Wheelson Usage Guide

Setup

Welcome to Wheelson's usage guide!

Hopefully, you had fun assembling your Wheelson. Are you ready to grow a bit more? We are going to show you how to use Wheelson in this usage guide!

Let's turn Wheelson on!

Using the switch located at the back of Wheelson, switch him on by pushing it to the right.


First time?

If this is your first time ever turning on the Wheelson, you should see the hardware test pop up. This is a cool little bit of software that will allow you to go through and make sure that you've assembled your Wheelson correctly! Follow the on-screen instructions at each stage and, if there is an issue, check your soldering!

## Setup
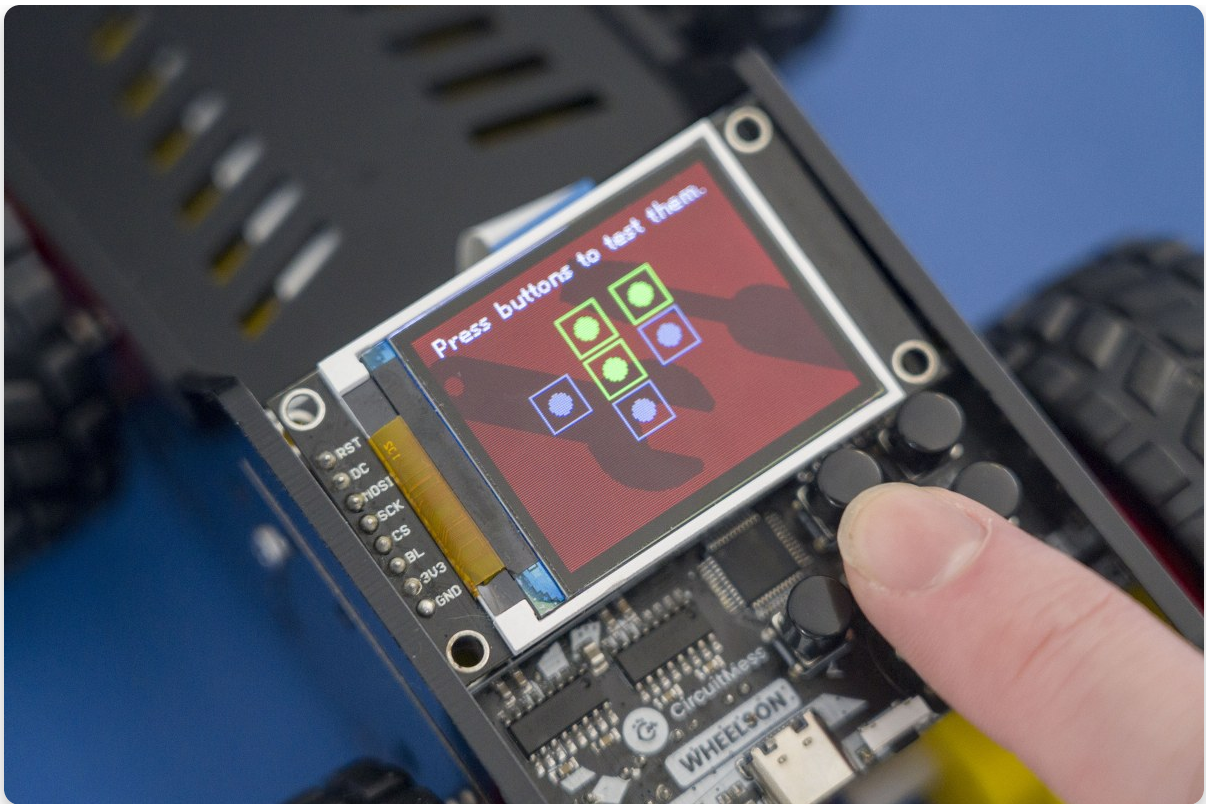
Running out of gas? Let's charge Wheelson.

Using the included USB cable, insert it into the USB port on the back of Wheelson. You should see a white LED while it's being charged, once it is fully charged, it will turn green!

The USB-C cable is used for charging and programming your device. Insert the other end of the cable into the power adapter for charging and into your laptop for programming.
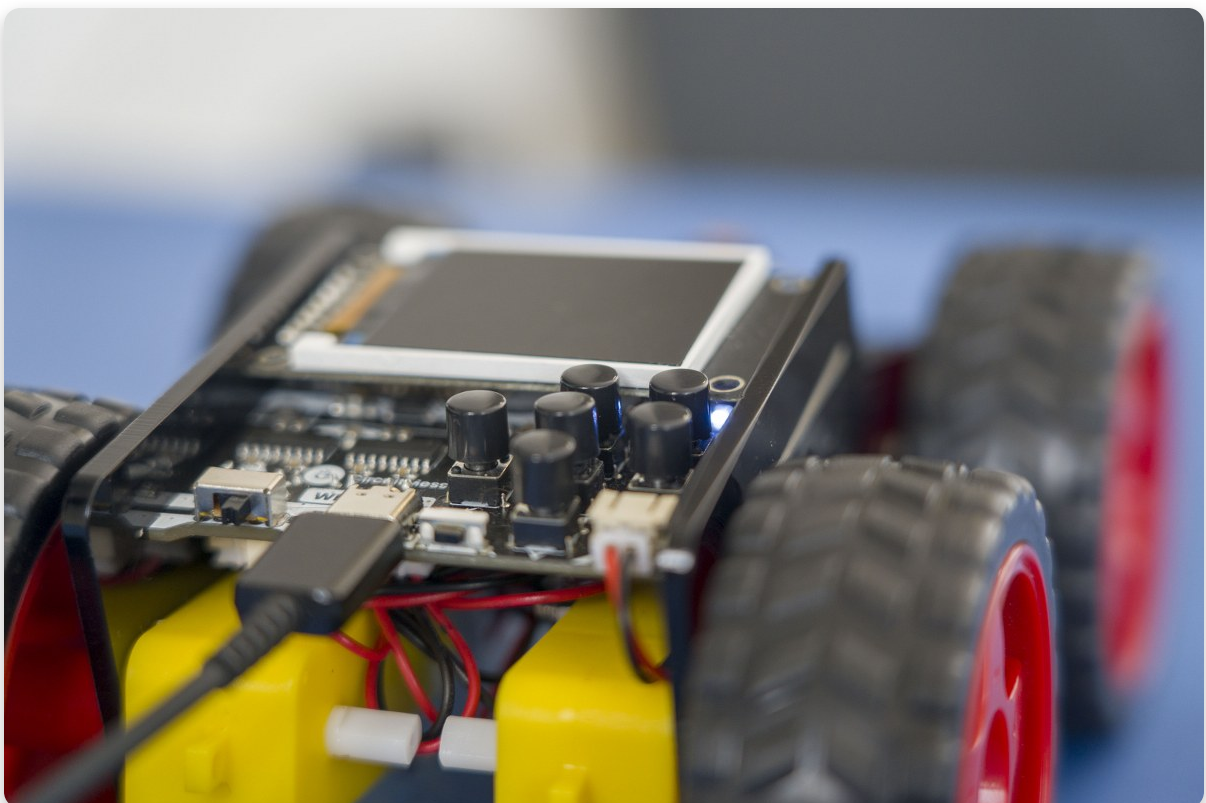

Frozen? Use the RESET Button

Got an issue with Wheelsons software or just want to do a RESET? Press the RESET button located on the back of Wheelson, this should RESET Wheelsons system fixing aUsing the included USB cable, insert it into the USB port on the back of Wheelson. You should see a white LED, once it is fully charged, it will turn green!
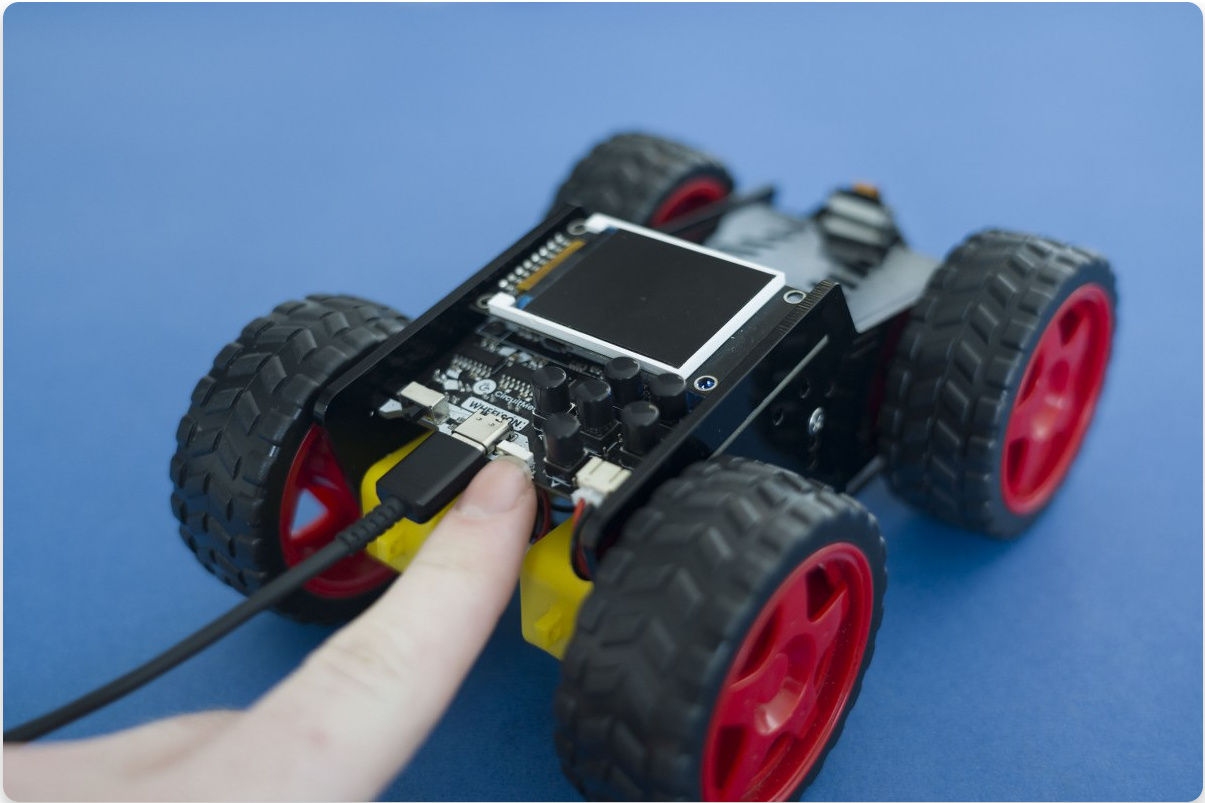
Navigate through Wheelson's menu

This is Wheelson's menu. There are five options to choose from:

- **Simple Programming** - Create fun little programs on Wheelson himself, using a blocky interface to tell Wheelson where to go!

- **Line tracking** - Using Wheelsons camera and some black electrical tape, make him follow a line to wherever you want!

- **Ball tracking** - Hold a ping pong ball in front of wheelson and make him follow it!

- **Marker tracking** - Using the included cards, hold them in front and Wheelson will read them and do different things!

- **Settings** - Adjust the volume, brightness and perform an input test if needed
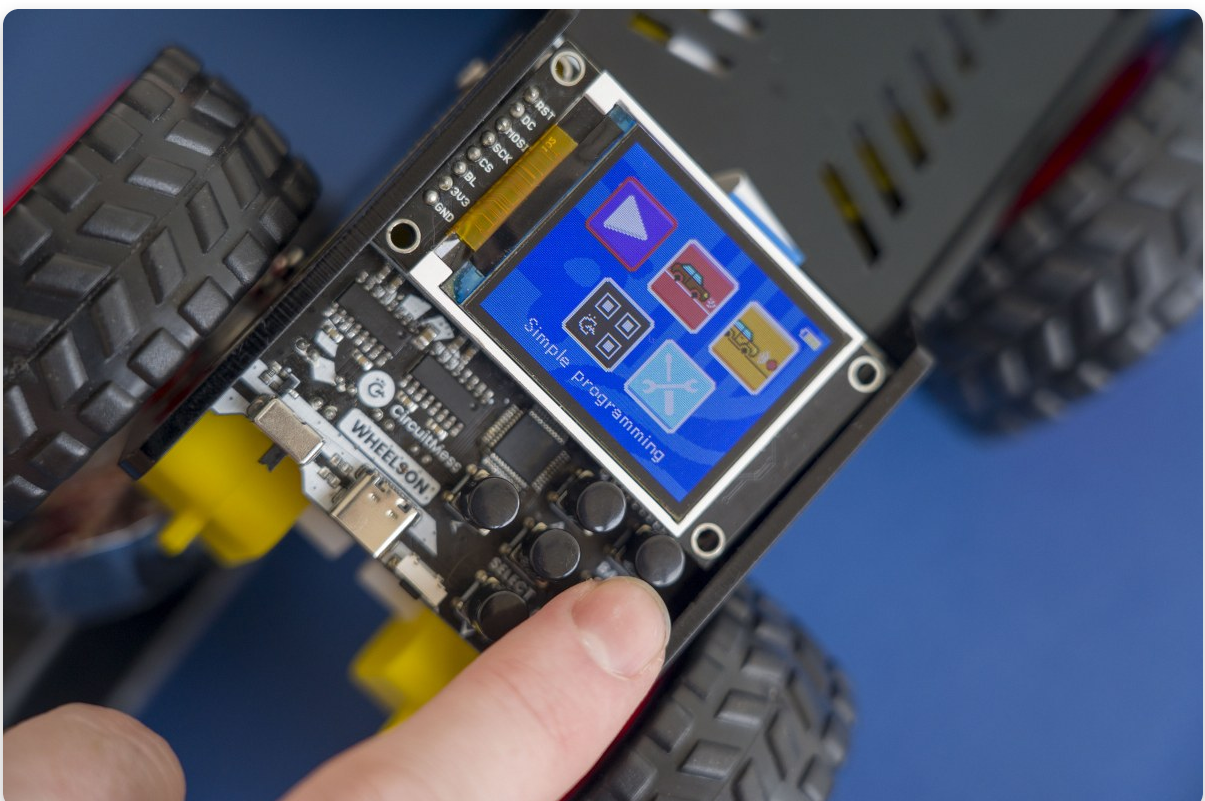
Navigate through Wheelson's menu by **using the 4 directional buttons on Wheelson's control panel** like in the photo.
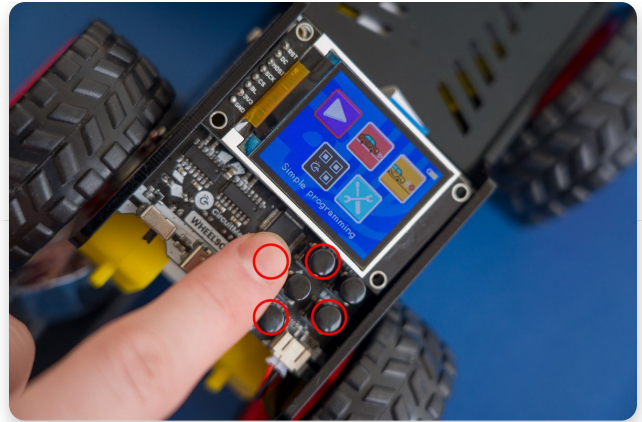
When you choose what option to pick in the menu, **press the middle button to select it**. The option that you selected should appear on display.
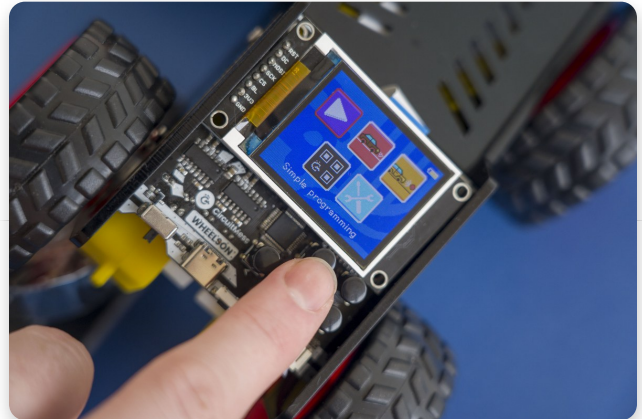
How to go back?

To exit one of the options that you selected, press the top right button on Wheelson's control panel.

You can do that every time you wish to exit any of the options.

Let's go over all the menu options, one at a time, starting with the 'Simple Programming' option...

Simple Programming

Get moving!

This is where you can program Wheelson to do different things!

Later on, when you plug your Wheelson into your computer, you will learn how to program Wheelson to do much more complicated stuff - for now though, if you just want him to move around, this is where you will find all of that!

Let us teach you how to use this feature...

## Select Simple Programming in the menu

Navigate through the menu by using the directional buttons and select Simple Programming by clicking on the middle button!
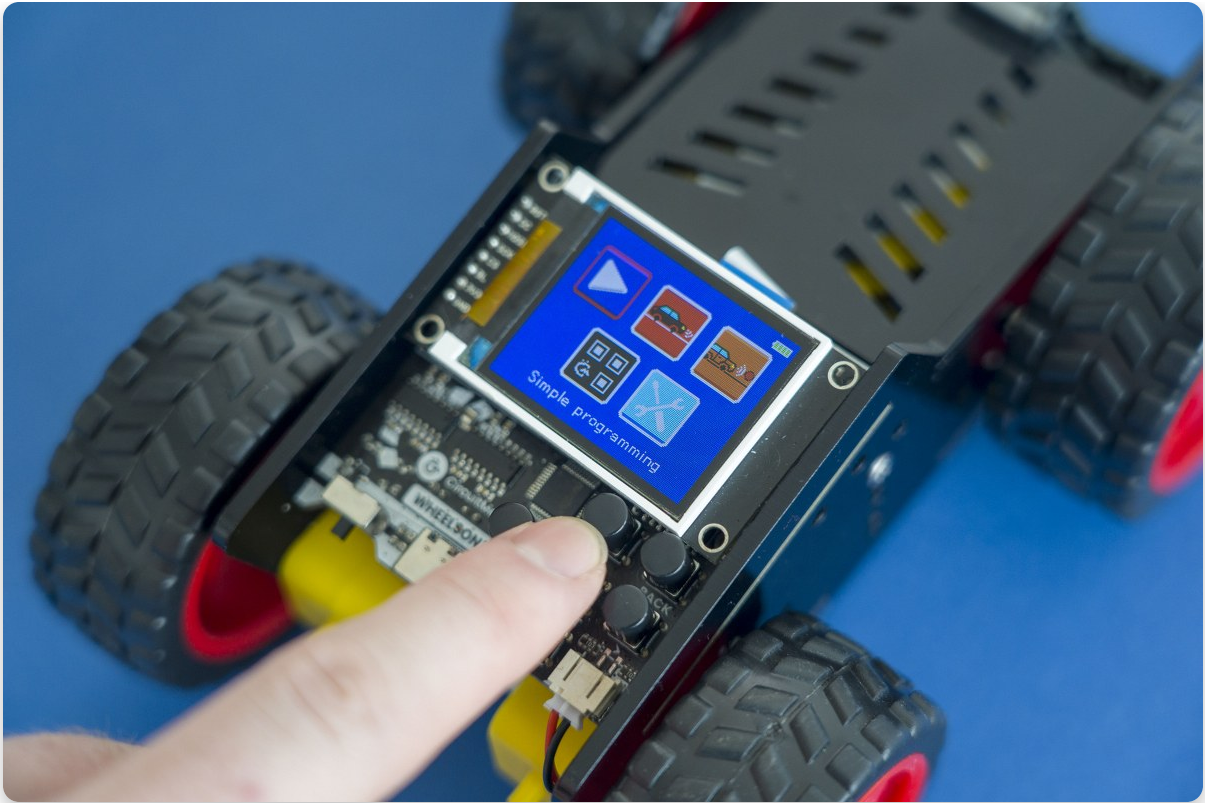
File Screen - Create, play, delete or save!

