Tilt that LED!

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Remember that Game?

- The first thing we did with the Micro:Bit was run a pre-made program.

- Part of the program was a game.

- You could tilt the Micro:Bit to move the lighted LED, like rolling a marble.

- The object was to hit a lighted target LED.

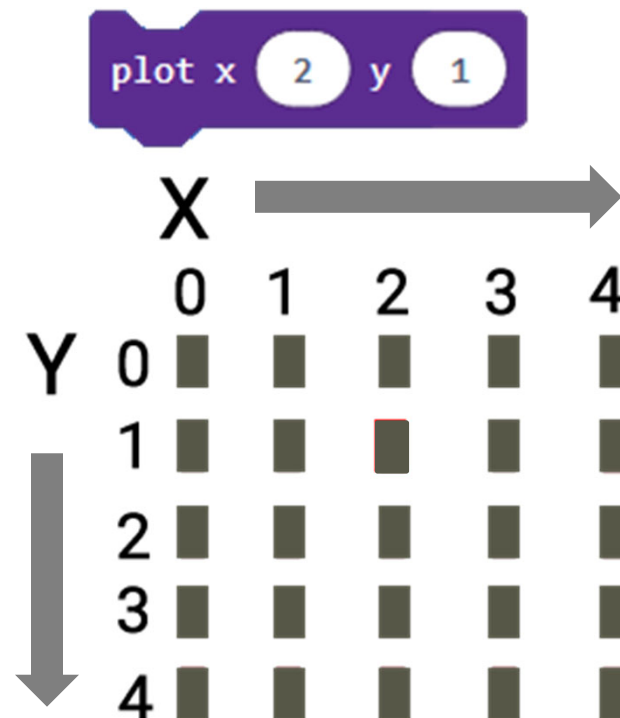- It's time for *you* to write such a program.

Reminder: the Micro:Bit LEDs

- The LEDs are organized as a grid.
- X goes left to right, Y goes top to bottom.
- Numbering starts with *zero.*

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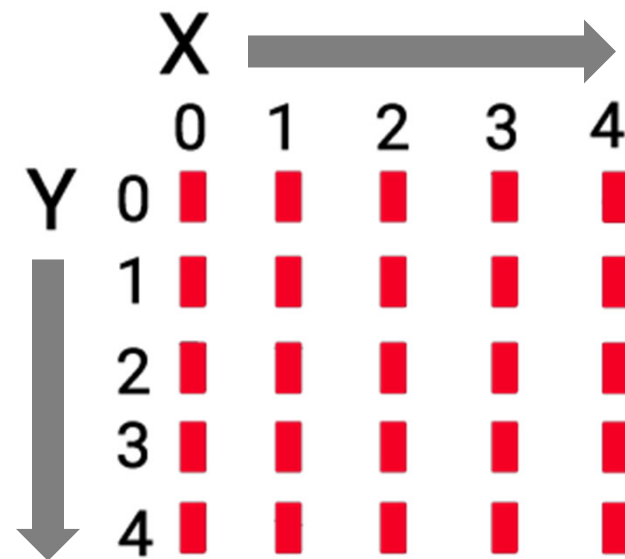
Turn On A Specific LED

- The *plot* block turns on a specific LED.
- The *unplot* block turns it off.

Accelerometer

- *There's* a 25¢ word!

- An *accelerometer* measures motion.

- And the Micro:Bit's got one!

- It can tell when the Micro:Bit is tilted up/down or left/right.

Pitch and Roll

- Tilting the Micro:Bit up or down is called pitch.
- Tilting left or right is called roll.
- The units are degrees.
- Down and left are negative; up and right are positive.
- We are only interested in the sign.

Pitch (Negative)

Roll (Negative)

Roll (Positive)

Pitch (Positive)

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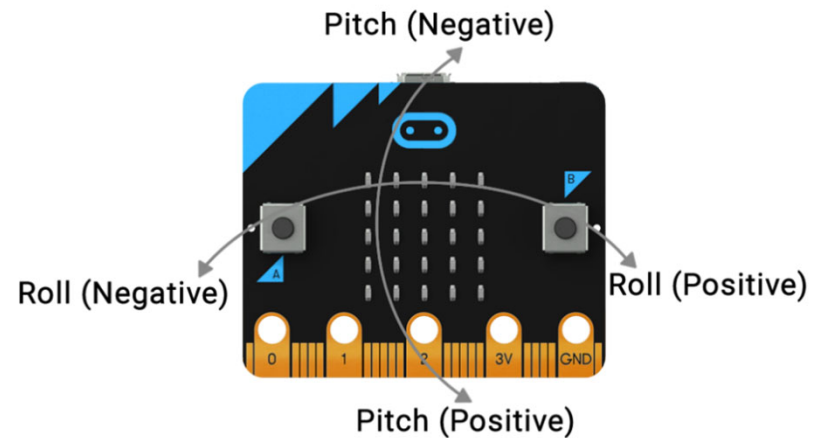
Rolling Left or Right

- We will start with one lighted LED in the middle of the grid.

