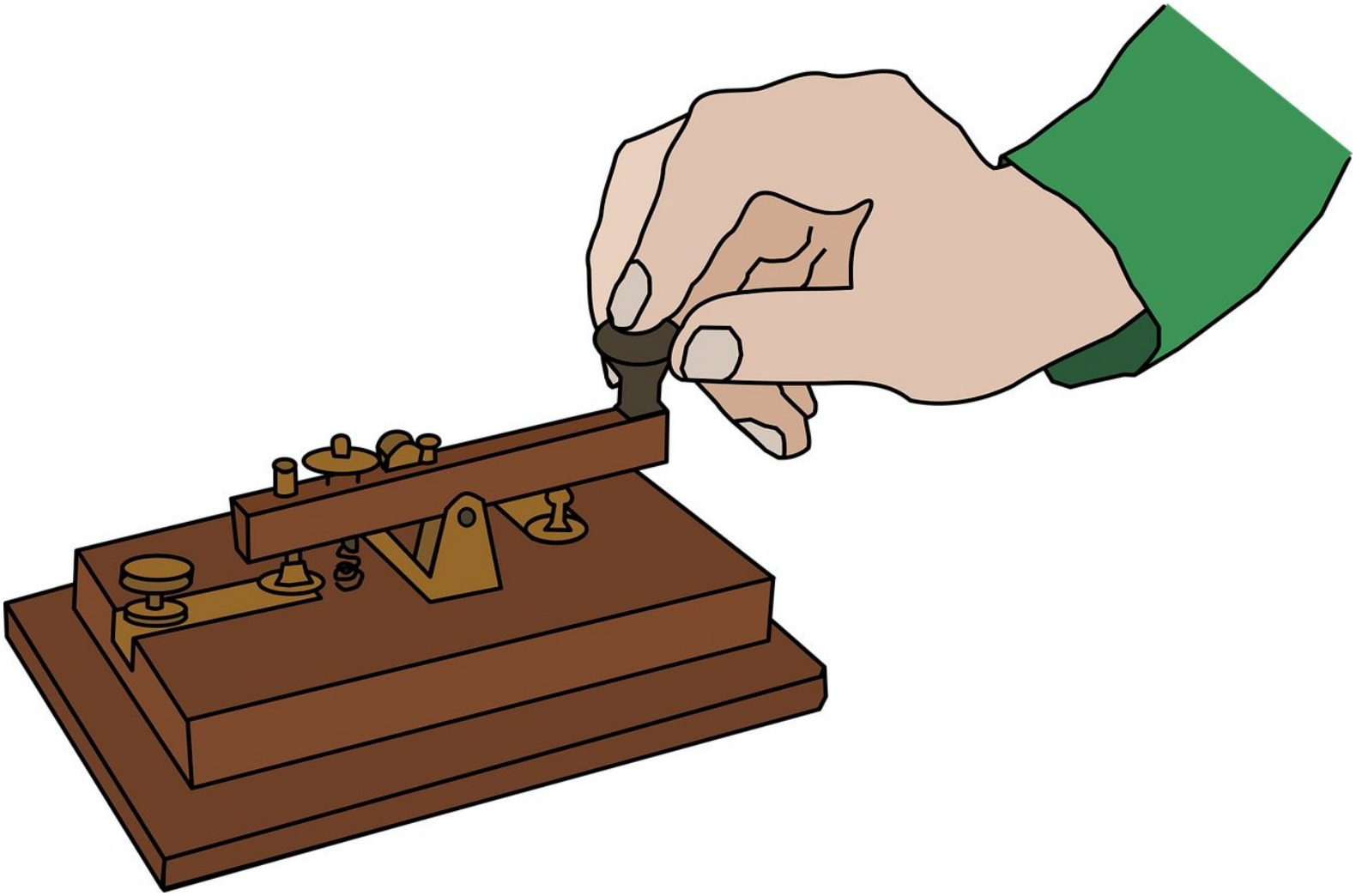
C - Morse Code Machine

Using a switch input and an IF block, make your own Morse Code machine to transmit any letter you like.



