

B - Robot Police

Make a program using your Sparkle and buzzer modules, that turns your robot into a police robot to keep the planet safe.



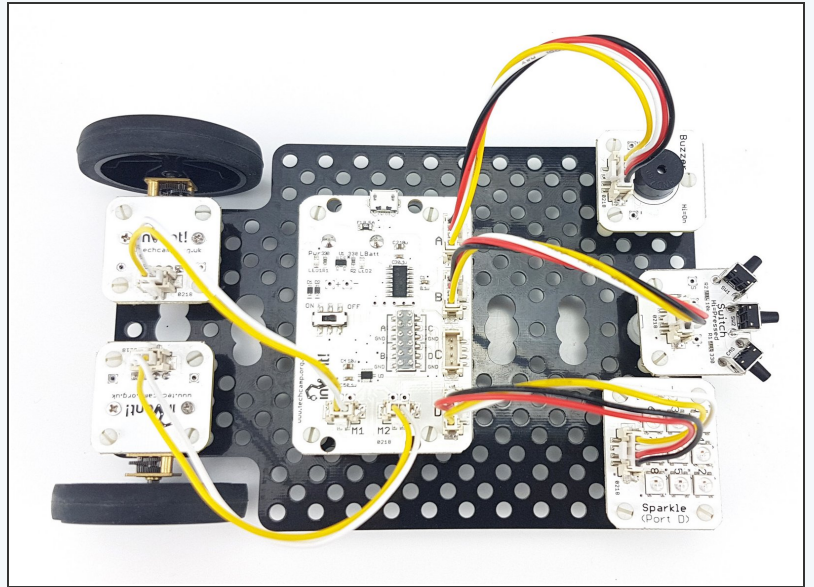
INTRODUCTION

Make a program using your Sparkle and buzzer modules, that turns your robot into a police robot to keep the planet safe.

Step 1

Assemble the Robot

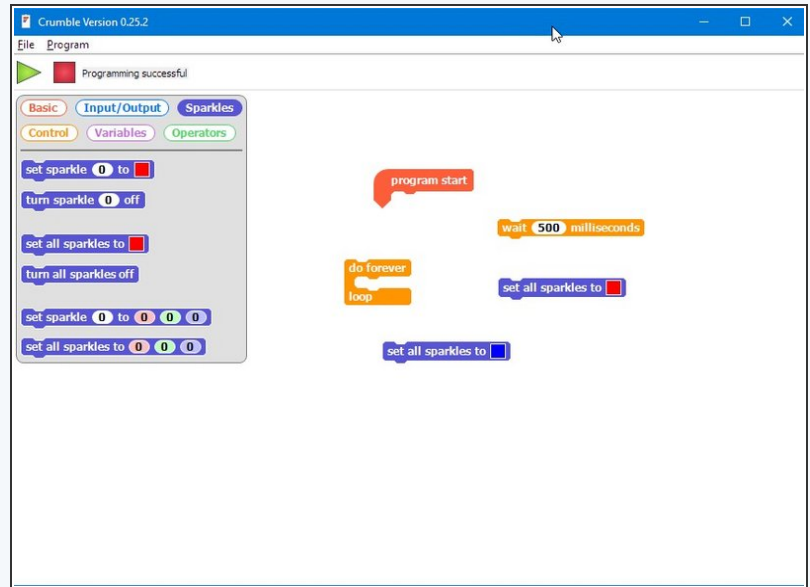
- We're going to be using a **lot of modules** to turn our robot into a police car!
- **Carefully** assemble your robot like the picture. The connections should be:
 - Buzzer > **A**
 - Switch > **B**
 - Sparkles > **D**
 - Left Motor > **M1**
 - Right Motor > **M2**
- Put the **trackball** under the switch module again.