The first thing you will see is a list of all your previous programs (or one program called 'Program 1' if this is your first time!). This screen is like your file manager, here you can:

Play an existing program - By *holding down the SELECT* (middle) button until the green bar gets to the end. This will then play the select program!
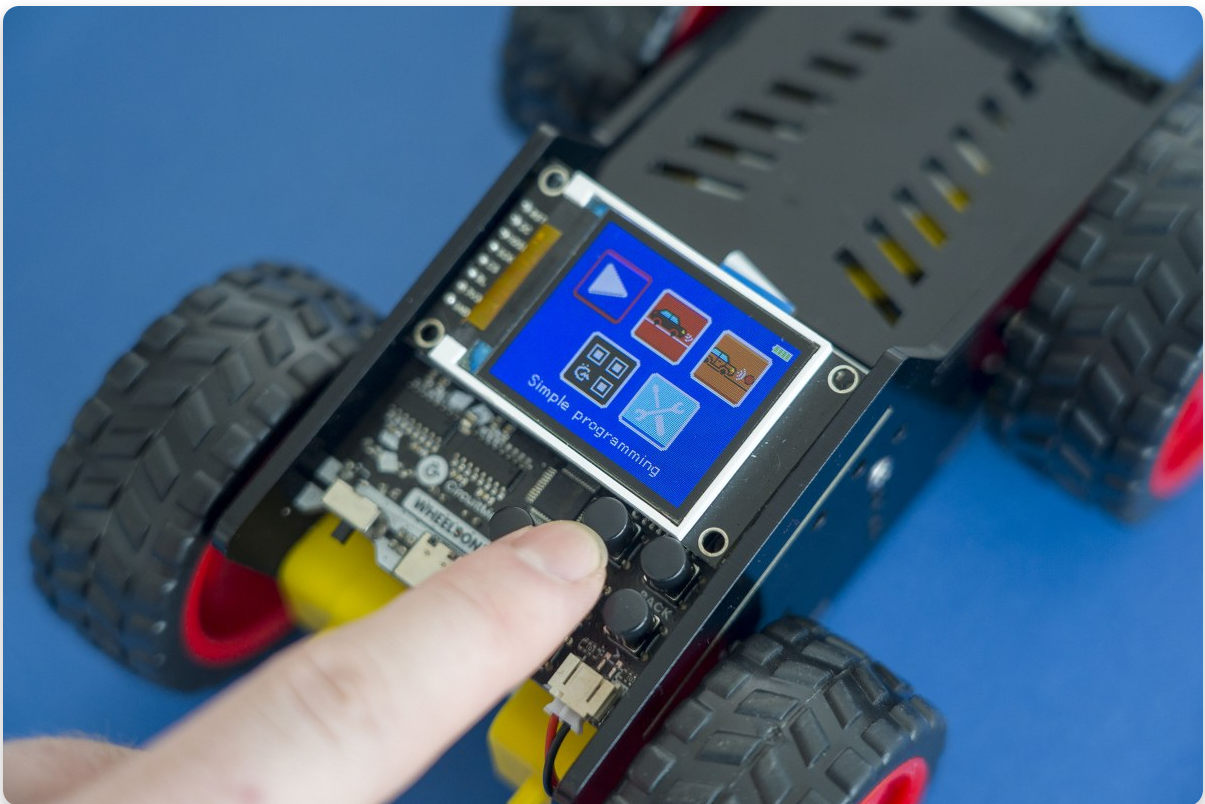
Open an existing program - By *pressing SELECT* (instead of holding down) we can open an existing program and edit it. This will bring you to the programming screen which we will cover in the next section.
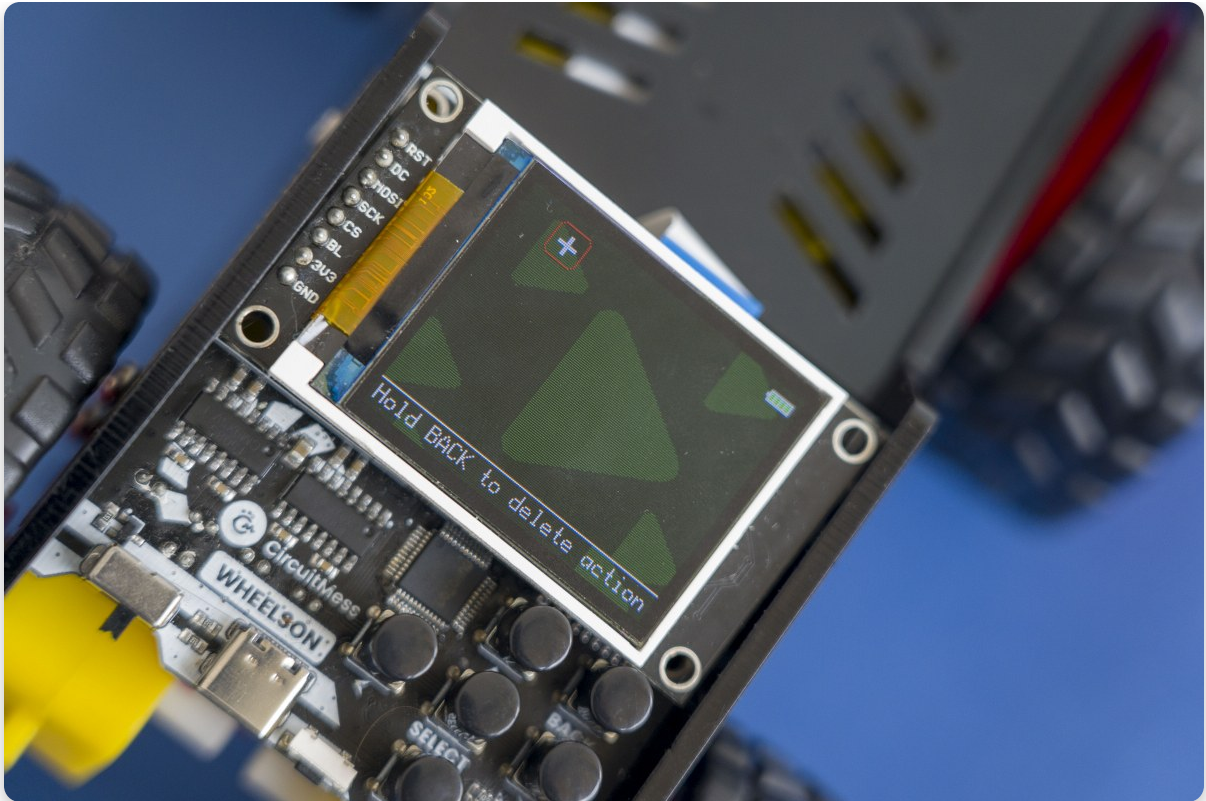
Delete a program - By *holding down the BACK button* until the red bar reaches the end, you will be deleting the selected program!
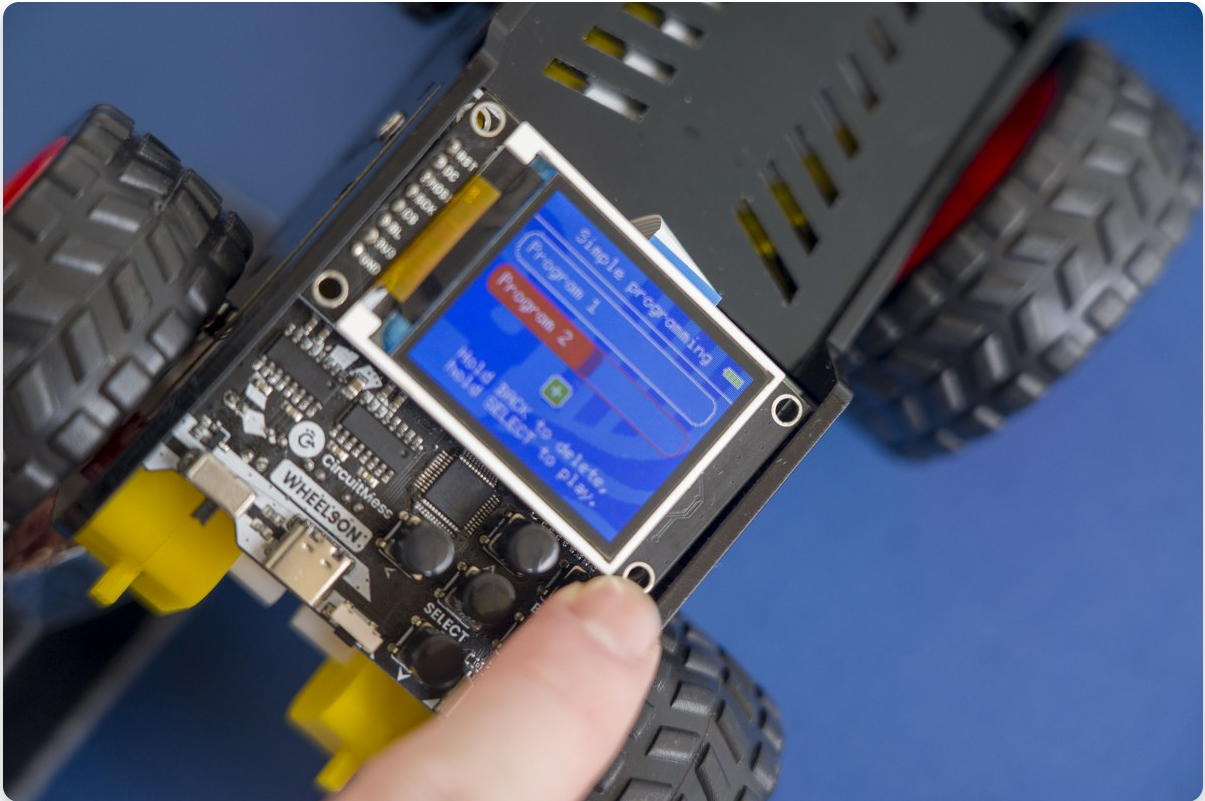
Create a new program - By clicking on the green plus you can create a new program. This will also open you up to the next screen:

And of course, you can always go back to the main menu by clicking back once!

Programming screen

Whether you opened an existing program or you created a new program, you should have the below programming screen! This is where we can add different blocks, in sequence, to create cool programs that tell Wheelson what to do!

Moving around - Using the directional buttons, you will be able to move your red cursor between blocks.

Creating a new block - Use the directional buttons to navigate all the way to the white block with a plus on it. This is the "add a new block" button and will always be at the end of your program, it doesn't do anything but opens up a new menu that will allow you to add different blocks!

Once your red cursor is on the + button, press the SELECT button. This will open up a pop-up menu with 7 different blocks for us to program with:

- Orange up block - This will tell Wheelson to go forward - we can edit the speed and how long it will go forward for in the next section!

- Green down block - This will tell Wheelson to go backwards.

- Red left block - This will tell Wheelson to go left.

- Blue right block - This will tell Wheelson to go right.

- Blue light bulb block - This will tell Wheelson to turn ON his headlights.

- Purple light bulb block - This will tell Wheelson to turn OFF his headlights.

- Black Pause button - This will tell Wheelson to pause/stop for a certain amount of time - we can edit how long for in the next section!

Let's say we want to add a "Black Pause Block", to do this we would use the navigational buttons from before, move our red cursor all the way down and click the SELECT button. You'll notice that the pop-up menu will drop down and the Pause Block is now in our program! If we want to add another block, repeat the same process by navigating to the white + block, clicking SELECT, choosing your block and clicking SELECT again! Its as easy as that!


Editing an existing block - To edit an existing block, simply navigate your cursor over to the block and click the SELECT button. This will open up a block specific options page:

Note the LED on and LED off blocks don't have a pop-up edit page as there isn't much to edit! If you wanted to turn on the headlights for a certain amount of time and then turn them off, you would simply use a LED on block combined with a pause block and then add a LED off block to turn the LEDs off!

The Orange up block, Green Down Block, Red Left Block and Blue Right Block all have the same options page. Here you can edit:

- How fast Wheelson will move (either forwards, backwards, left or right). This is presented as a percentage of the maximum speed! So 100% is the max speed so a smaller percentage will mean Wheelson will move slower!

- How long Wheelson will move for! You can edit the time, in seconds, Wheelson will move at the above speed for.

To edit these two options we use the up and down buttons to move between them and the left and right buttons to edit the values. Once we are happy with the values, regardless of which option we are on, click select and it will save and exit the blocks option page!
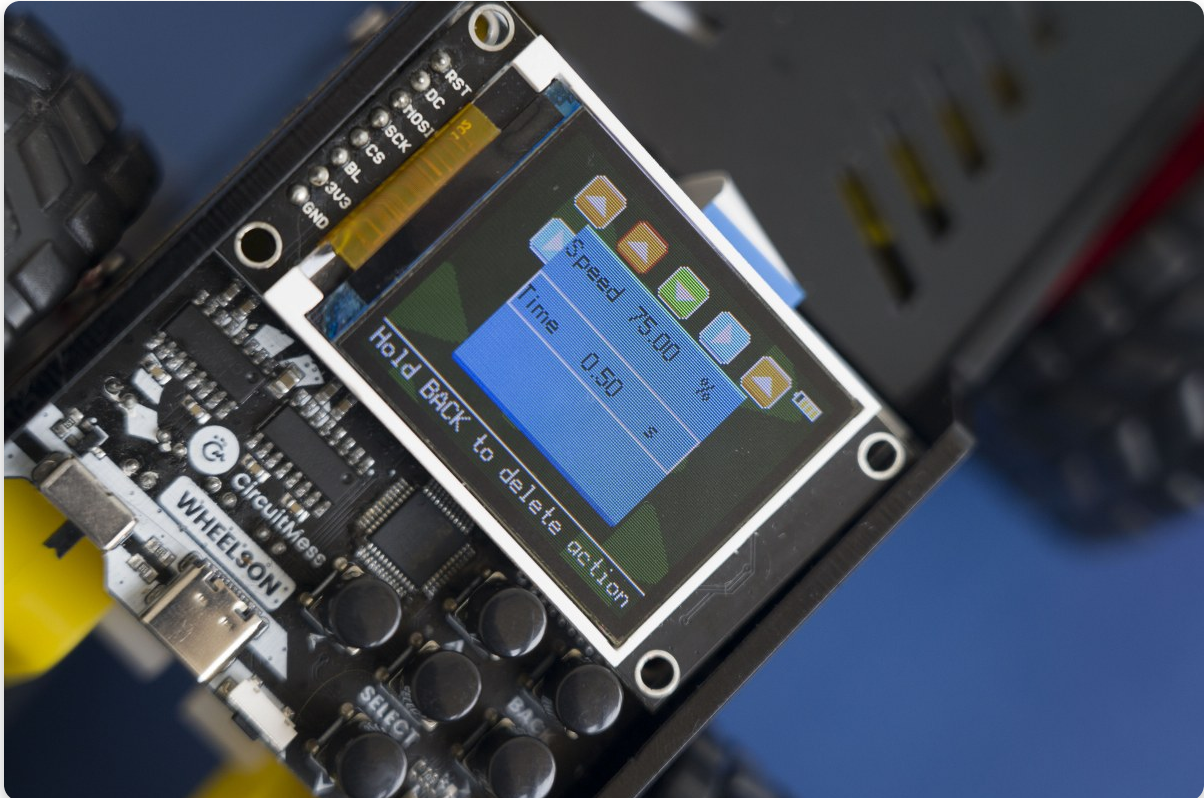
The only other block you can edit is the PAUSE block. In the same way as before, click SELECT to edit the blocks options and then use the left and right buttons to change the time in seconds (how long Wheelson will pause for).
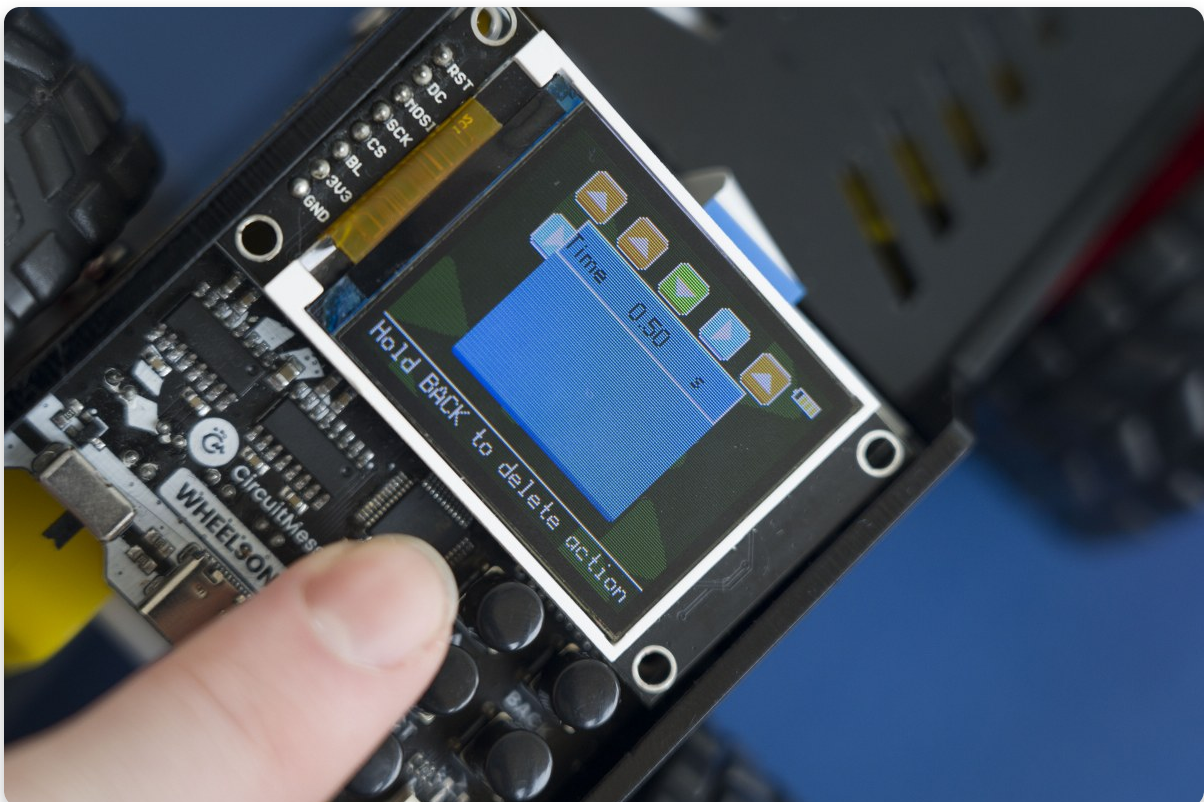
Deleting a block - Not happy with something? Hold down the BACK button until the block disappears.