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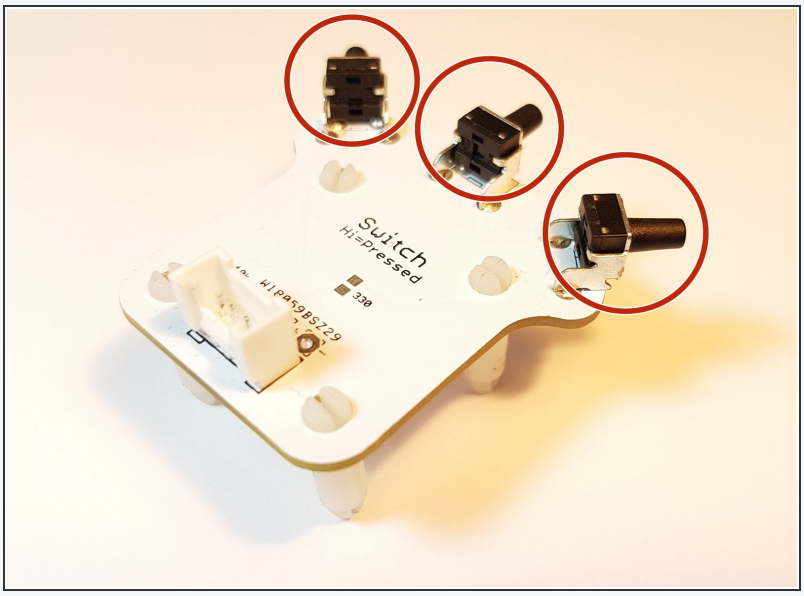
INTRODUCTION

Using a switch input and an IF block, make your own Morse Code machine to transmit any letter you like.

Step 1

Switches and Inputs

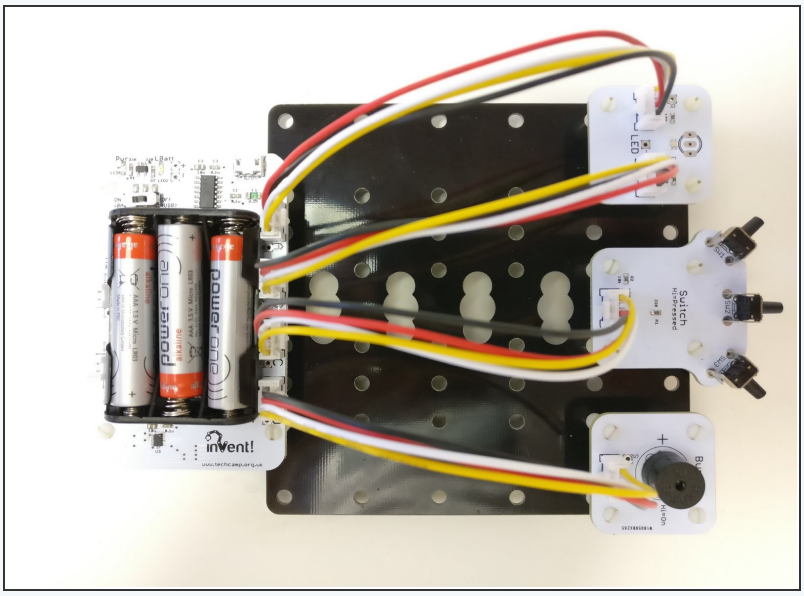
- So far, we have only used **outputs** - things that the Crumble board can change to **HI** or **LO**.
- **Inputs** work in a similar, but opposite way - they can send a HI or LO signal **back to the Crumble!**
- Our program then needs to **decide** what to do, depending on whether the signal is HI or LO.
- The **switch module** is a great example of an input - when one of the switches is pressed, the port it is connected to will go **HI**.



