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D - Change the Speed

What if we want to change the speed our robot is following the line, without stopping it and reprogramming? Let's use variables and switches to do this.

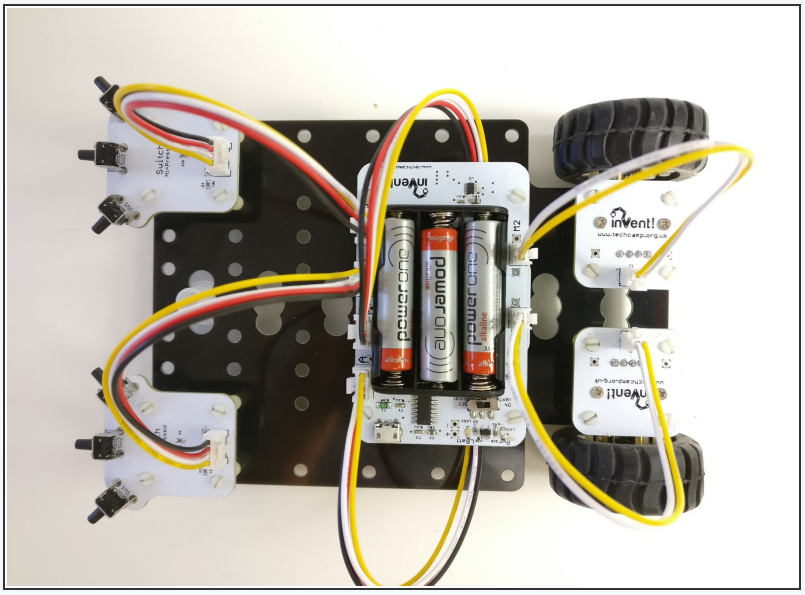
INTRODUCTION

What if we want to change the speed our robot is following the line, without stopping it and reprogramming? Let's use variables and switches to do this.

Step 1

Add the Switches

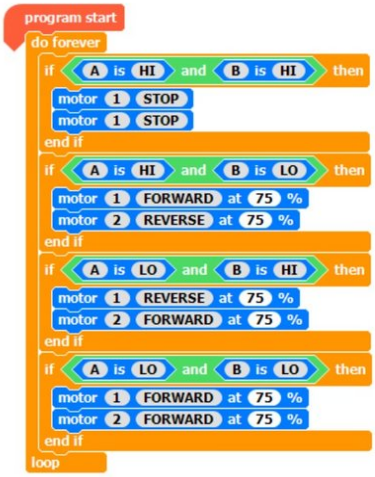
- We're going to need **two** switches - one to **increase** the speed, and one to **decrease** the speed.
- Add the **two switch modules** to your robot, and plug them into **C** and **D.**



Step 2

Two Sensor Follower Program

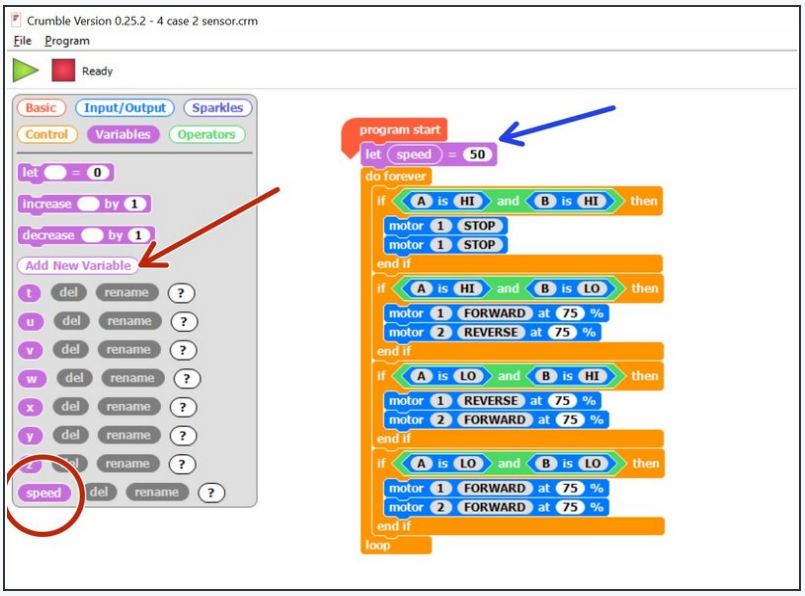
- **Load** your two sensor line follower program from the last lesson.
- **Remove** all the Sparkle blocks - we **don't have space** to plug the Sparkles in anymore!
- Your program should look like the **picture** - your speeds and waits might be **different**, depending on what works best for you.