Playing the program - If you want to play your new program, simply click the back button to go back to the File screen and then *hold down SELECT till the green bar reaches the end* to play your program!

Pretty cool right? This is also a great way to learn more about procedural programming! Ready to move on though? Next up is the Line Tracking menu!
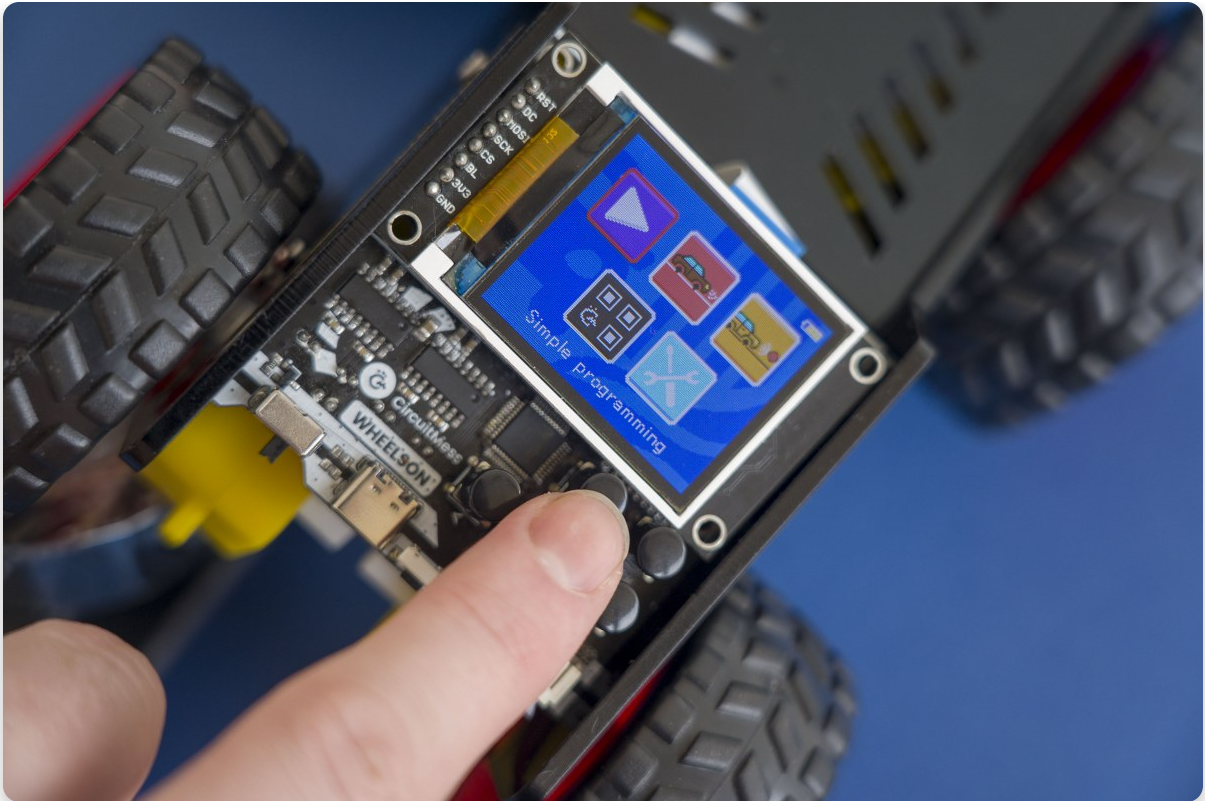
Let's track!

Line tracking

Get following!

This is where you can make Wheelson follow a line!

Let's go through what we will need and what we can do!

Select Line Tracking in the menu

Navigate through the menu by using the directional buttons and select *Line Tracking* by clicking on the middle, SELECT, button!

Move Wheelson's camera down

As the line is running along the ground beneath Wheelson, we need to move Wheelsons camera into the lower-facing position, to do this:

- Using two hands, push open the side panels so the Headlights + Camera panel pops out.
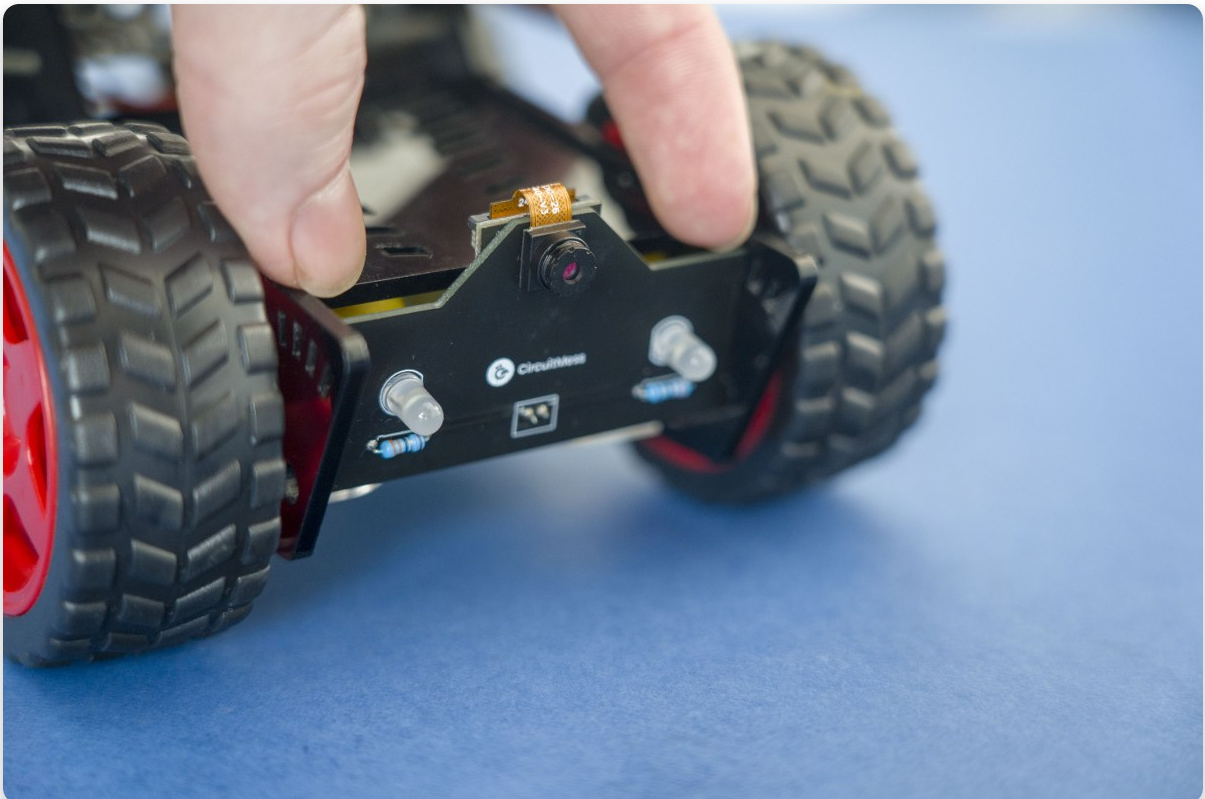
- Then move the Headlights + Camera panel into the lower-facing position with your hands, by slotting it into the bottom slot, as shown.

- Once in position, let the side panels close and secure the Headlights + Camera panel in place.
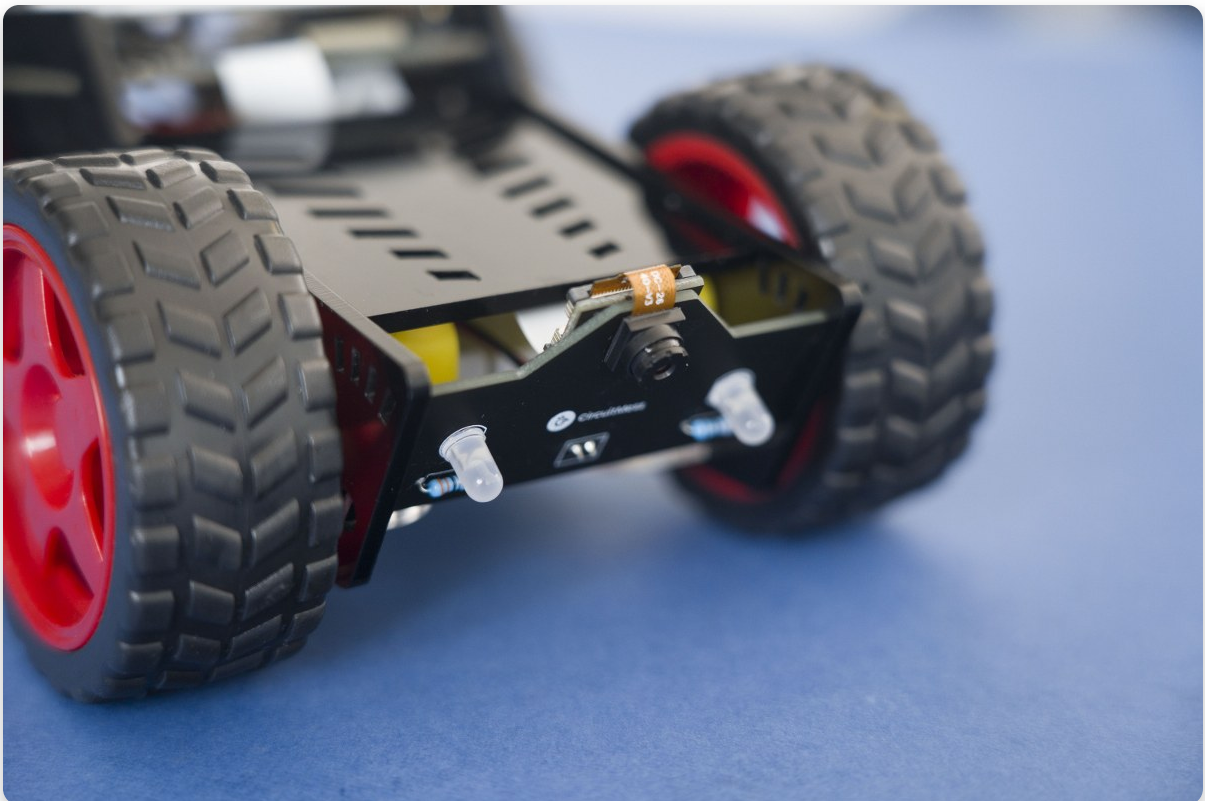
Now that the camera is in position, let's get cracking!

What you will also need!

Before we can follow a line, we need to create a line! Wheelson is programmed to follow a black line, as you will soon find out. The best way to create a thick black line is to use electrical tape - that's what we used! So go to your local hardware store or rummage through your drawers and try to find some black electrical tape, like this one.

Once you have it, it's pretty easy to create a cool little track for Wheelson to follow. Simple take some of the tape and place it on the floor until you have a pretty cool track, like the one we have!
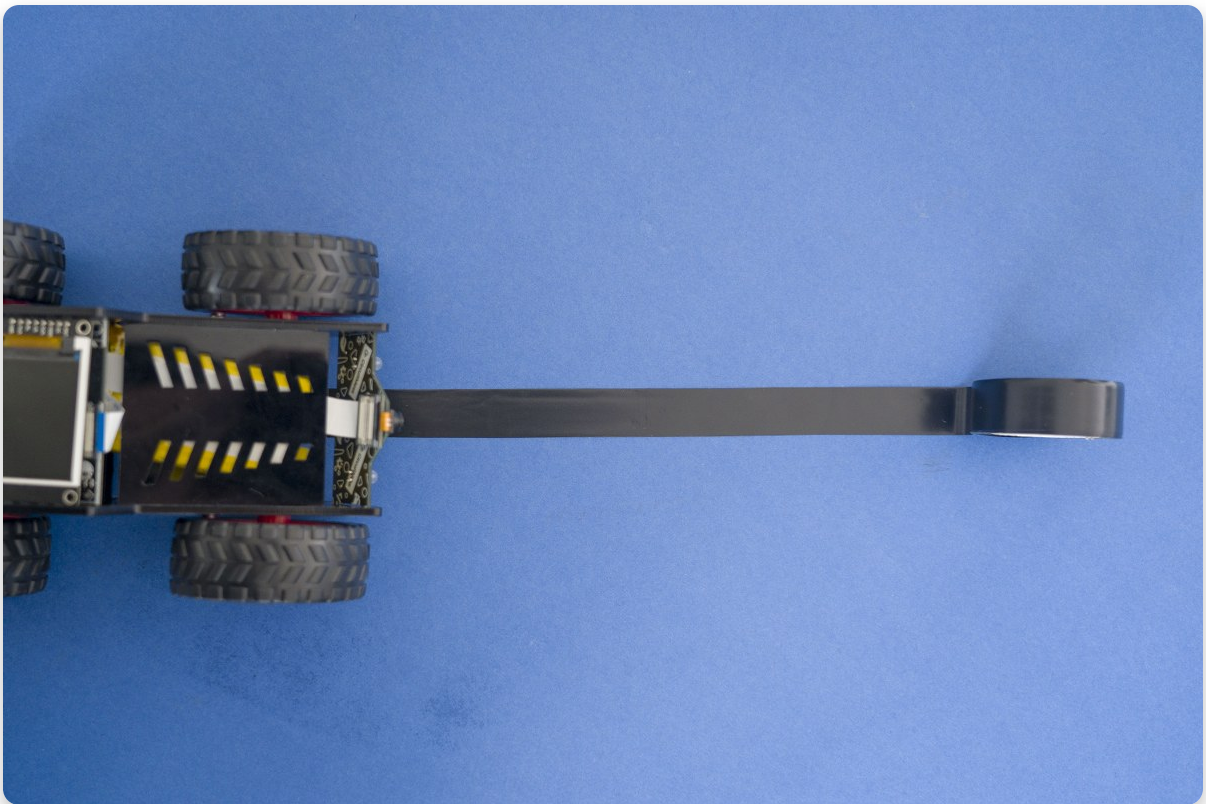

Let's get racing!

On the Line Tracking page you will see a few different things:

- A screen in the middle that shows a live feed of what Wheelson sees!
- 4 red motor icons, 2 on either side of the screen.

Activate Wheelsons motors - To make sure Wheelson doesn't just drive off as soon as he sees a line, we turned the motors off when you enter the Line Tracking mode. To toggle the motors on/off, simply click the DOWN button. As you'll see, the icons will turn to white, meaning they are active, and if Wheelson is detecting a line, he will start to move!
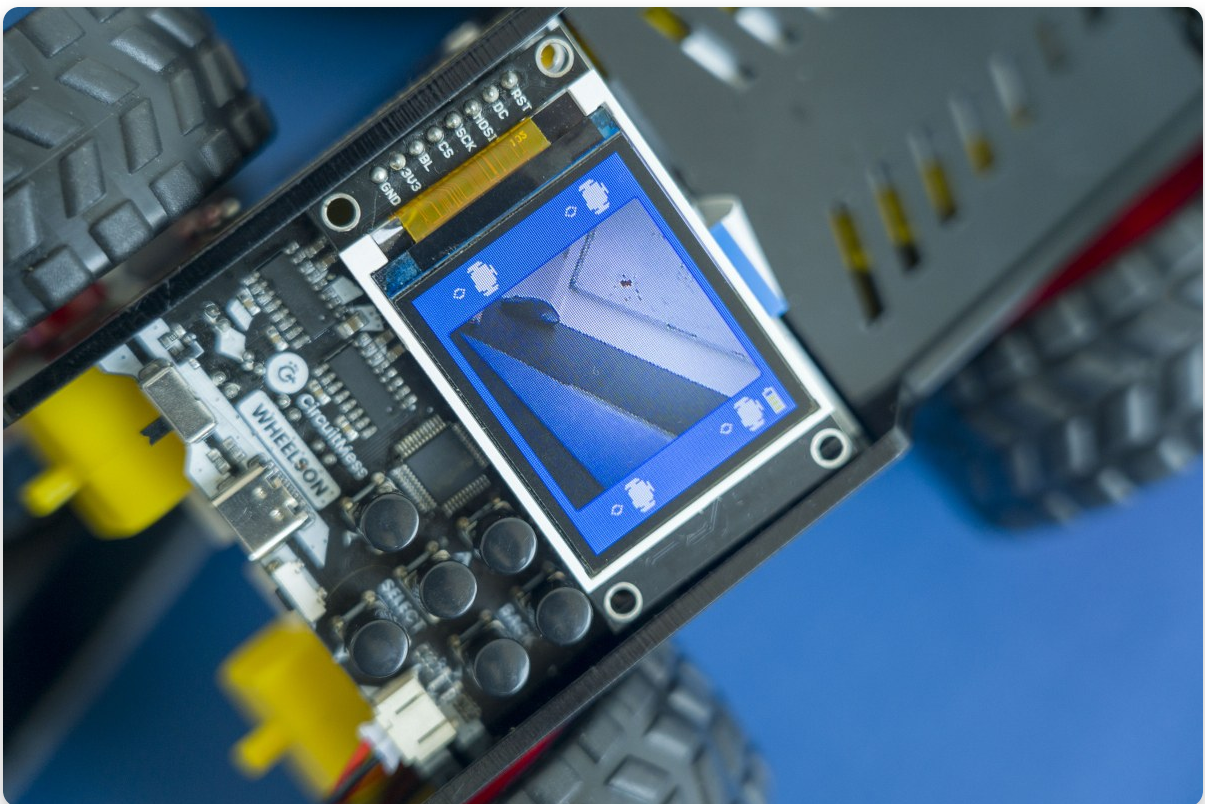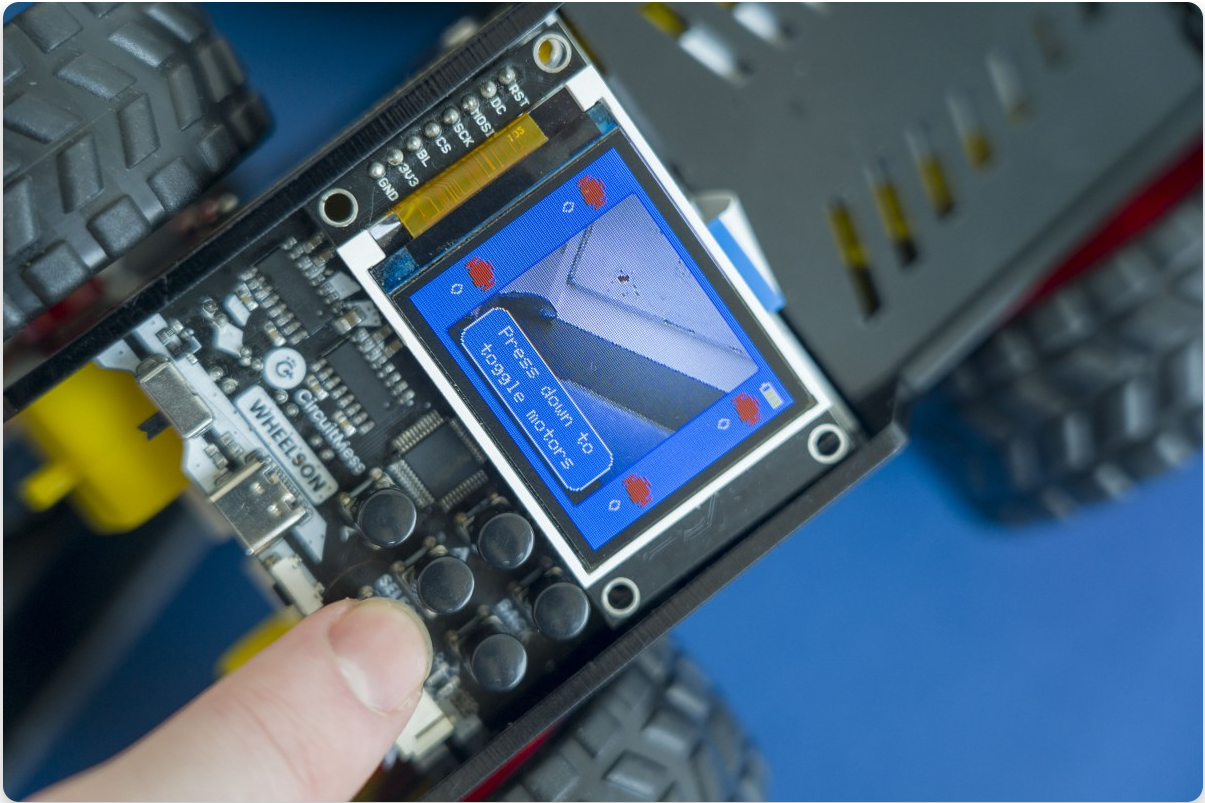
Make it stop - If you want Wheelson to stop, click the DOWN button again and you should see that Wheelson's motor icons turn back to red and he stops moving!