Step 2

Setup the Switch

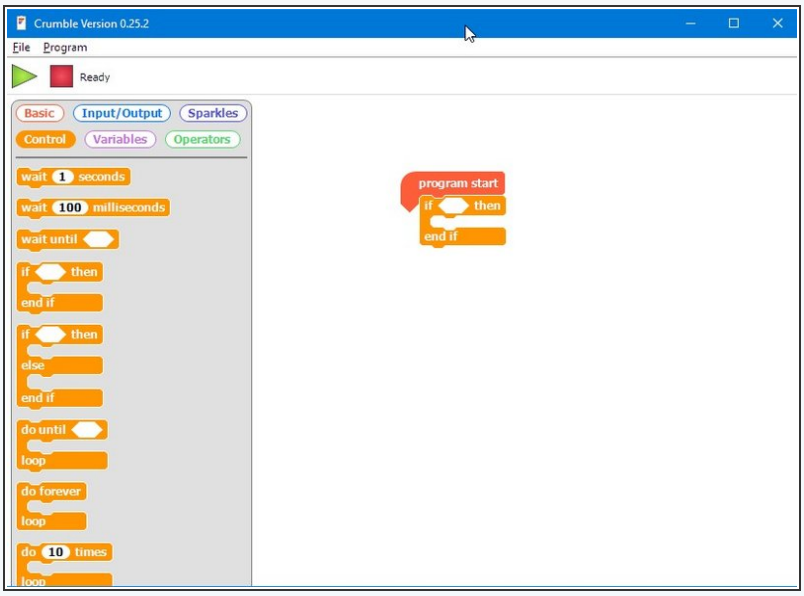
- Assemble your robot like the picture. The connections should be:
  - Red LED - **A**
  - Green LED - **B**
  - Switch - **C**
  - Buzzer - **D**



Step 3

Using Inputs

- Using inputs is slightly more complicated - the Crumble needs to **make a decision** on what to do, based on the input.
- We can make decisions easily using a **IF block.**
- From the **control menu**, drag an **IF block** into your program underneath **Program Start.**

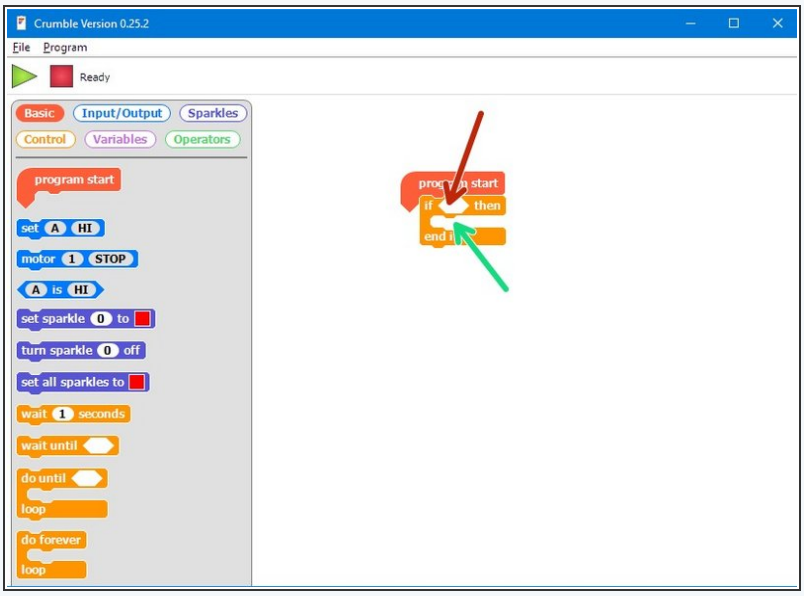


Step 4

IF Blocks

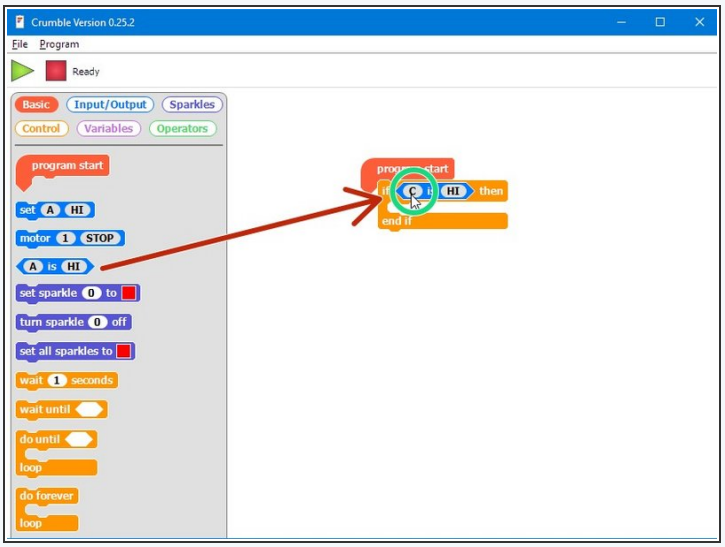
- IF blocks have **two** parts:
  - **Condition** - this is the block you put inside the **angled box** of the IF block. The condition can be either **TRUE** or **FALSE**
  - **Conclusion** - this is just some blocks of code that are **only run if the condition is TRUE** - if the condition is false, they are **skipped!**
- You're a bit like a computer that can use your own 'IF' blocks every day! For example, **IF** the bell rings, **THEN** the lesson is over.

