be scaled in size depending on your settings.

- **Drive in a Circle:** Moves the robot in a circular path.
- **Drive in a Square:** Moves the robot in a square path with four turns.
- **Drive in a Triangle:** Moves the robot in a triangular path.
- **Drive in an Infinity:** Moves the robot in an infinity-loop pattern.

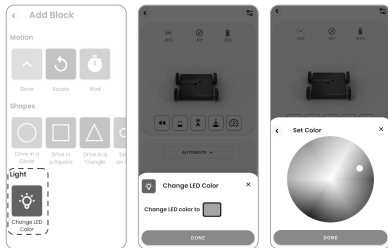
Set the circle size and the number of repetitions to make the robot drive in a circular path, then press "Done".



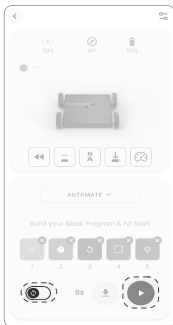
## 3. Light Block:

This controls ProtoBot's Eye Color.

- **Change LED Color:** Changes the LED display to your selected color. Once the desired color is selected, click the "Done" option.

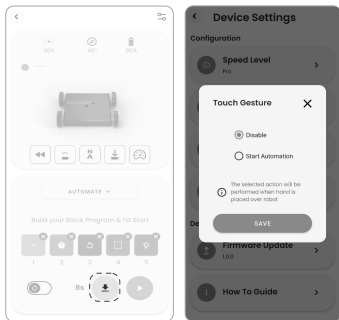


Each block executes in the order it's placed. Tap "Play" to run the sequence and toggle "Loop" to repeat the sequence continuously.



- **Touch Gesture Activation:**

When automation is saved, and you wave your hand over the robot's proximity sensor, it runs the saved animation. The touch gesture can be enabled from the settings.



### C. SETTINGS:

Go to the “Device Settings” option in the top right corner of the screen.

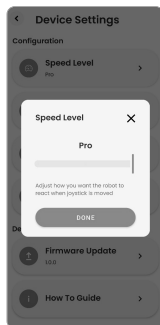
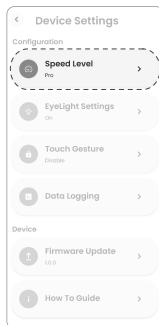
#### Speed Levels:

Speed Level allows you to control how fast ProtoBot moves according to your preference.

There are three options:

- **Beginner:** Slow and steady; perfect for first-time users.
- **Intermediate:** Balanced speed for casual use and testing.
- **Pro:** Drive at Maximum Speed.

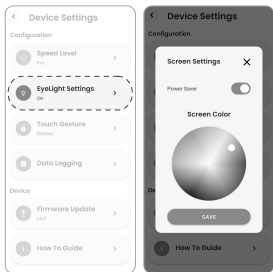
Use the Slider to switch between modes by selecting one of the three positions. The setting will be applied automatically.



## Eye-Light Settings:

Customize ProtoBot's eye-light indicators:

- **Eye-Light Active:** Turn the eye-lights on or off to save power.
- **Eye-Light Color:** Choose your preferred color for the default eye-light animations.



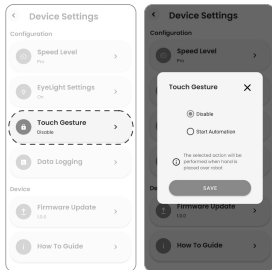
Once the desired settings are done, click the “Done” option to apply the settings.

## Touch Gesture:

Customize how ProtoBot responds when your hand is placed over it:

- **Disable:** Turns off the gesture function.
- **Start Automation:** When top-side proximity is triggered, ProtoBot will run the saved automation.

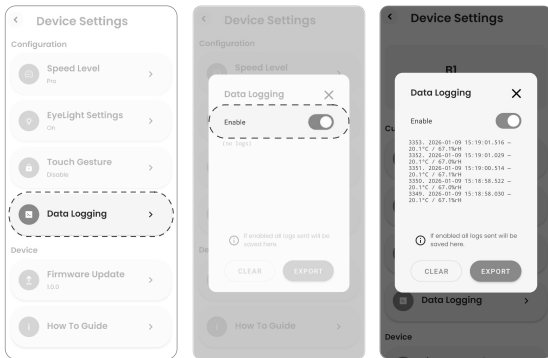
Once the desired settings are done, click the “Save” option to apply the settings.



## Data Logging:

Toggle the switch to enable or disable data logging. When enabled, all logs sent from the device will be saved here.

To delete all saved logs, tap “CLEAR”. Tap “EXPORT” to download the saved logs on your device.