See what Wheelson sees - Another cool feature can be activated by pressing the SELECT button. once pressed, you'll notice that the screen turns black and white. This is what Wheelson actually sees. The WHITE is all irrelevant stuff that Wheelson doesn't need to worry about however you'll notice that the BLACK pixels also align with the black line, this is because Wheelson is searching for everything black in the frame to help it understand where the line is! Pretty cool right?

Once he's found the line, you'll see a blue and green line that shows the path Wheelson is going to take!
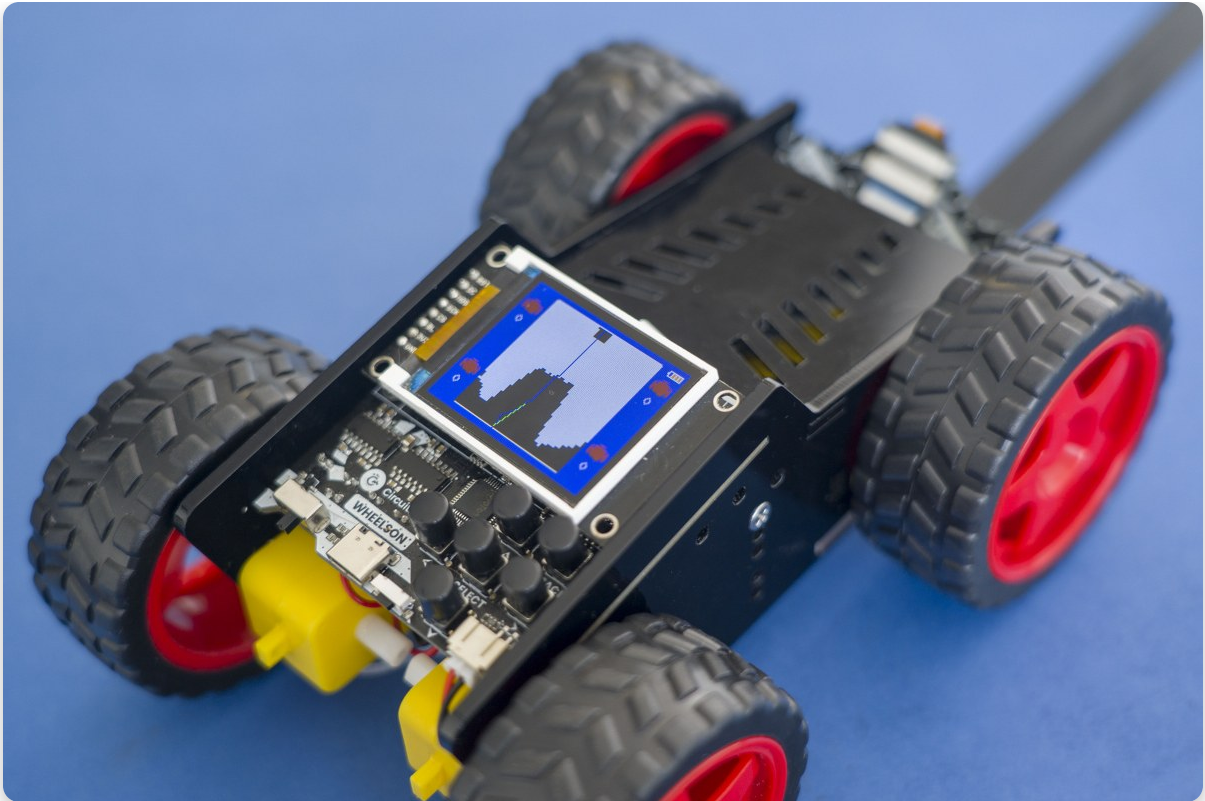
To exit out of the B&W mode, simply press the select button again.

Edit the contrast - Using the left and right buttons we can also edit the contrast, this is visible in the B&W mode. If you increase the contrast, by shifting it to the right, you will notice that the blacks overwhelm the screen. In *contrast* ;), you will notice that if you lower the contrast (shift to the left) that the whites overwhelm the screen. This allows you to adjust the screen to suit your conditions, if your in a brightly light room you might want to increase the contrast!
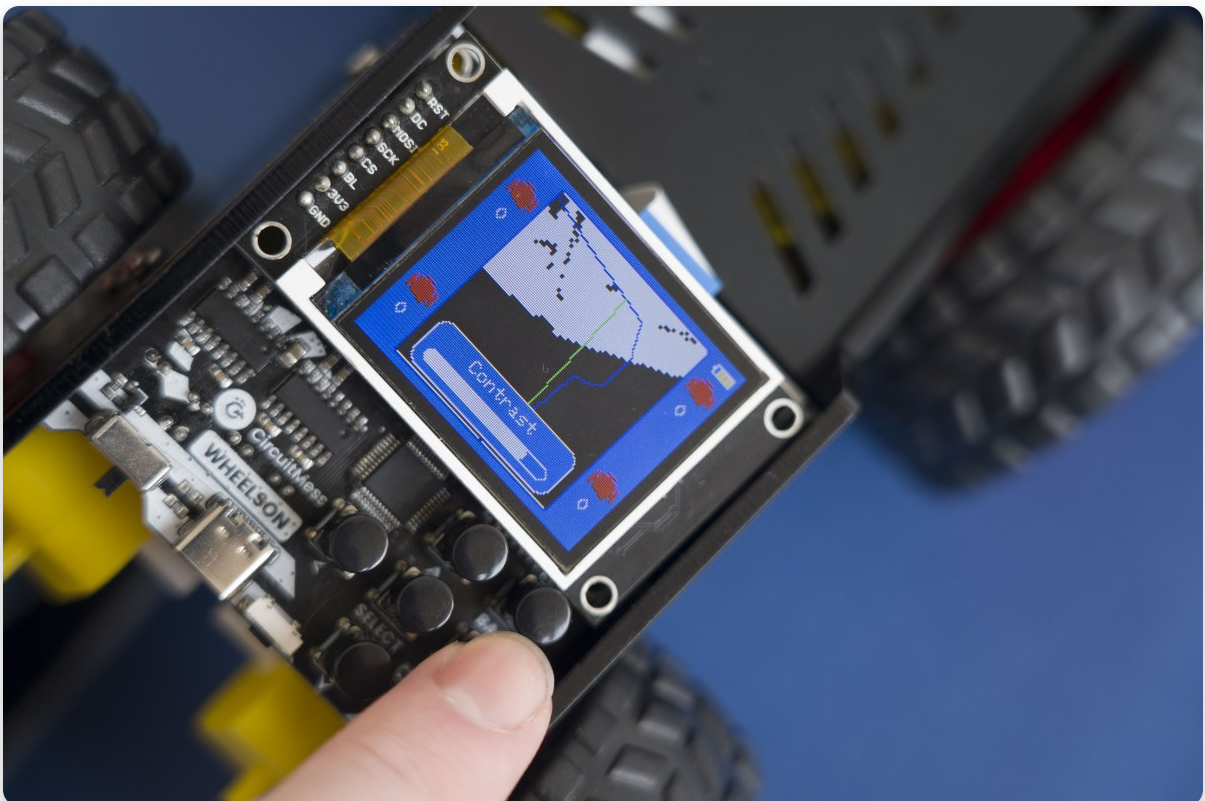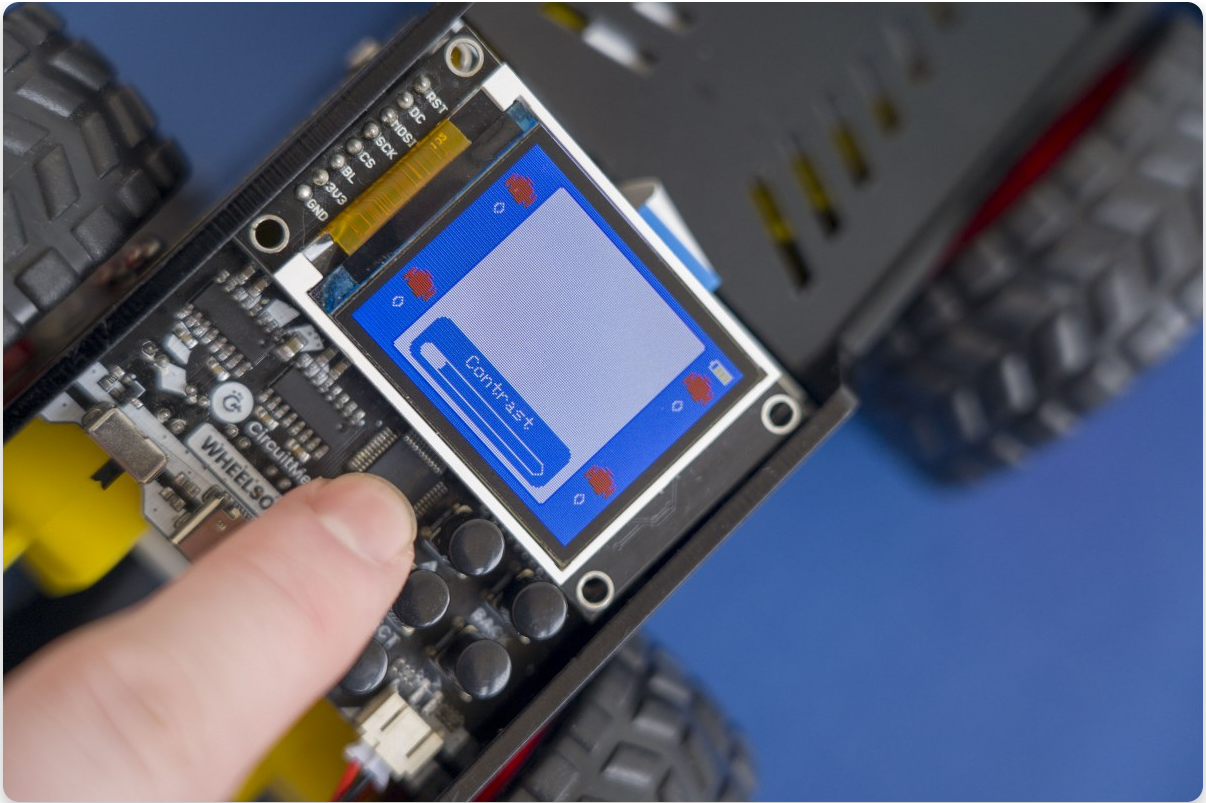
Awesome? Ready to move onto some Ball tracking?

Ball tracking

Ballsy move!

This is where you can make Wheelson follow a ball!

Let's go through what we will need and what we can do!

Select Ball Tracking in the menu

Navigate through the menu by using the directional buttons and select *Line Tracking* by clicking on the middle, SELECT, button!
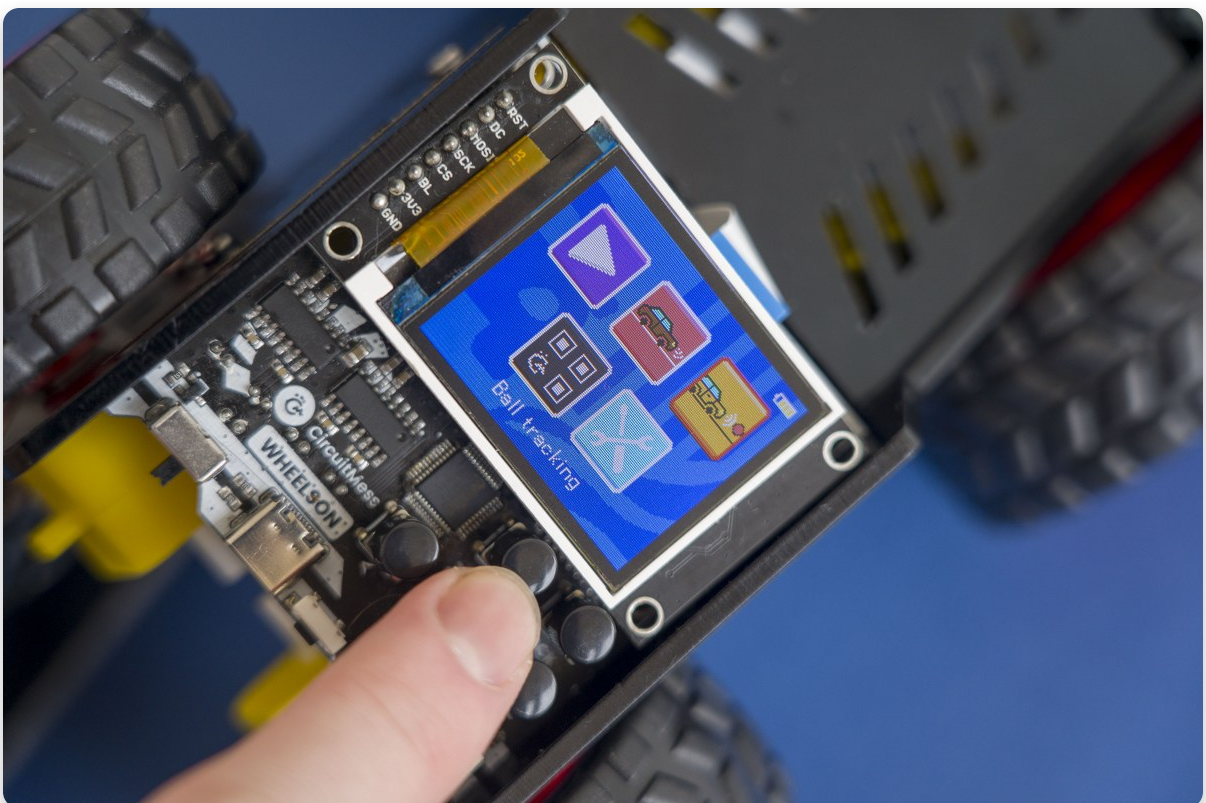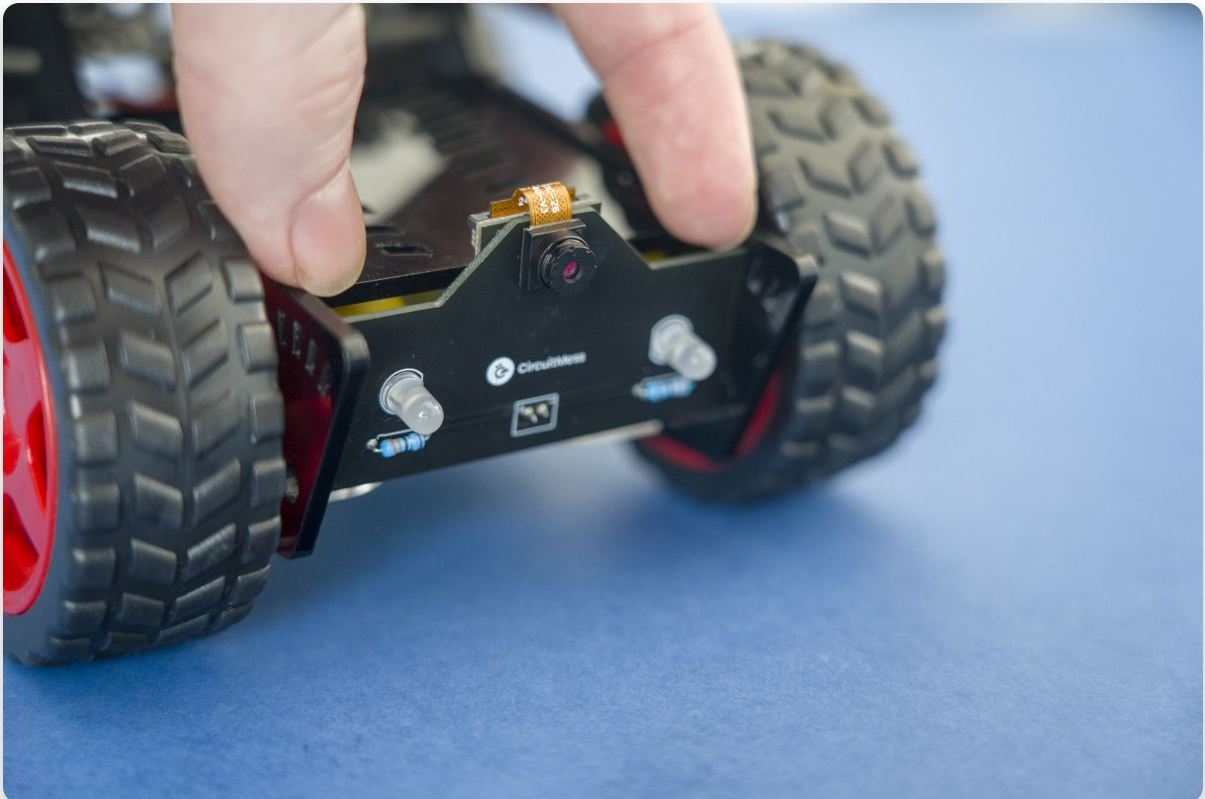
Move Wheelson's camera up

As the ball will be placed in front of Wheelson, we need to move Wheelsons camera into the forward-facing position, to do this:

- Using two hands, push open the side panels so the Headlights + Camera panel pops out.