Step 3

Add a Variable

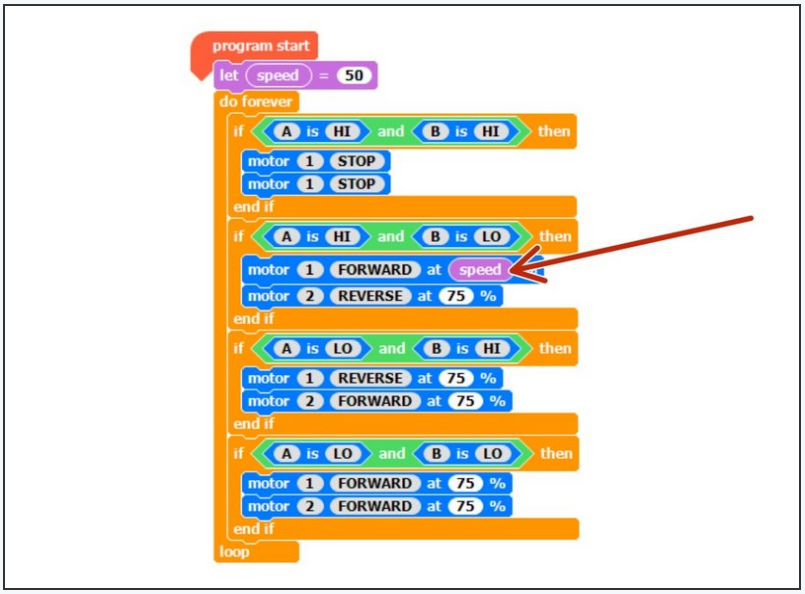
- Remember variables? Here's a quick **reminder** of what we can do with them:
  - **Call** them anything we like (variable **name**)
  - **Store** any number we like inside them (variable **contents**)
  - **Change** the contents at any time (add, subtract, multiply, divide and so on)
  - **Access** the contents at any time, so long as we know the **name** of the variable.
- **Add** a new variable called **speed**
- Right at the **start** of your program, **let speed = 50**



Step 4

Use the Variable

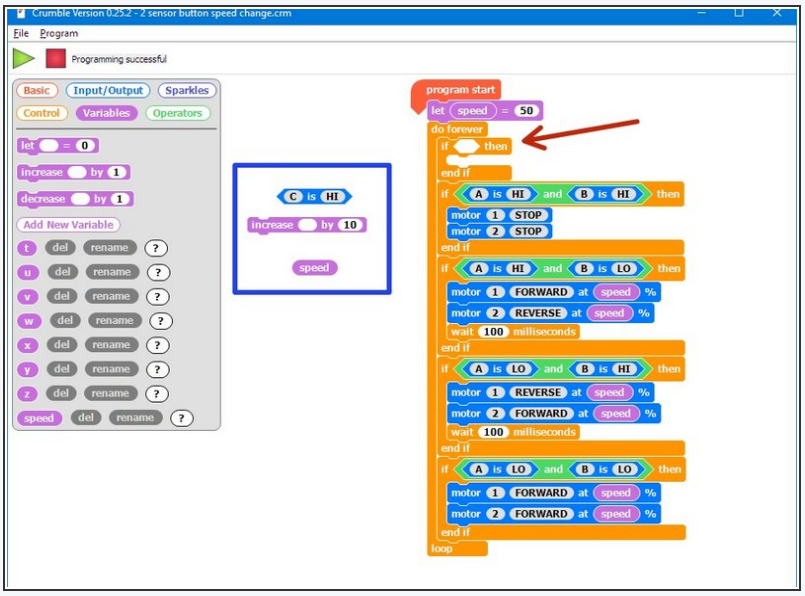
- Let's use the variable we have just created to **set the motor speeds!**
- **Replace** all the motor speeds in the motor blocks with the **speed variable.** We've done the first one for you!
- **Program** your robot and **test** to make sure it still works correctly. **What speed** will the motors be going at?