Step 2

Reds and Blues

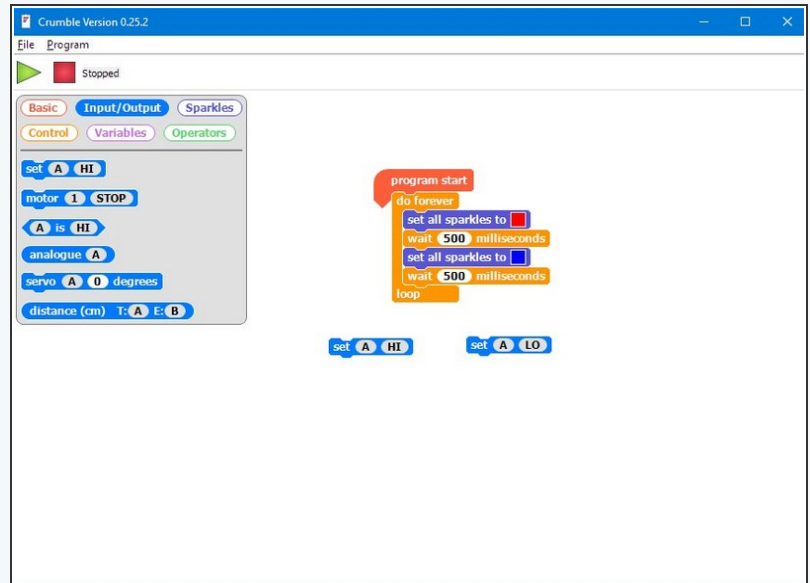
- Now we know how to use the **sparkle module**, let's start by programming all the sparkles to **flash red and blue** like a police car.
- Your program should:
 - Turn all sparkles **red**
 - Wait **half a second**
 - Turn all sparkles **blue**
 - Wait **half a second**
 - **Repeat** this forever!
- Make sure to **test your program** works - there are some **hints** about the blocks you will need in the picture if you need help.



Step 3

Add the Siren

- Let's add the **buzzer** to the flashing lights to make a **siren!**
- **Add some blocks** to your program so the buzzer is:
 - **Buzzing** when the sparkles are **red**
 - **Off** when the sparkles are **blue**
- Again, there are some **hints** in the picture if you can't remember which blocks to use.