- Then move the Headlights + Camera panel into the forward-facing position with your hands, by slotting it into the top slot, as shown.

- Once in position, let the side panels close and secure the Headlights + Camera panel in place.

Now that the camera is in position, let's get tracking!

What you will also need!

Before we can follow a ball, we need a ball! Wheelson is programmed in a way where we can select the colour of the ball we want to track, I'll show you how to do that in a bit!

We found that the best-coloured ball to use is a Blue Ball! So if you have a blue ball, great, if not then go find a ping pong ball and colour it blue with a sharpie!


Let's get balling!

On the Ball Tracking page you will see a few different things:

- A screen in the middle that shows a live feed of what Wheelson sees!
- 4 red motor icons, 2 on either side of the screen.

Activate Wheelsons motors - To make sure Wheelson doesn't just drive off as

soon as he sees a ball, we turned the motors off when you enter the Ball Tracking mode. To toggle the motors on/off, simply click the DOWN button. As you'll see, the icons will turn to white, meaning they are active, and if Wheelson is detecting a ball, he will start to move towards it!
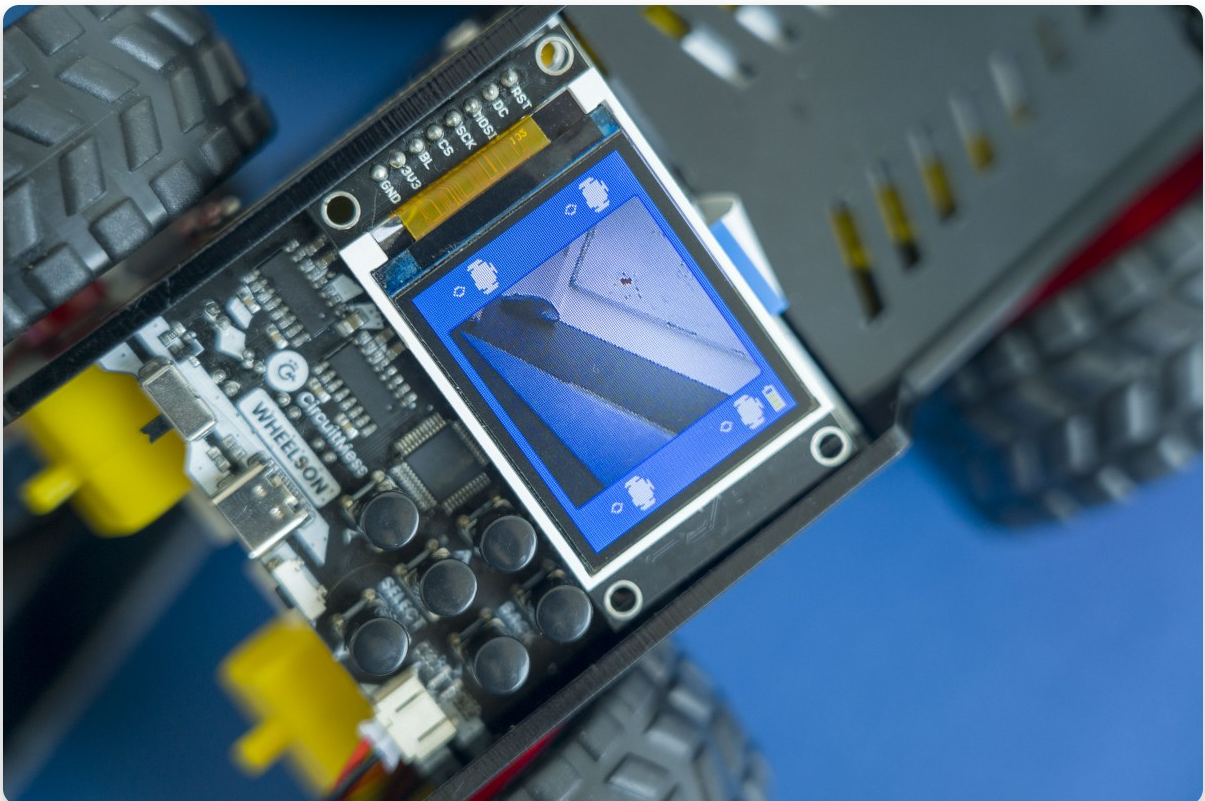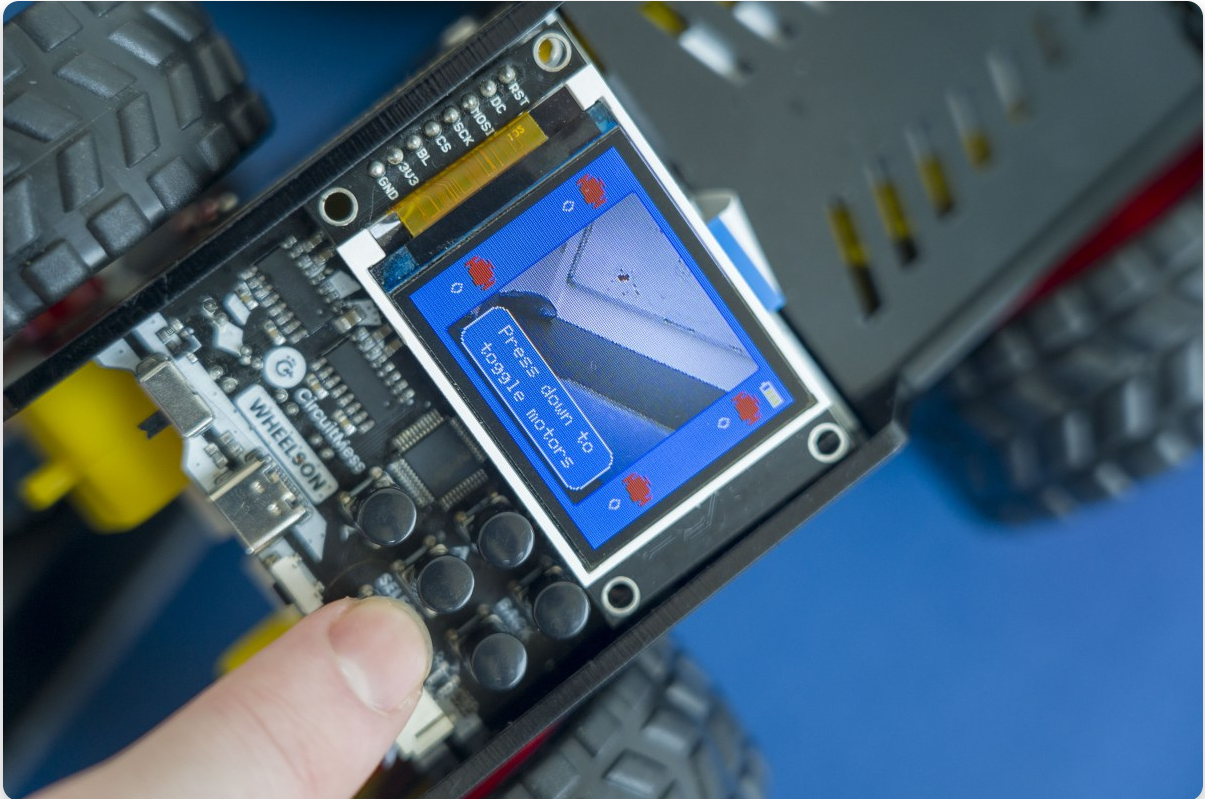

Make it stop - If you want Wheelson to stop, click the DOWN button again and you should see that Wheelson's motor icons turn back to red and he stops moving!

See what Wheelson sees - Another cool feature can be activated by pressing the SELECT button. once pressed, you'll notice that the screen turns black and white. This is what Wheelson actually sees.
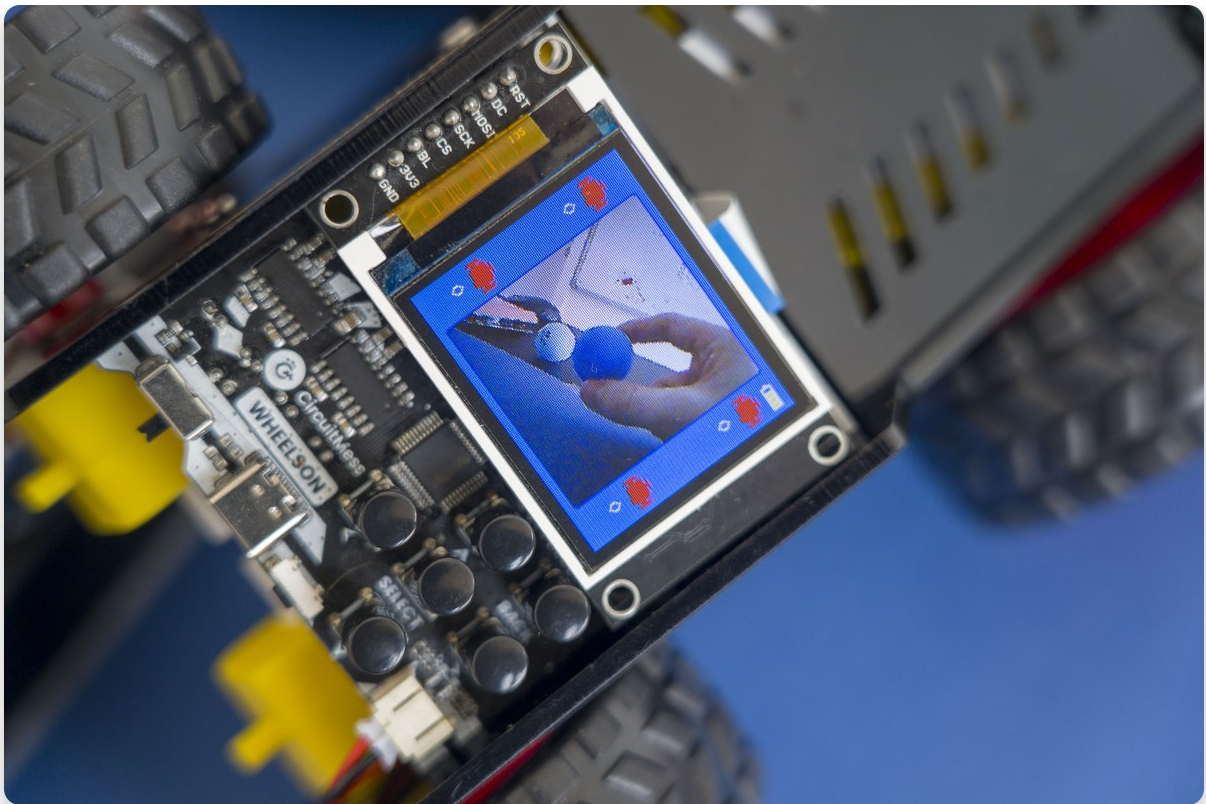
The BLACK pixels are all irrelevant stuff that Wheelson doesn't need to worry about however you'll notice that the WHITE pixels also align with the ball we placed in front of it, this is because Wheelson is searching for everything that is a specific colour, in our case it's blue but we will cover how to change that in the next section!

You will also notice that Wheelson is starting to draw circles around groups of white pixels. This is him trying to comprehend and understand what is a ball and what is just some noise! Once he is confident that he has found the ball, the light blue circle will turn to a dark blue circle and he will begin to follow the ball (if his motors are activated of course!).
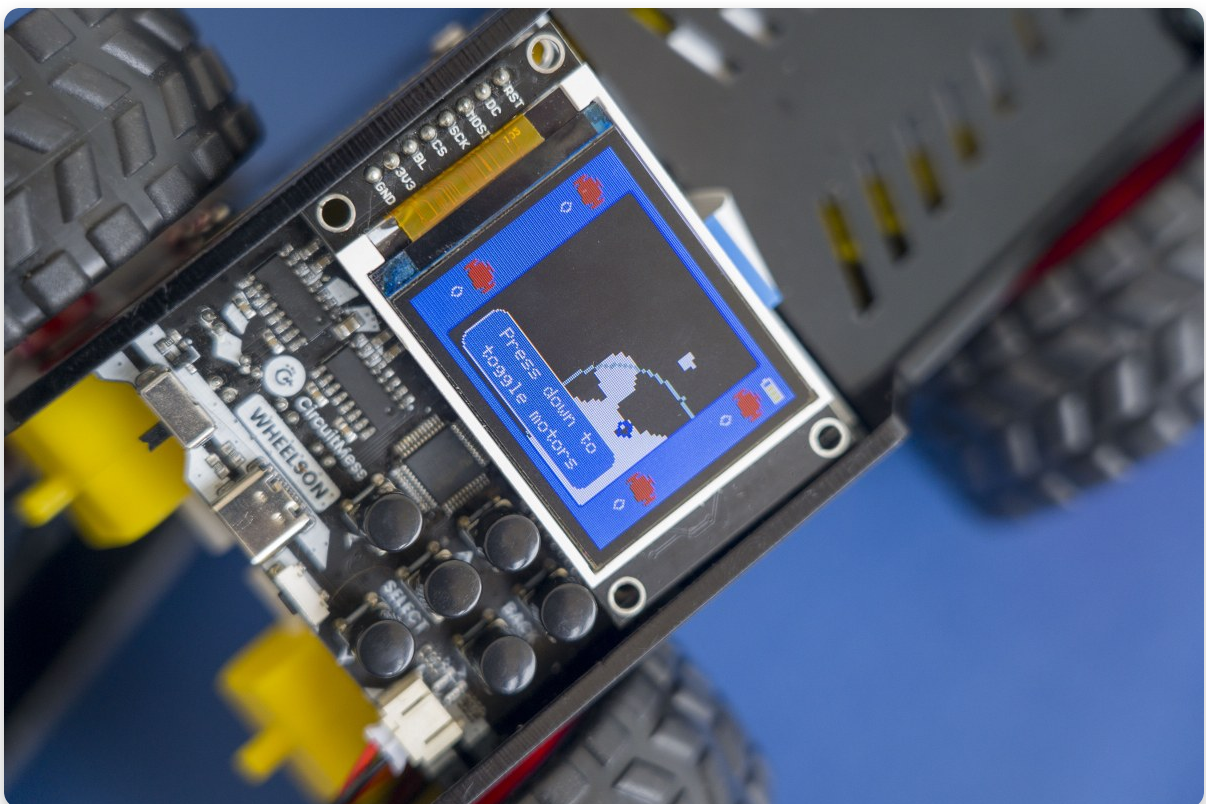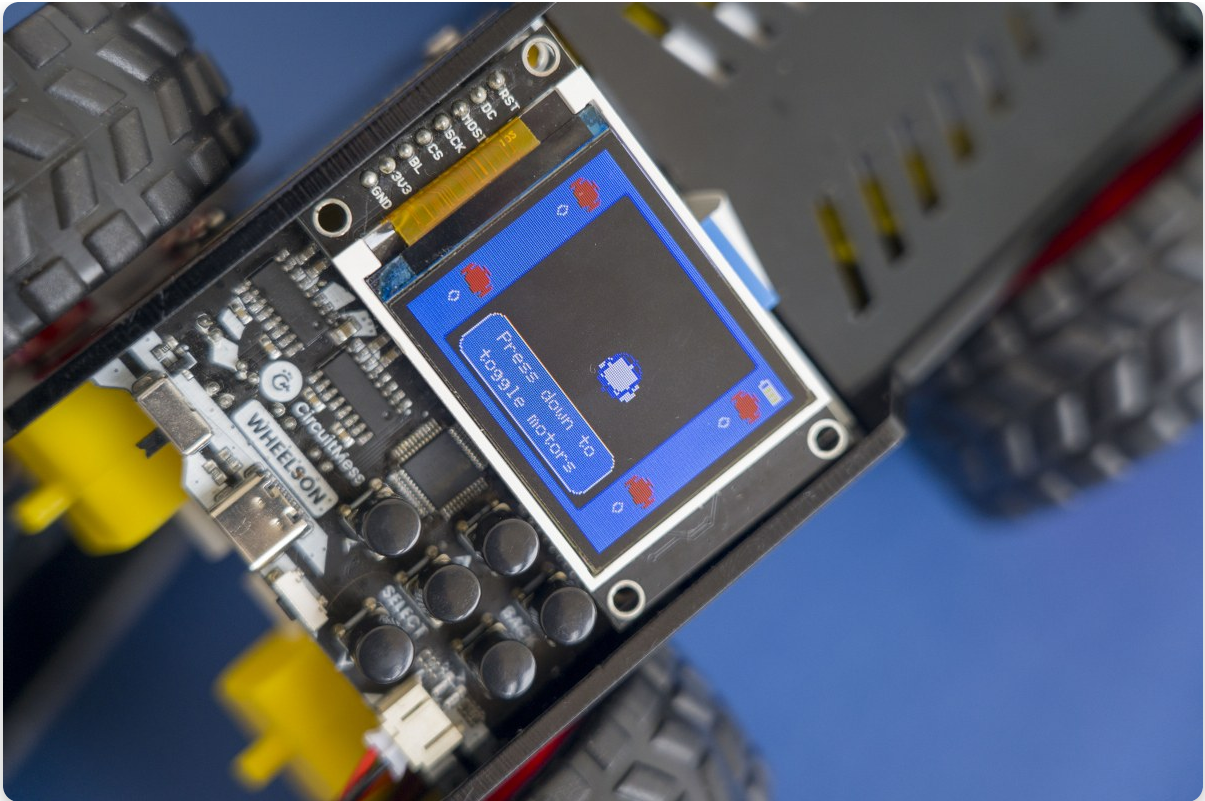
To exit out of the B&W mode, simply press the select button again.