Step 5

Increase the speed

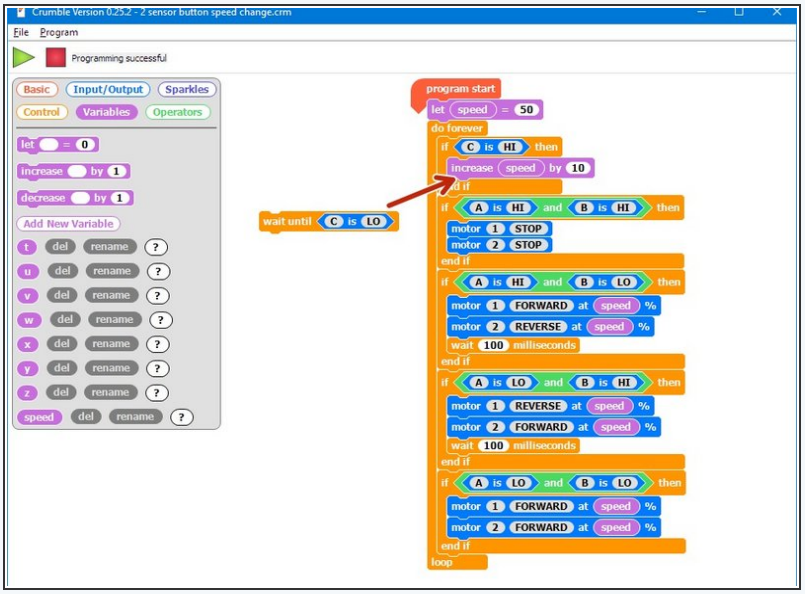
- Let's use the **first switch** connected to **C** to **increase** the speed.
- Add an **IF block** right at the top of the program to **check** the switch.
- If the switch is pressed, **increase speed by 10.**
- There are some **hint blocks** if you need them!
- **Test** out the program - can you work out **what is wrong?**