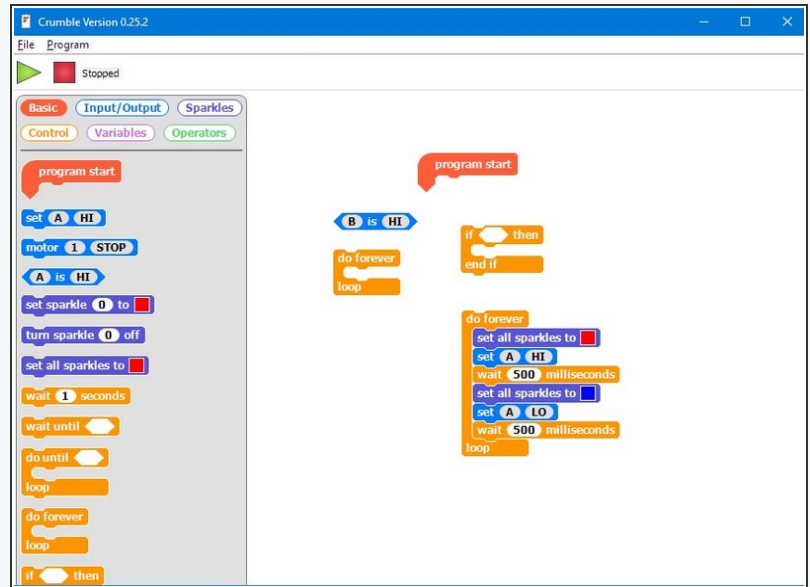


Step 4

Switch Activation

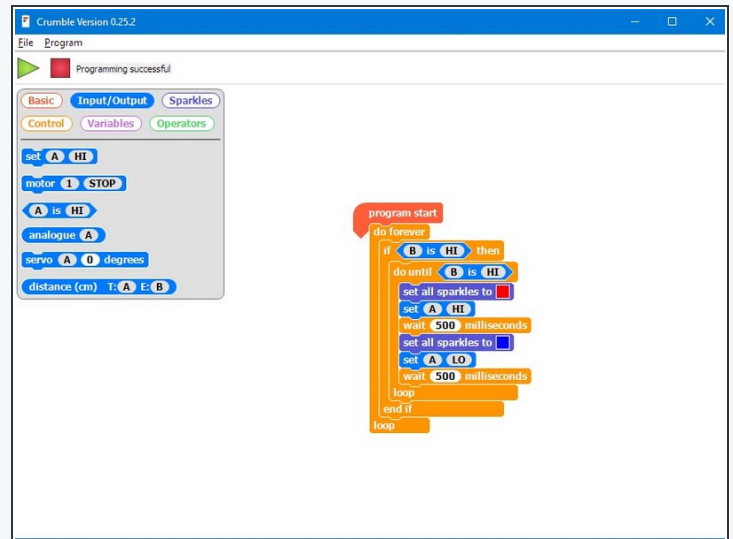
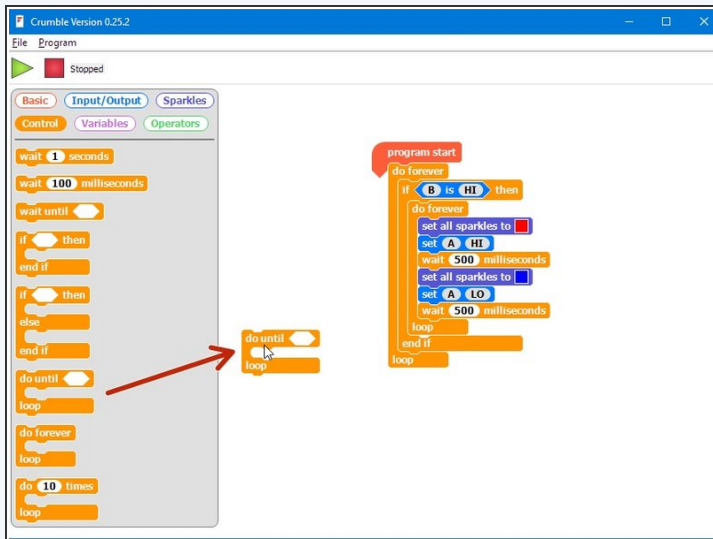
- Police cars don't have their lights and sirens on **all the time**, that would be very irritating!
- Let's **add a switch** so the police robot only flashes and buzzes when we **press** it.
- Add an **IF block** that checks if the **switch** is pressed, and **move** your do forever loop inside the IF block so it is run **only when the switch is pressed**.

⚠ Don't forget, you will need to **put everything inside another do forever loop** so the switch isn't just checked once!



Step 5

Switch De-activation

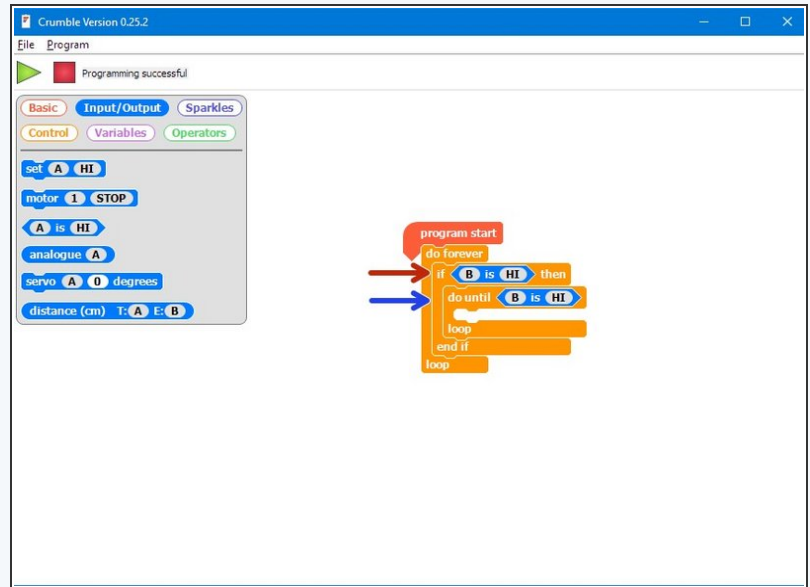


- Now we can **activate** the police robot with the switch, but we can't **turn it off** again!
- We need to change the do forever loop to another type of loop - the **do until loop**.
- The do until loop has a **condition**, just like the IF block - the loop will repeat but **only until the condition is true!**
- **Drag one in** from the control menu and update your code to look like the picture.
- **Test it out** - does it work as expected?