Edit the ball colour- Using a green ball? Maybe a red ball? It doesn't matter, we can change the coloured ball Wheelson is searching for by using the left and right buttons. The change is visible in the B&W mode, you'll notice that if we change the Ball Colour to green, the blue ball Wheelson was so confident about earlier doesn't even show up on the screen!
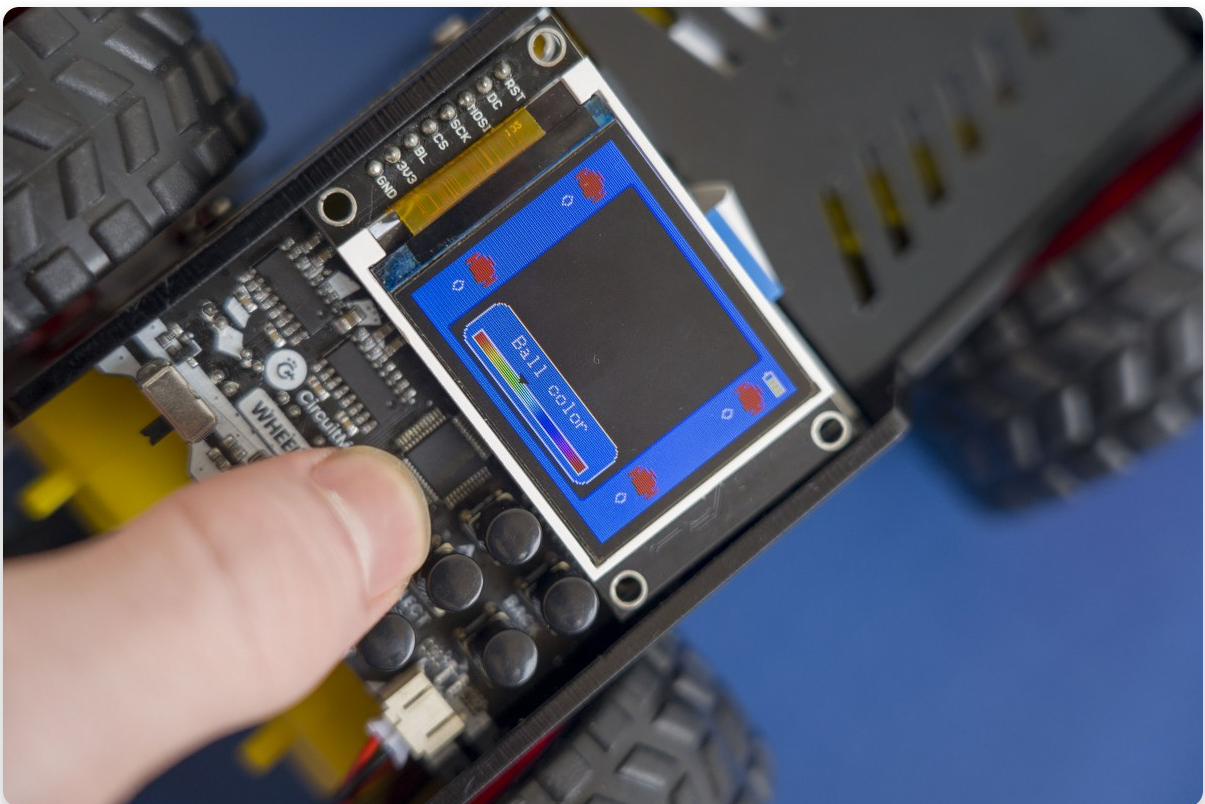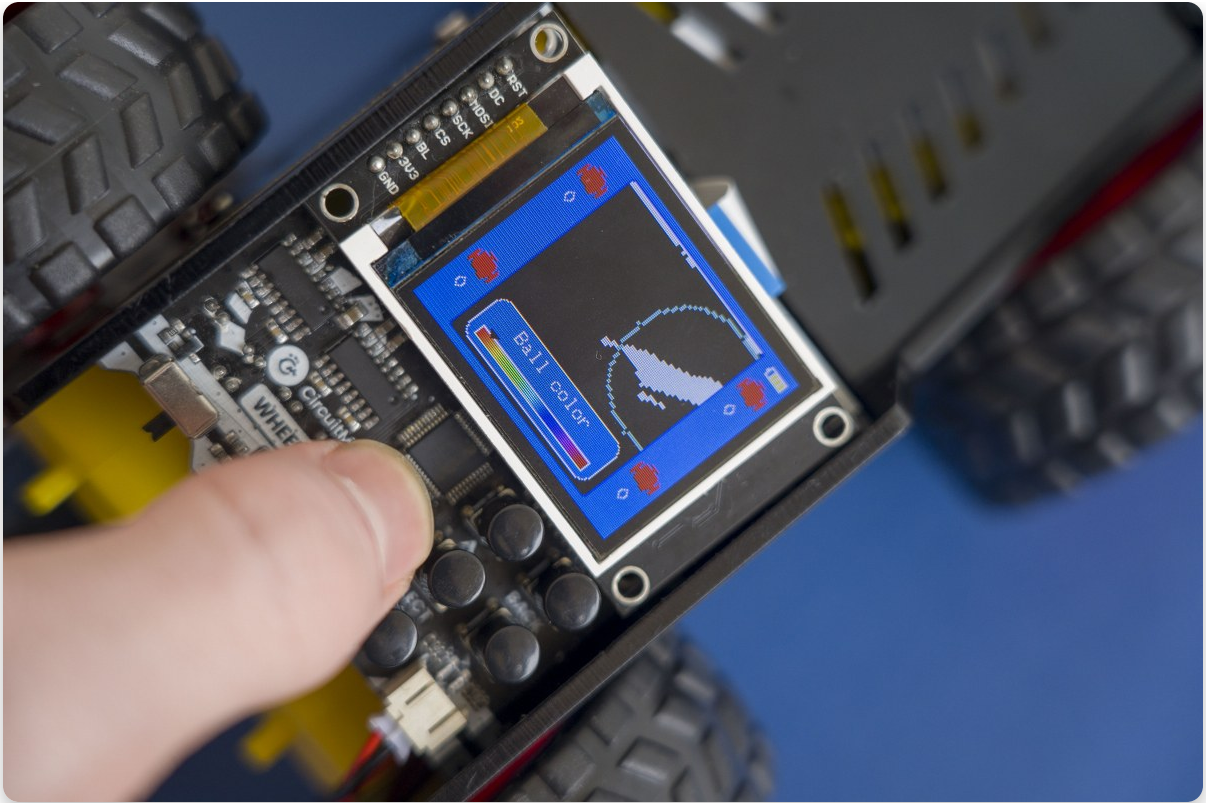
Ball-tastic! Mark this next one off your list. Ready to move onto some tracking?
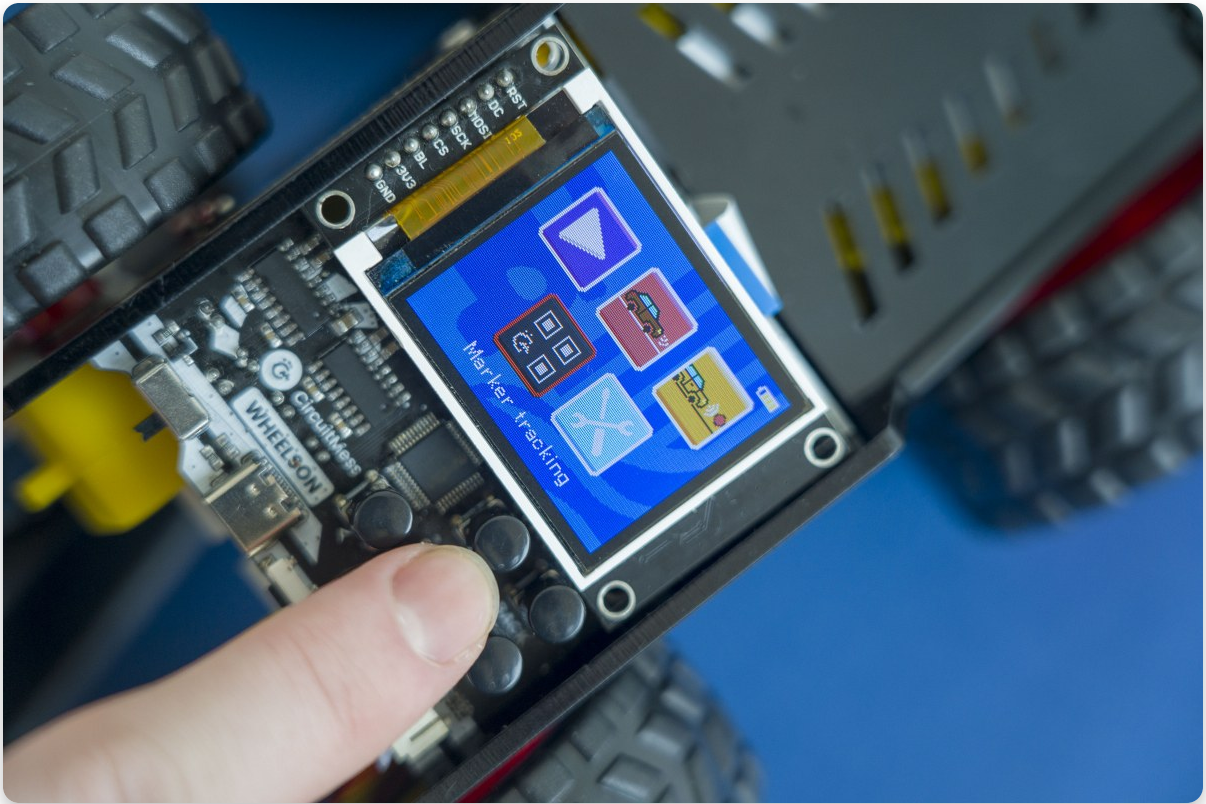
Marker tracking

Oh, hi Mark!

This is where you can make Wheelson complete various actions based on the **Marker tracking cards**

Let's go through what we will need and what we can do!

Select Marker Tracking in the menu

Navigate through the menu by using the directional buttons and select *Marker Tracking* by clicking on the middle, SELECT, button!
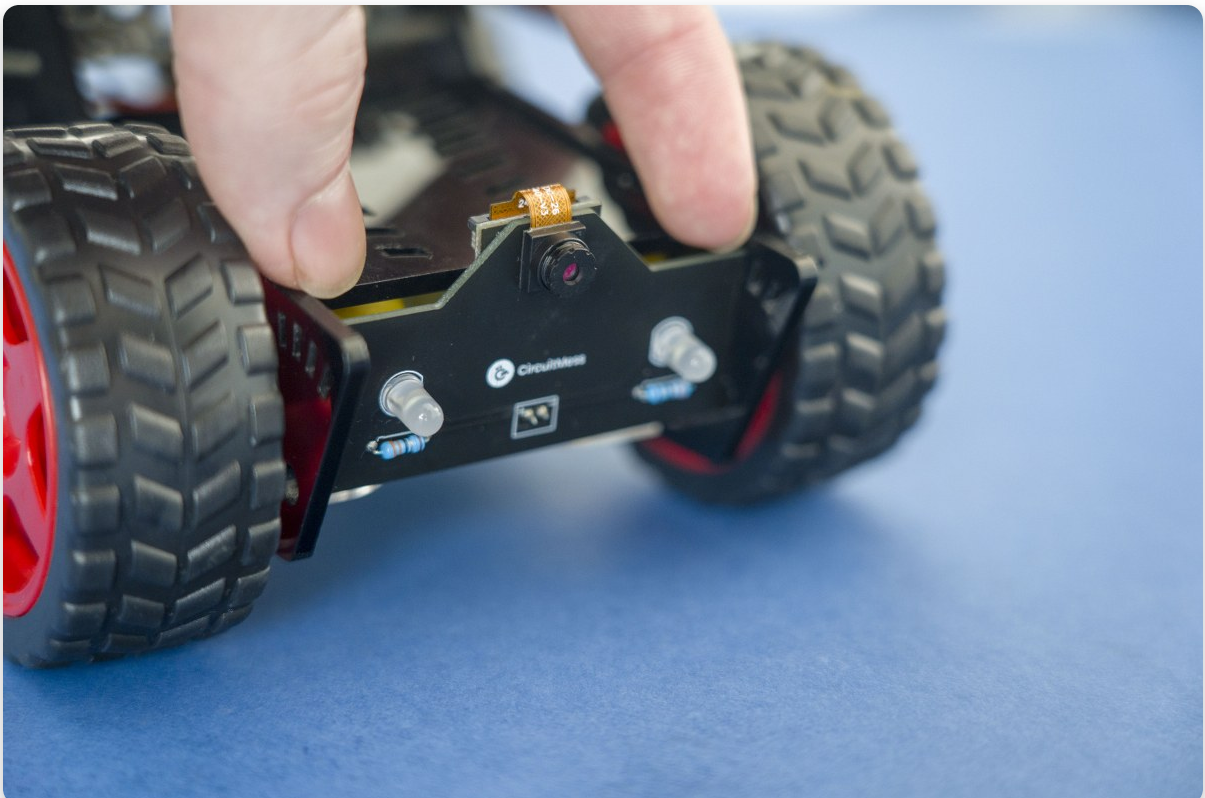
Move Wheelson's camera up

As the cards will be placed in front of Wheelson, we need to move Wheelsons camera into the forward-facing position, to do this:
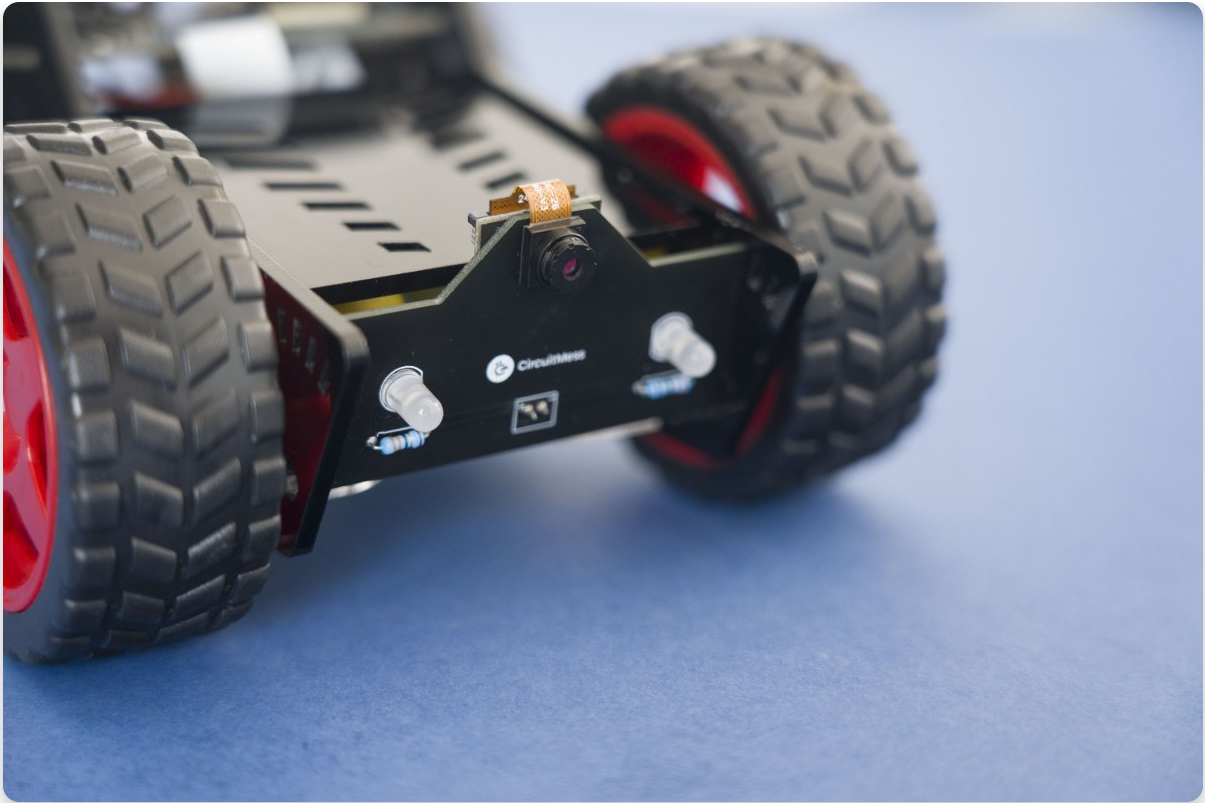
- Using two hands, push open the side panels so the Headlights + Camera panel pops out.

- Then move the Headlights + Camera panel into the forward-facing position with your hands, by slotting it into the top slot, as shown.

- Once in position, let the side panels close and secure the Headlights + Camera panel in place.

Now that the camera is in position, let's get tracking!

What you will also need!

Before we can follow a tracking card, we need the cards! Go ahead and get Wheelson's tracking cards out of the box and place them next to you!


Let's get Marking!

On the Marker Tracking page you will see a few different things:

- A screen in the middle that shows a live feed of what Wheelson sees!
- 4 red motor icons, 2 on either side of the screen.