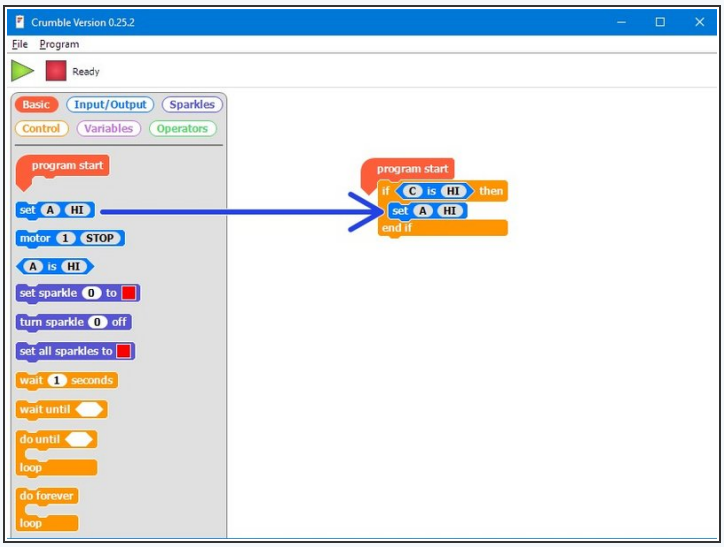
ⓘ Can you think of any more examples of IF blocks you use in real life?



Step 5

Turning on an LED



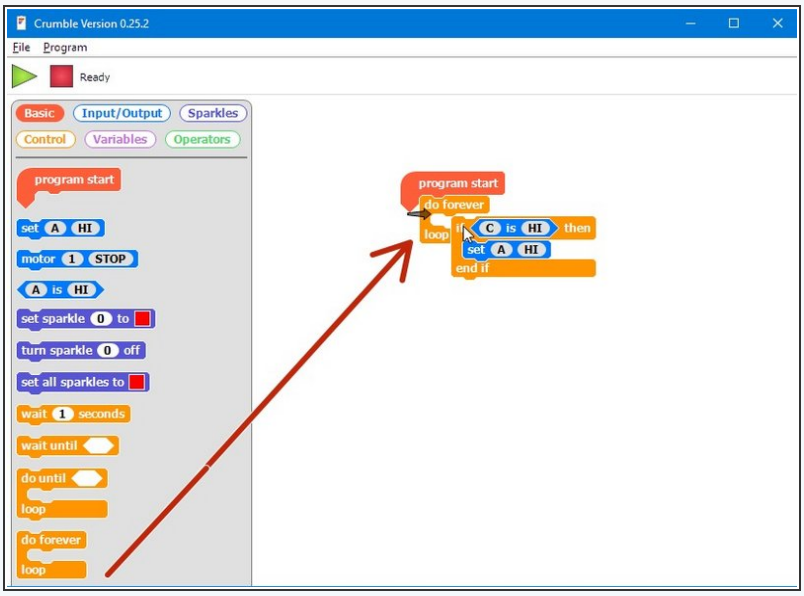


- To use the switch input in the IF block, we use the **angled block** that checks if a letter is **HI** or **LO**. Drag one into the IF block.
- Change it so that it checks if the switch **(C)** is **HI** (pressed). Our **condition** is now finished!
- Finally, drag an **output set** block into the **conclusion** of the IF block. Make sure it is set to **turn on** an LED.
- **Hold down the switch** and click the program button. Your LED should light up! What happens if you don't hold down the switch? **Will it light up if you press the switch after programming?**