Step 6

Waiting for Switches

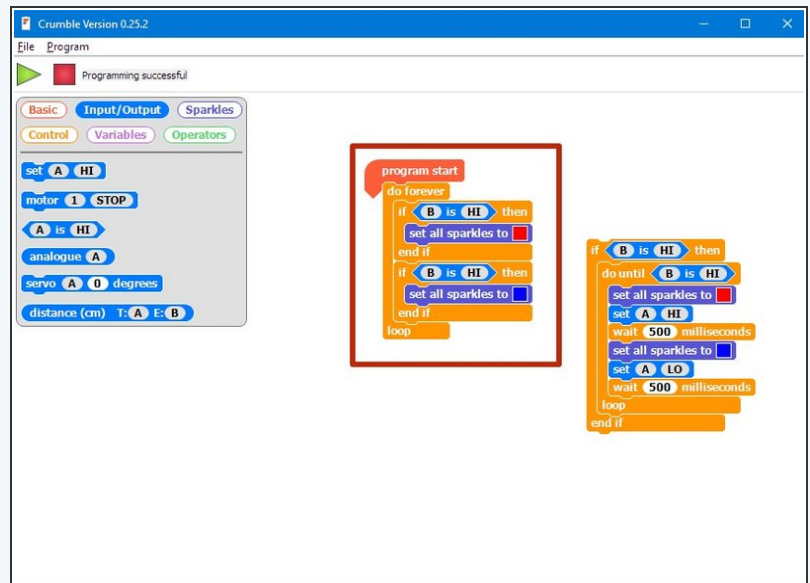
- You might find it **doesn't work very well**, and it sometimes **takes a few attempts** to turn the lights on or off.
- Our problem is that the robot runs the program **very, very fast!**
- Even if we just tap the switch, the robot thinks so quickly it thinks we are **holding it down**.
- Look at the simplified version of the code in the picture:
 - As soon as we press the switch, the **conclusion** of the if block is run
 - The robot **checks** the condition of the do until loop **before we can possibly have time to take our finger off the switch**, so the loop stops and the program goes back to the red arrow
 - This can happen **many times** before we have released the switch, so we have **no idea** whether the lights will be running or not!



Step 7

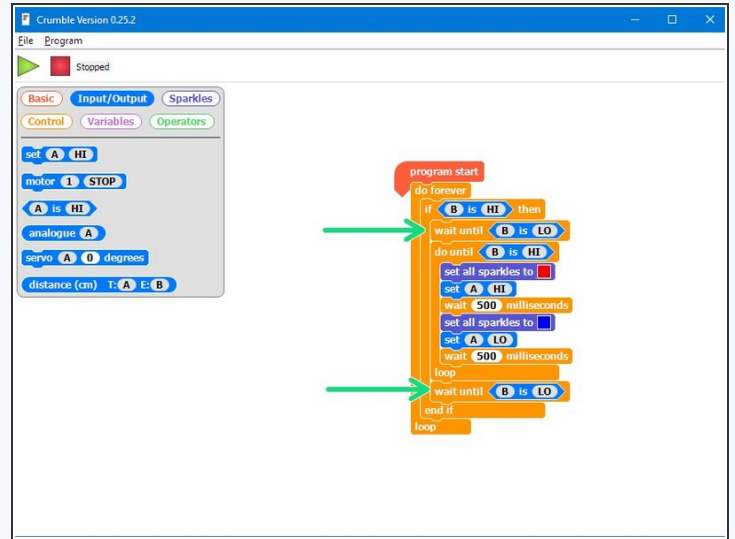
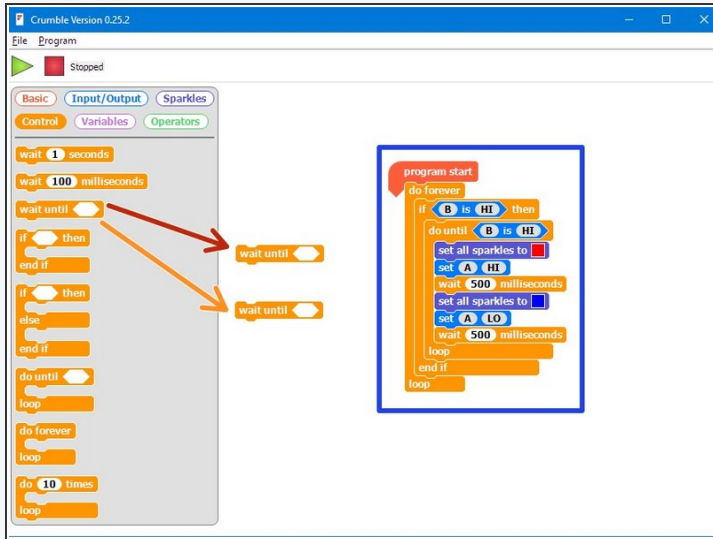
Waiting for Switches

- This can be **hard to understand!** Let's make another short program to understand this problem with **an example**.
- Drag** your police program to the side (**don't delete it!**) and build the program in the picture.
- This program turns the sparkles red if we press the switch, then blue if we press it again - **test it out!**
- It is **impossible** to accurately make the sparkles red or blue, as the robot is too fast - we need to make it **wait for us to let go of the switch** to fix this.