Activate Wheelsons motors - To make sure Wheelson doesn't just do a backflip as soon as he sees a tracking card, we turned the motors off when you enter the Marker Tracking mode. To toggle the motors on/off, simply click the DOWN button. As you'll see, the icons will turn to white, meaning they are active, and

Wheelson is prime to move around.
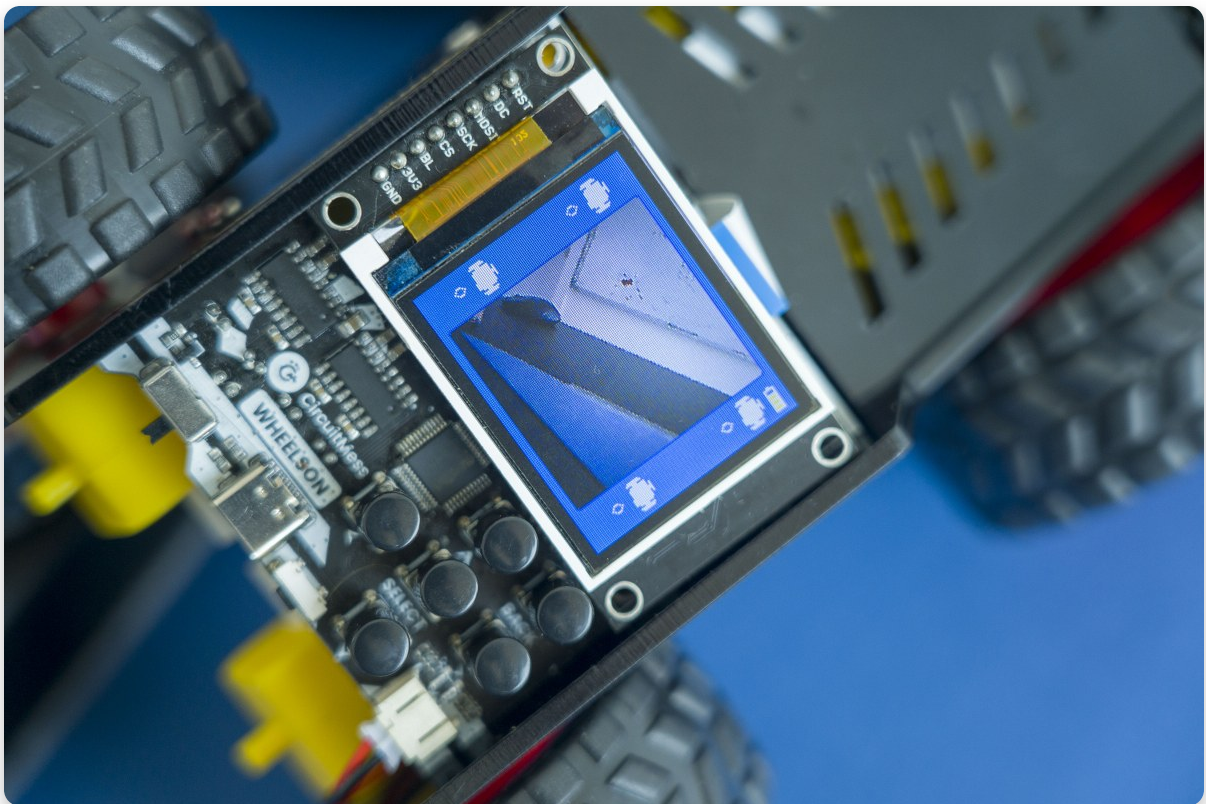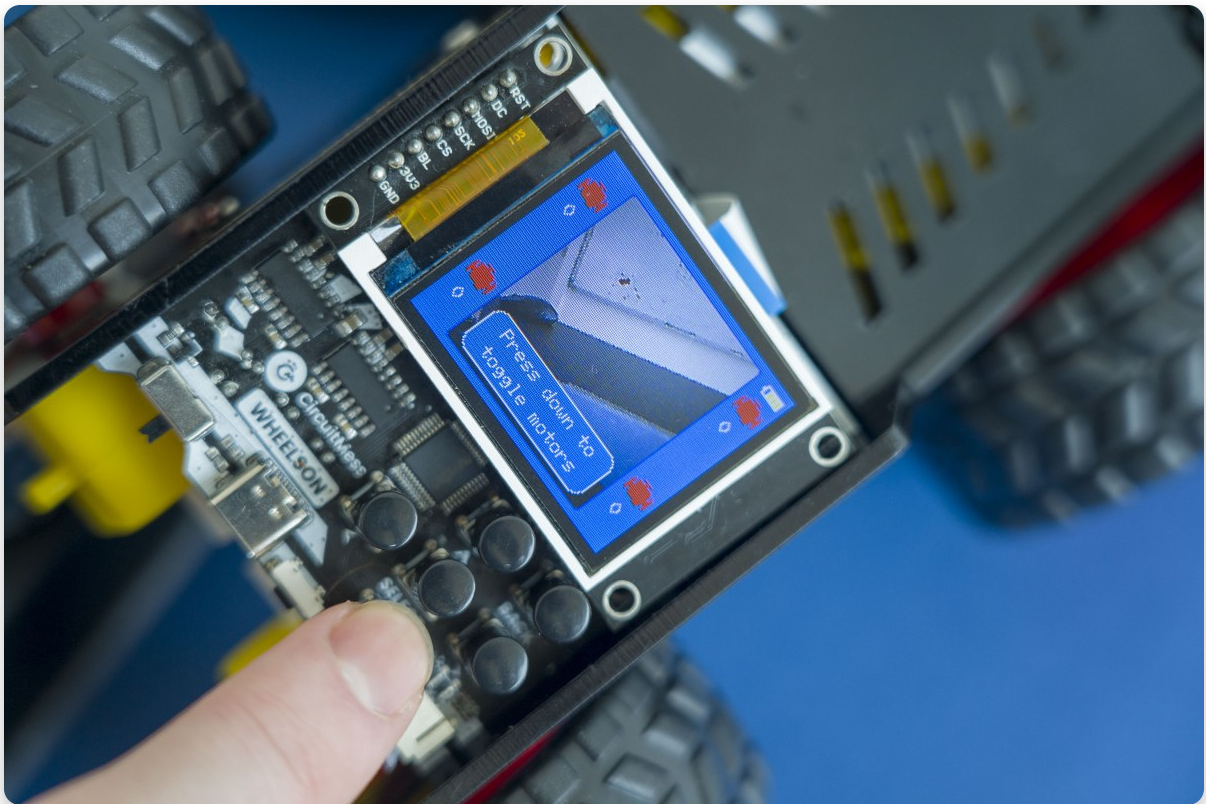
Make it stop - If you want Wheelson to stop, click the DOWN button again and you should see that Wheelson's motor icons turn back to red and his motors will be deactivated!

See what Wheelson sees - Another cool feature can be activated by pressing the SELECT button. once pressed, you'll notice that the screen turns black and white. This is what Wheelson actually sees.

To make it easier, Wheelson converts everything to black and white (the same colours as the cards). This means that when we place a card in front of him, its super easy for him to differentiate the patterns and detect which card is which.

You will also notice that Wheelson starts to draw squares around any potential card patterns. This is him trying to comprehend and differentiate the cards from background noise. Once he is confident that he has found the card, the blue box will turn yellow and the cards function will be written underneath in red.
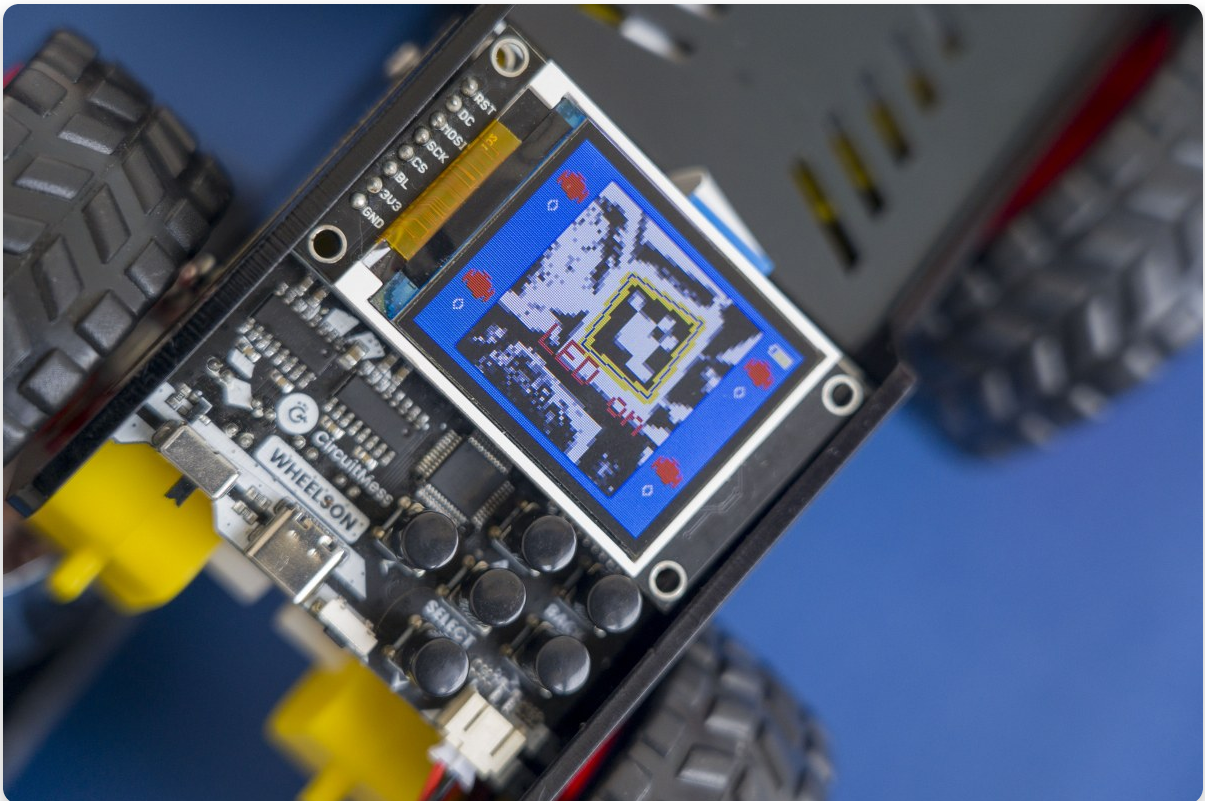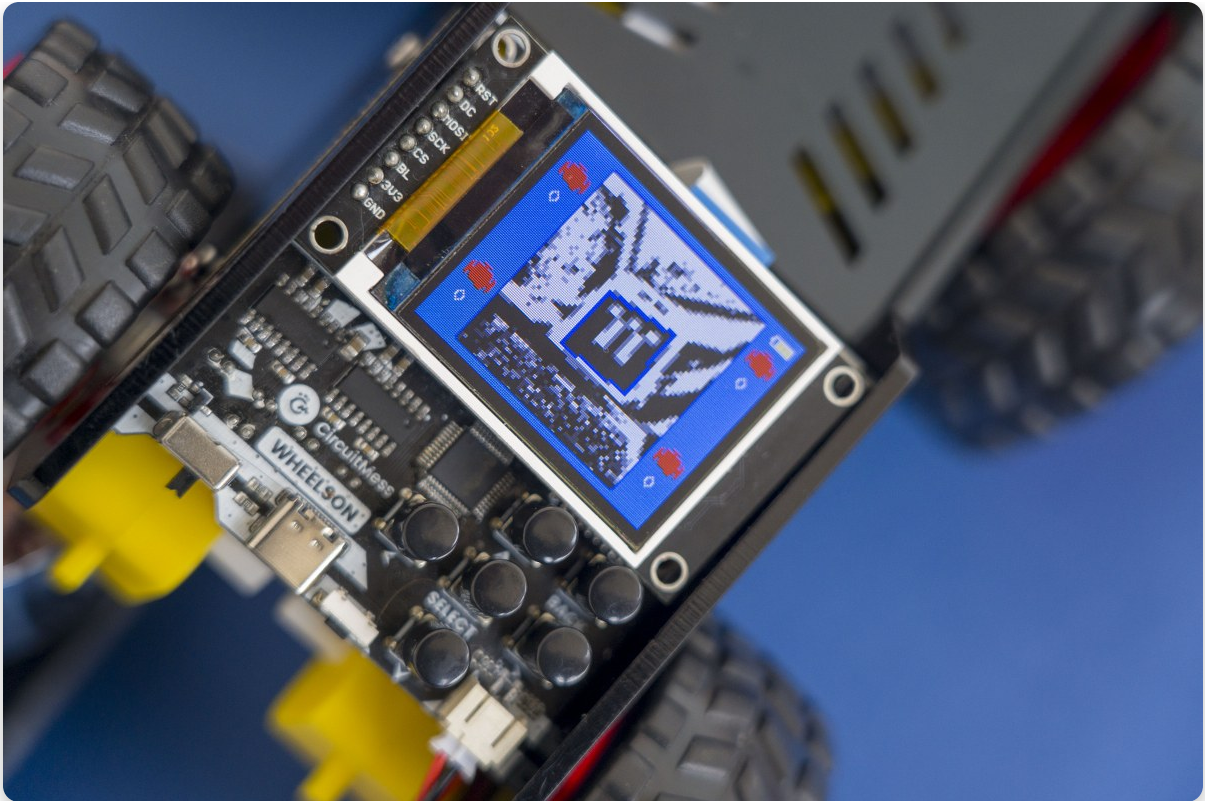
As you can see, we have placed the LED OFF card in front of him so he turned off his LEDS! Go ahead and try out some of the other cards to see what Wheelson will do!

*To exit out of the B&W mode, simply press the select button again.*

Special cards? What?

You get 12 cards with your Wheelson, 6 of those cards are clearly labelled with there functions:

- Backward - Moves Wheelson backwards
- Forward - Moves Wheelson forwards
- LED ON - Turns on Wheelsons headlights
- LED OFF - Turns off Wheelsons headlights
- Burnout - Wheelson will do a Burnout!
- 360 - Wheelson will turn 360 degrees!

Custom Cards

However, in that pack, there are also 6 special cards with different codes on them, e.g. 100, 305, 341 etc. These cards can be customized and programmed, using either Circuitblocks or Arduino, to tell Wheelson to do different actions.
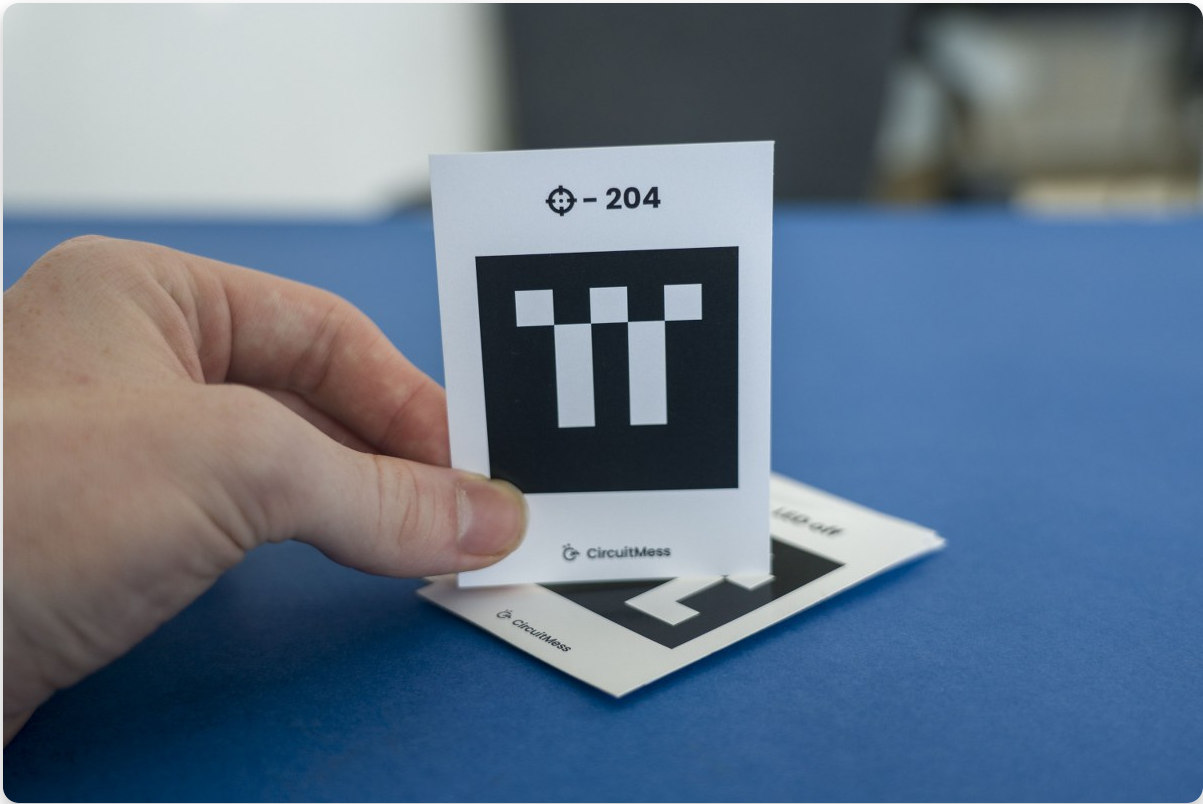
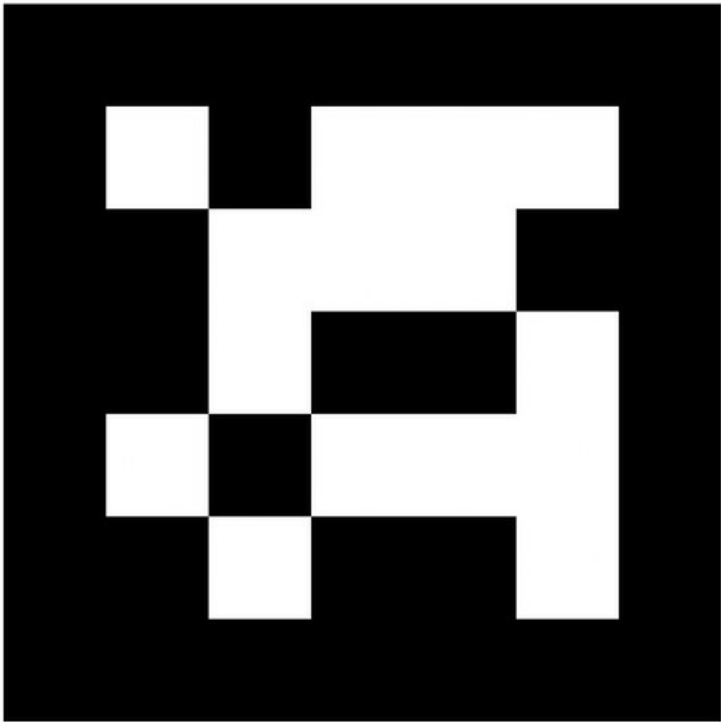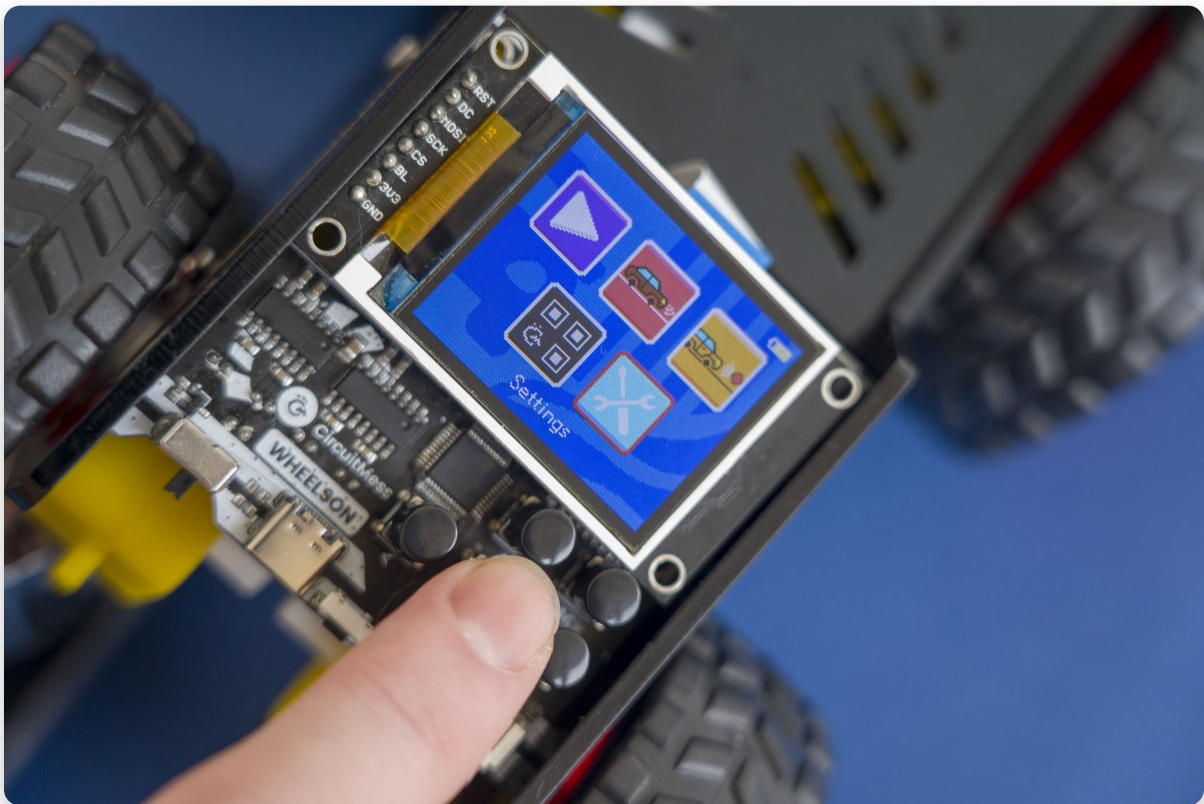**You can mark that off your list now! Ready to check out the settings page?**

Edit the settings

Let's get technical!