## CHARGING INSTRUCTIONS:

1. To charge ProtoBot, insert a USB-C cable into the USB-C charging port and the other end into a compatible 5V charging adapter.
2. ProtoBot uses its eye-lights to display a RGB animation to indicate it's activity status. The power status is indicated below:
  - **Default Fading Comet-Animation:** Displayed during normal operation, based on your chosen color.
  - **Blinking Blue:** USB power connected only.
  - **Blinking Red:** Battery is low, please recharge.
  - **Blinking Green:** Battery is fully charged.
  - **Red-Yellow-Green Charging Animation:** Displayed during charging.

## PROTOBOT ARDUINO LIBRARY:

**Note:** Scan the QR code to access our software library.



The ProtoBot Arduino library lets you easily program and control your ProtoBot robot via the Arduino IDE. You can follow examples provided in the library or write your own code commands to make your robot do cool stuff!

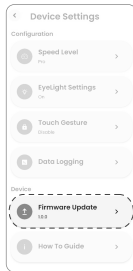
ProtoBot also includes a mini breadboard, allowing you to build tiny add-on circuits, like external I<sup>2</sup>C displays, temperature or humidity sensors, LED lights, solar chargers, and more. It's truly a tiny playground for experimentation and creativity.

## HOW TO UPDATE SOFTWARE?

ProtoBot is ready to use straight out of the box, but its firmware can be updated wirelessly via the app. To ensure you have the latest version installed, go to Settings and tap Firmware Update.

If you prefer to update the software via USB or wish to customize and program the **ProtoBot**, you can do so by downloading its open-source **Arduino library**. Follow these steps:

1. If you're new to **Arduino**, install it first. Then go to **File > Preferences**. In the **Additional Board Manager URLs** field, enter: [https://dl.espressif.com/dl/package\\_esp32\\_index.json](https://dl.espressif.com/dl/package_esp32_index.json)
2. Click "OK" and restart the "Arduino IDE".
3. Open the "Arduino IDE" and navigate to **Sketch > Include Library > Manage Libraries**.
4. Search for "ProtoBot" and install the latest version. If it's already installed, ensure it is up to date.
5. Go to **Tools > Board > Board Manager**, search for ESP32, and install or update it to the latest version.
6. **ProtoBot** uses the 'CodeCell C6 Drive' module module as its electronic brain. To set it up correctly in **Arduino**: Navigate to **Tools > Board > ESP32C6 Dev Module**.



7. Select the correct COM port under **Tools > Port**.
8. Enable **USB\_CDC\_On\_Boot** under **Tools > USB\_CDC\_On\_Boot**.
9. Set Partition Scheme: 8M with spiiffs (3MB APP/1.5MB SPIFFS)
10. Set the CPU clock speed to 160 MHz and Flash Size: "8MB (64Mb)"
11. Finally, open **File > Examples > ProtoBot**, and try out the examples to get familiar with ProtoBot's software features and begin customizing it to your needs.

## CARE AND MAINTENANCE:

- Keep wheels free of hair, dust, and debris, as these can affect performance.
- If required, clean the device gently with a soft, slightly damp cloth. Do not use harsh chemicals.
- The robot is not rated to be waterproof or water-resistant. While driving, avoid wet surfaces and liquids.
- Avoid exposing the device to extreme temperatures or prolonged direct sunlight, which can discolour plastic and damage the battery.
- Store in a cool, dry place when not in use.

## SAFETY AND WARNINGS:

- **Adult Supervision Required:**
  - The Pro kit involves soldering and small parts. Children must be supervised by an adult during assembly and operation. The soldering iron tip can exceed 300 °C – never touch the soldering tip while hot. Always unplug when finished. Work in a well-ventilated area when soldering.
- **Small Parts Hazard:** Contains tiny screws, wheels, and components that may pose a choking hazard. Keep out of reach of young children.
- **Bright LEDs:** The product uses bright, flashing lights. Do not look directly into them. Prolonged exposure may cause discomfort, eye strain, or headaches. Flashing lights may also trigger seizures in individuals with photosensitive epilepsy.
- **Battery Safety:**
  - Do not puncture, disassemble, or dispose of the battery in fire or water.
  - Unplug the charging cable when not in use.
  - If the battery feels hot after use, allow it to cool for at least 20 minutes before charging.
  - Always check polarity when installing or replacing the battery.
- **General Handling:**
  - Avoid dropping, crushing, or applying excessive force to the robot, as this may cause damage.
  - Don't twist the flexible PCB; it is delicate and can tear.





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