Step 6

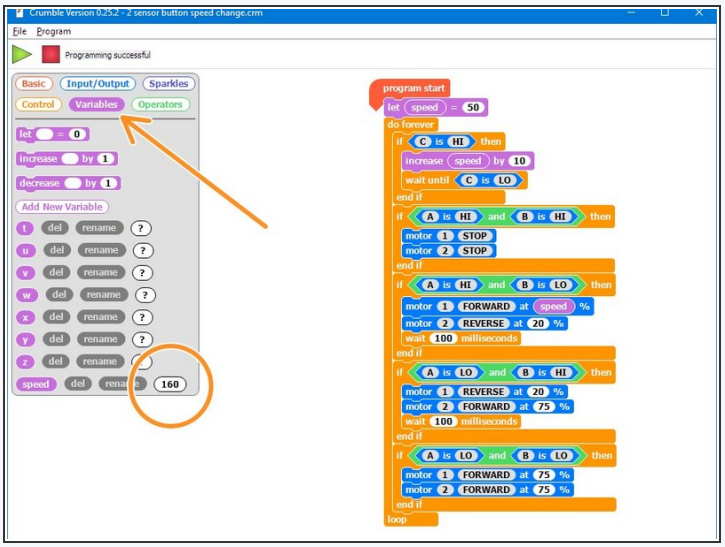
Wait Until

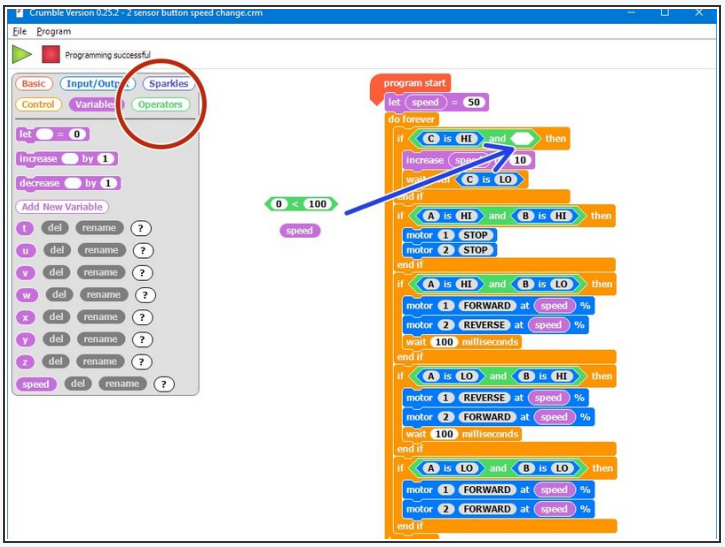
- Remember last time we used a switch to change something? We had to add something else so it didn't change **too fast!**
- We want to **wait until** the switch is not pressed anymore, so we only increase the speed **once** each time the switch is pressed.
- Add a **wait until** block **after** you increase speed by 10 to fix this.
- **Test it out** - make sure it works properly now!



Step 7

Limit the Speed

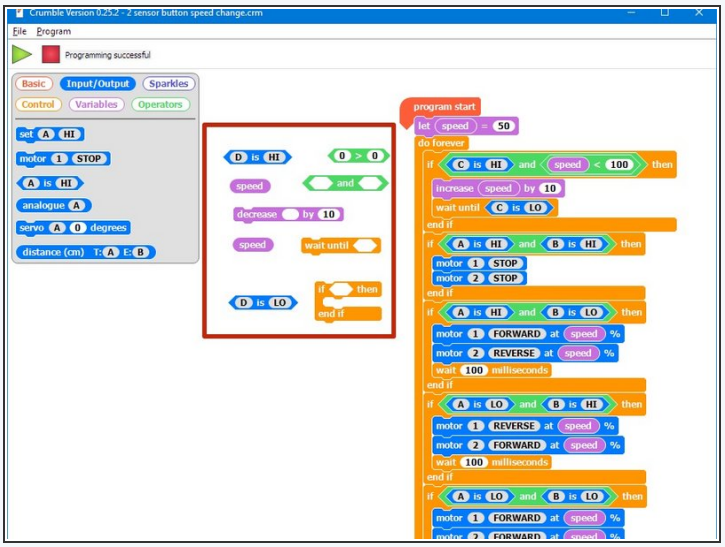




- You may have noticed that if you press the switch **lots** of times, **strange things** start to happen when the speed goes **over 100.**
- Program your robot and **keep it plugged in** - watch the value of speed on the **variables screen** and see what happens when it goes **over 100.**
- The motor blocks **cannot have a speed of over 100**, so we need to make sure **speed is never more than 100!**
- To do this, let's edit the IF block that checks the switch.
- Change the condition so that it checks if C is HI, **AND** speed is less than **(<)** 100.
- You can find the **less than** operator, < , in the **operators** menu. We've started it for you - **add** the rest of the blocks and **test it out!**

Step 8

Decrease the Speed



- Now its **up to you!**
- Add some more blocks to check the **other switch**, and **decrease** the speed by 10 each time it is pressed.
- This time, you will need to make sure that speed is only **decreased** if it is **more than 0.**
- We've given you all the blocks you need - just **put them in the right order!**

Step 9

One switch only!

- This is a **hard** extension challenge, so don't worry if you find it difficult!
- Can you change the code so only **one switch** is needed?
- The speed should **increase** with a **short** press, and **decrease** with a **long** press.

Step 10

Speed change with sparkles

- If you're feeling really clever, **add the Sparkle code back in** once you've got rid of one switch!
- For super advanced coders only - can you change the **brightness** of the Sparkles depending on the **speed of the robot?** For example, at **maximum speed (100)** they should be as **bright as possible**, and at **0** speed they should be **off**.