This is where you can edit some of Wheelsons settings!

Select Settings in the menu

Navigate through the menu by using the directional buttons and select *Settings* by clicking on the middle, SELECT, button!
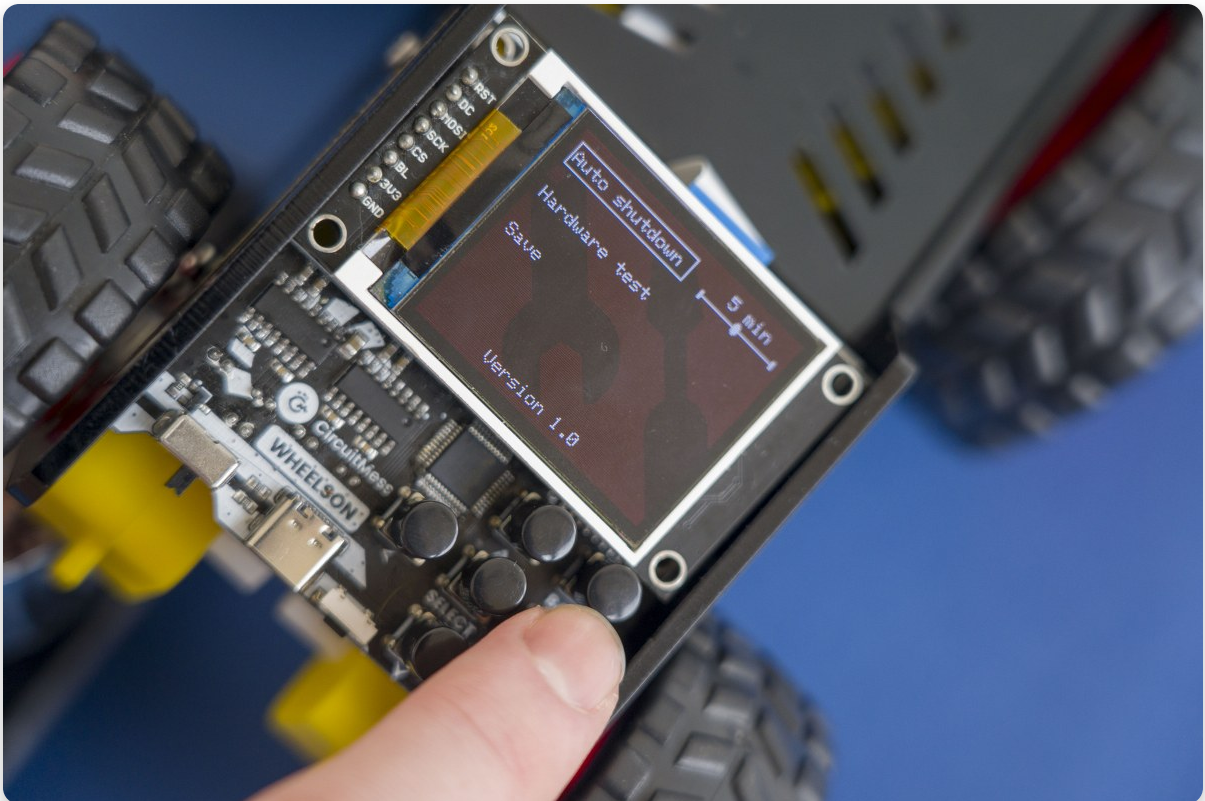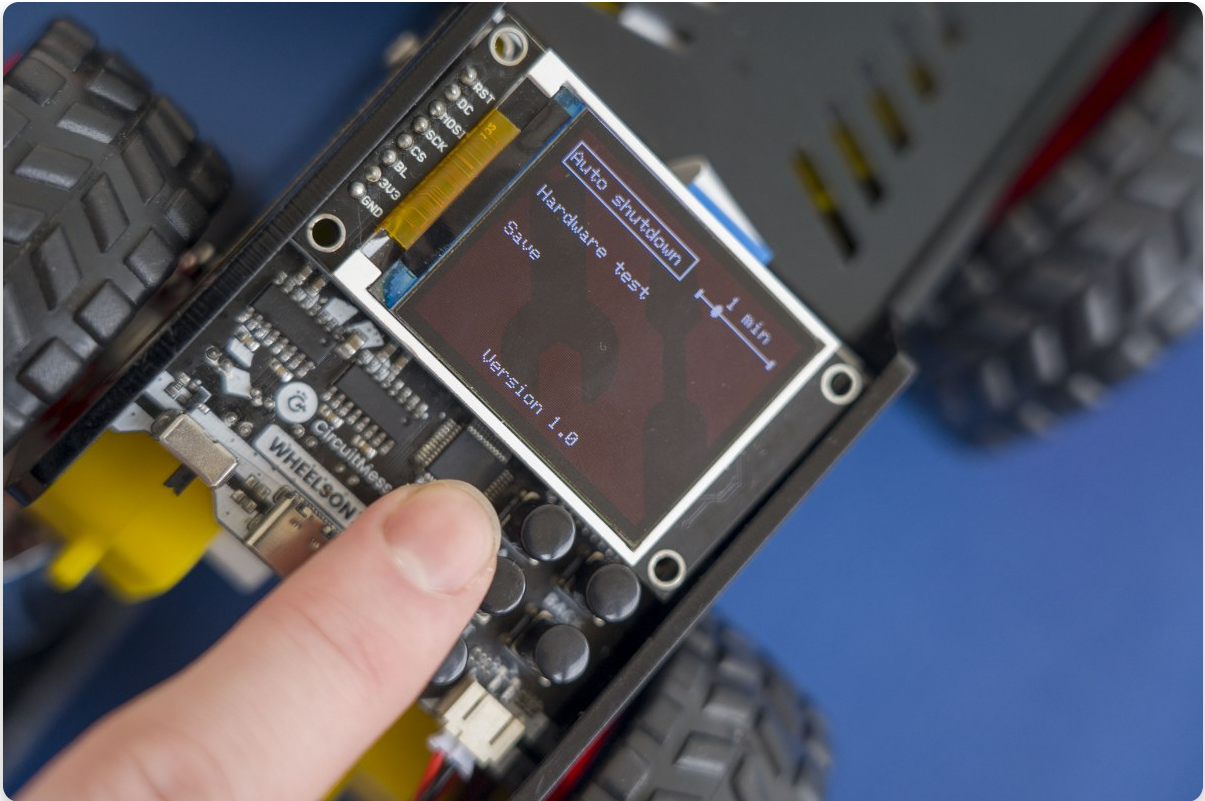

Let's get picky!

On the Settings page you will see a few different things:

- Auto Shutdown + a slider
- Hardware Test
- Save

Auto shutdown - To save on battery life, you can set Wheelson to auto shutdown after a certain period of time of inactivity, e.g. if you set it to 1 minute and you don't press any of the buttons for a whole minute, Wheelson will turn off!

Once he is OFF, to switch him back on you can either press the RESET button or turn the switch off and then back on.
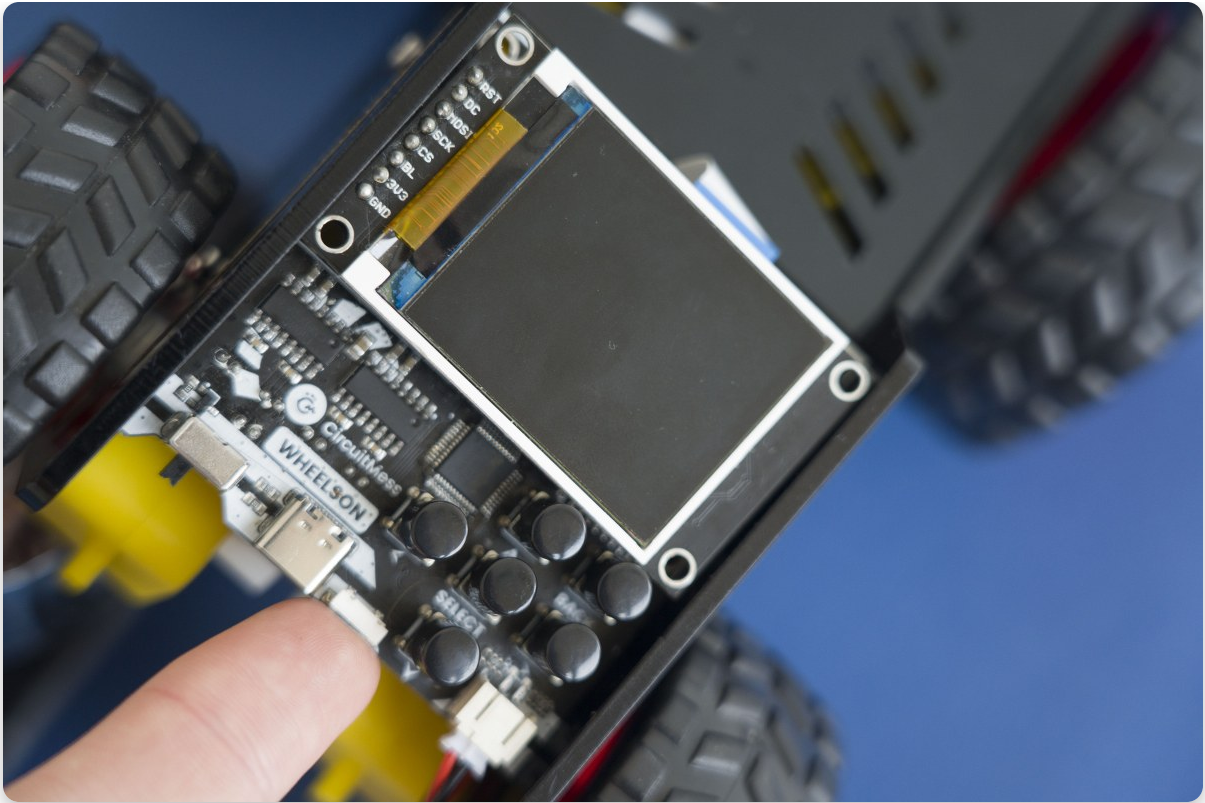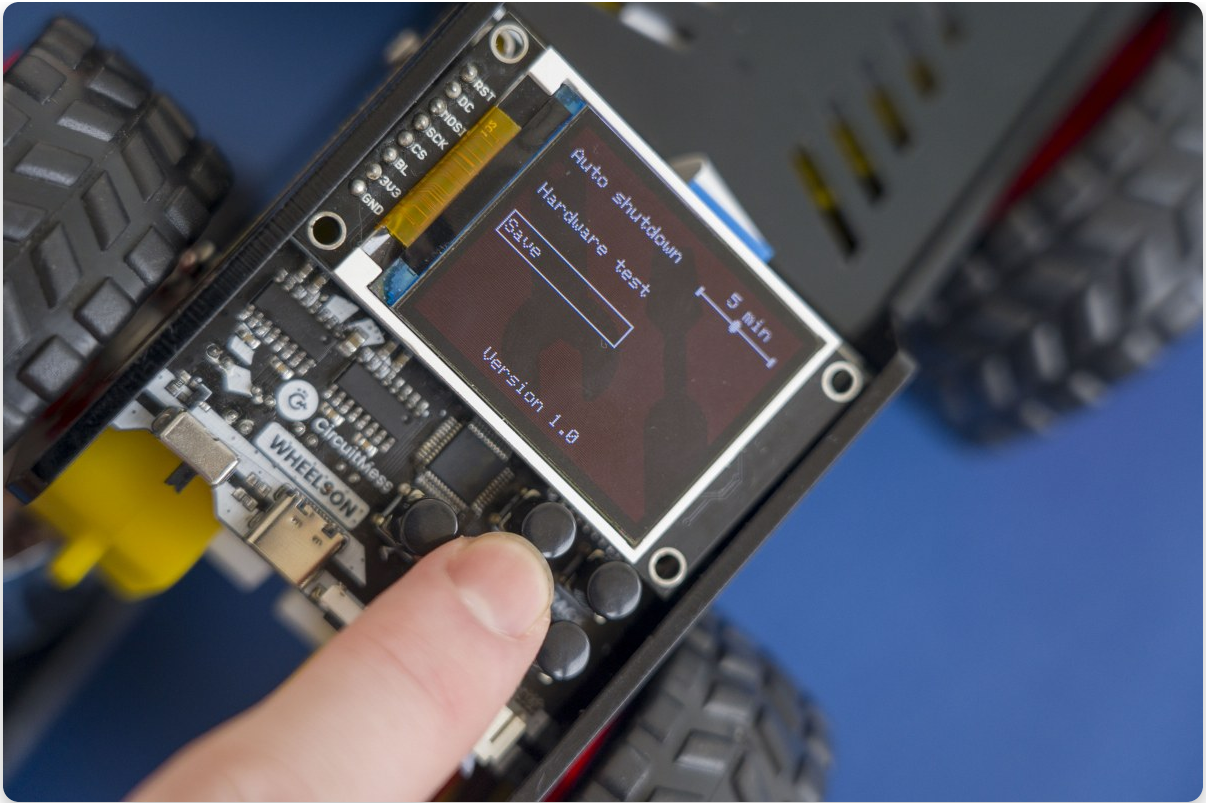
To adjust the inactivity time period simply hover over the Auto shutdown option in the menu and use the left and right buttons to increase or decrease the period of time!

Hardware test - You should be familiar with this as it popped up when you first opened your Wheelson! The only reason you may want to run the Hardware Test is if you discover a certain component doesn't seem to be working correctly, this will help you identify what exactly isn't working. There are instructions along the way so make sure to read and follow through!
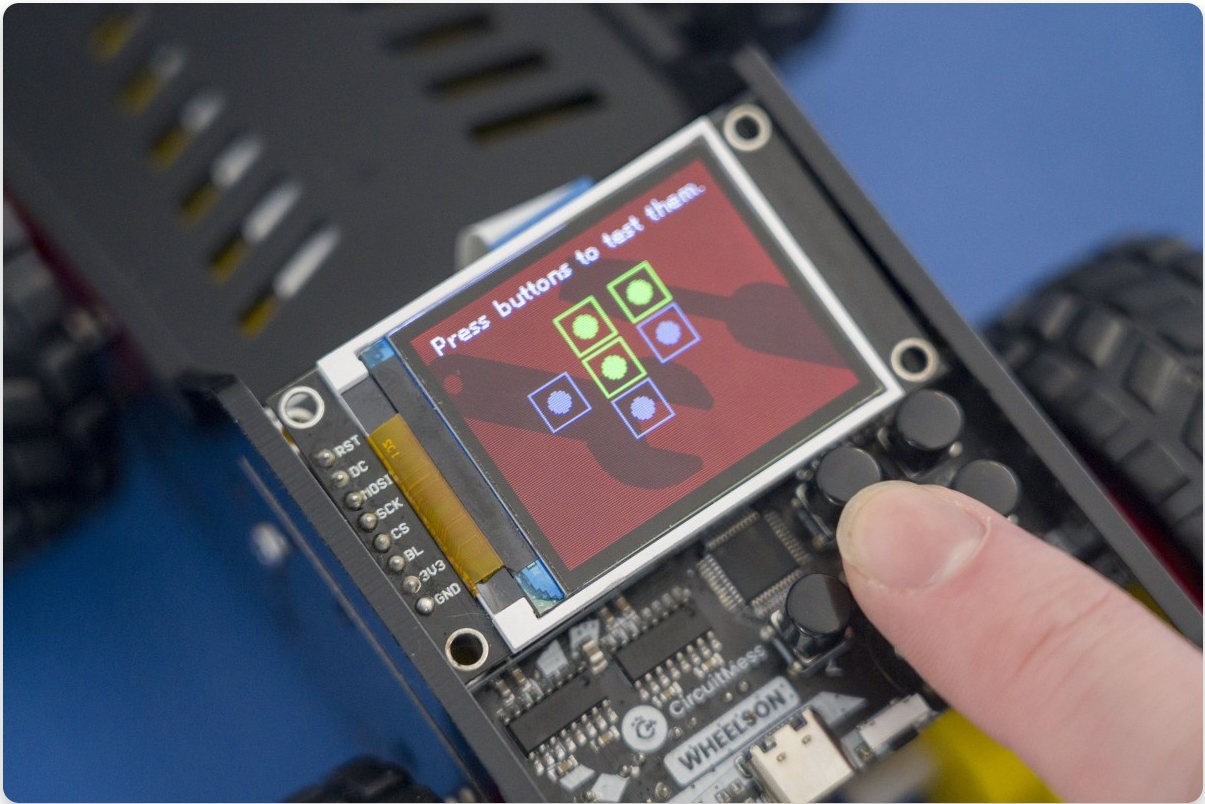
Save - Now that you've changed some settings, don't forget to click save!

That's all for today!