Step 8

Wait Until

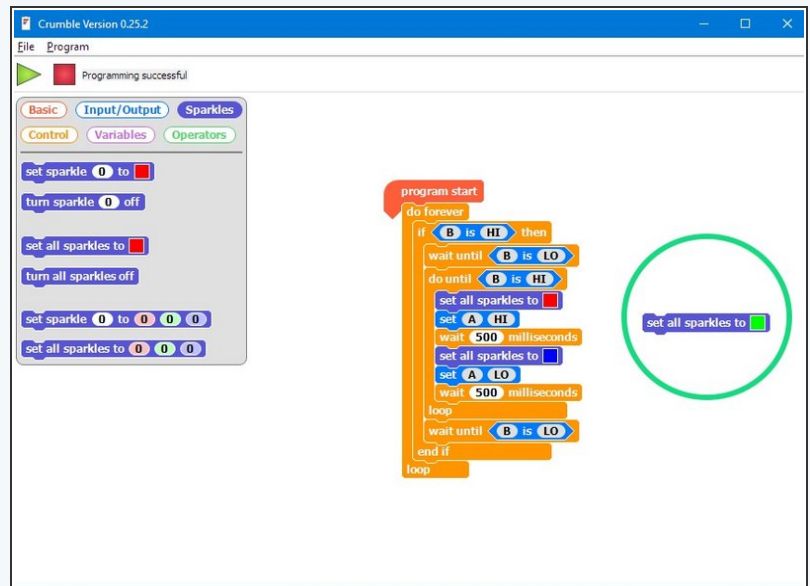


- Luckily there is a block that lets us do just that - **wait until**.
- This block also has a condition, and will simply **wait until the condition is true!**
- **Delete** the example program you just made and **put the police program back**.
- Drag **two wait until** blocks from the **control menu**.
- **Add them to your program** like the second picture - can you **guess** what they will do?
- **Test** out the program and **make sure you understand it before moving on**.

Step 9

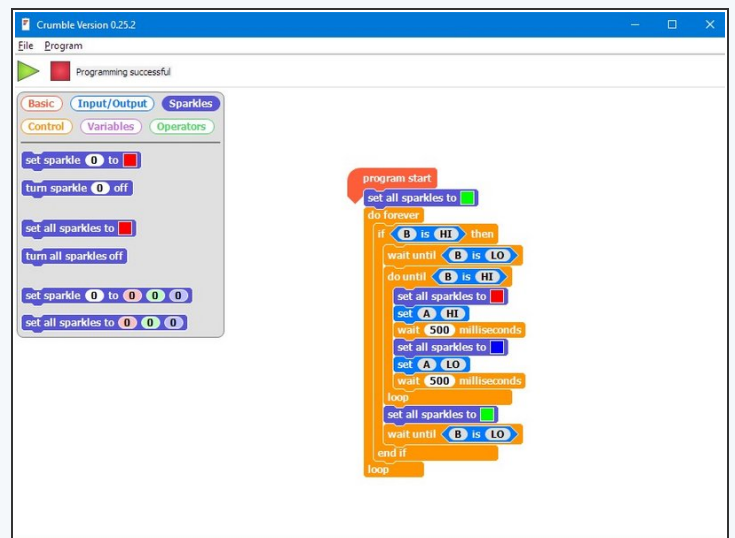
Business as Usual

- You may have noticed that the sparkles **stay blue** after we turn off the police lights and siren - let's change them so they are **green**!
- Add some more sparkle blocks so that:
 - The sparkles are set to **green** at the start
 - They are **reset** to green **after the end of the do until loop**.



Step 10

Chase the Criminals



- The final part of our police program is to make the robot **chase** after our criminal!
- **Check the picture** for what your code should look like so far.
- **Add some blocks** to make your robot **drive forwards** at **full speed** when the switch is pressed and the sparkles are flashing, then **stop** when it is pressed again.

Step 11

Improve your Police Program

- For this extension challenge, you need to complete a few tasks:
- **Change the buzzer blocks** so that your buzzer beeps **faster than the sparkles change** to make it sound more realistic.
- When your robot is chasing the criminal, make it **turn left and right** in a **weaving motion** instead of just moving forwards.

Extension Challenge! 