Step 6

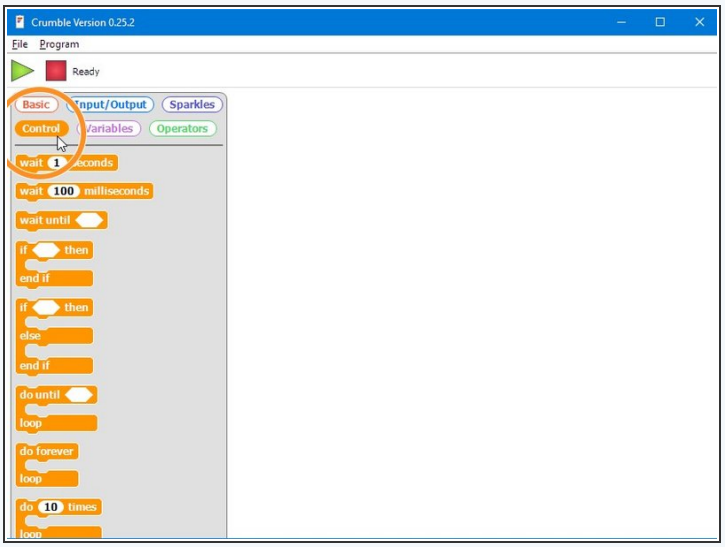
Checking Forever

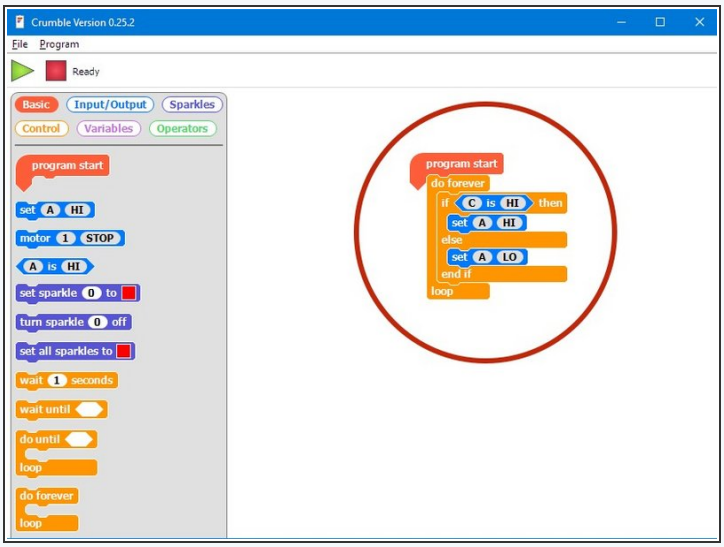
- You would expect the previous program to turn on the LED **when you press the switch.**
- You should have found that it only works if you **hold the switch down** when clicking program, or turning your robot off and on again.
- What's wrong? Let's think through the program:
  - **Start** program
  - IF **C** is HI, set **A** HI
  - **End** program
- Our robot only checks the switch **once, then stops!** We need to make sure it keeps checking, forever.
- Add a **do forever** loop around your IF block, and check everything now works properly.



Step 7

More conditionals





- IF blocks are part of a family of blocks called **conditionals** - you can find them all in the **control menu**. Have a look through and see if you can guess what some of them do!
- We're going to have a look at one more conditional, the **IF/ELSE** block.
- **IF/ELSE** blocks start the same way as an IF block, but have another bit on the end - the **ELSE** part!
- If the **conditional** is TRUE, the IF conclusion is run and the **ELSE conclusion is ignored.**
- If the **conditional** is FALSE, the IF conclusion is ignored and the **ELSE conclusion is run!**
- Have a go at building the example in the picture - **before** you program the robot, can you **guess what it will do?** Don't forget the **do forever loop!**

Step 8

Your Own Morse Code Machine

- You may have noticed we have actually made our own **Morse Code machine** already!
- By holding down the switch for a long time you can send a **dash**, and a short press would send a **dot.**
- For this challenge, add some more blocks so that:
  - When the switch **is** pressed, the green LED **and** buzzer are on
  - When the switch **isn't** pressed, only the **red LED** is on.

Challenge!

Step 9

Decode Morse Code from a friend

- Time for a harder challenge!
- Using the Morse Code card from the first step, can you send a **secret message** to your neighbour?
- Get them to decode it and see what they come up with - **no speaking allowed!**

Extension Challenge!

Step 10

Your Name in Morse Code

- A super hard challenge now - can you write a program that sends Morse Code for your initials (or even your whole name) **automatically, but only when you press the button?**
- If you're feeling really clever, try and **use some loops** to reduce the length of your program if you need to send lots of dots or dashes **in a row.**