- Tilting the left side down should move the lighted LED left; tilting left side downward gives a negative value.

- Tilting the right side down should move the lighted LED right; tilting the left side upward gives a positive value.

- Movement must stop at the edge.

Our Goal

- We start off small.

- We want a program that does this.
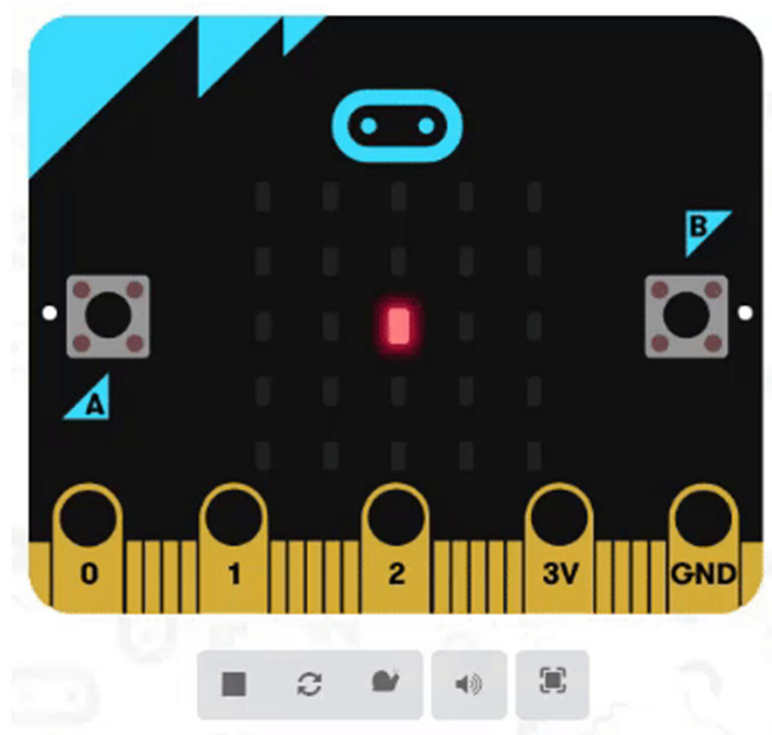
Variables

- We need three variables:
  - *roll* will hold the accelerometer's roll value.
  - *x* will hold the X position of the LED to light.
  - *y* will hold the y position of the LED to light.
  - For now, *y* will always be 2, the middle row.

Algorithm

<u>On start</u>

- Set *x* to 2
- Set *y* to 2
- Plot *x, y*   Lights the middle LED
- Pause 1 second   People are slow!

Algorithm

Forever
- unplot *x,y*   Turn off old LED
- set *roll* to rotation(roll)
- if *roll* < 0   Negative, so tilted left
  - Set *x* to *x* – 1
  - If *x* < 0 set *x* to 0
- else if *roll* > 0   Positive, so tilted right
  - set *x* to *x* + 1
  - if *x* > 4 set *x* to 4
- plot *x,y*   Turn on new LED
- pause 200 ms

The *roll* Program

- Open the simulator https://makecode.microbit.org/
- Start a new program, *roll*
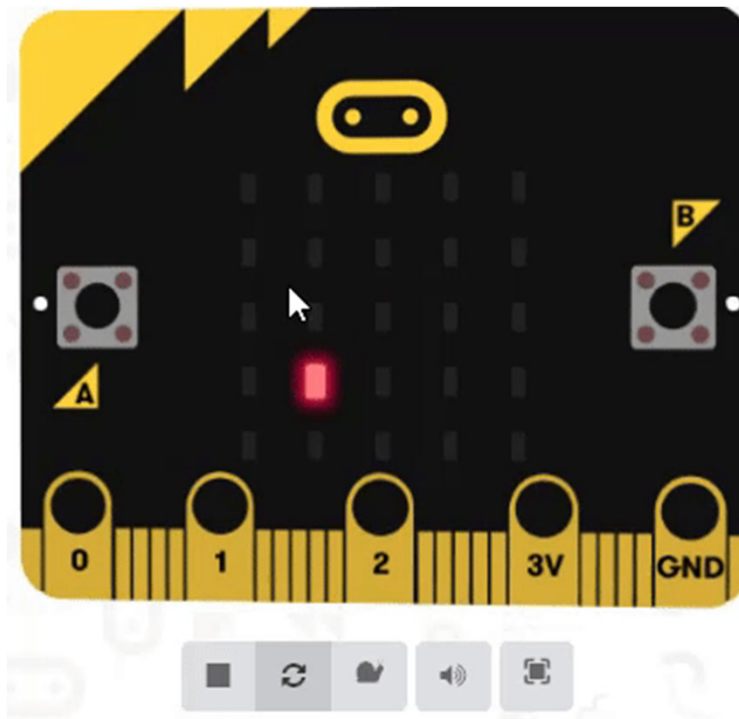- Set up your variables.
- Write and test your program.

Pitching Up and Down

- Can you make a program that does this?

- You will need to use *pitch* instead of *roll*.

- Use a new variable for *pitch*.

- You will need to change *y* instead of *x*.
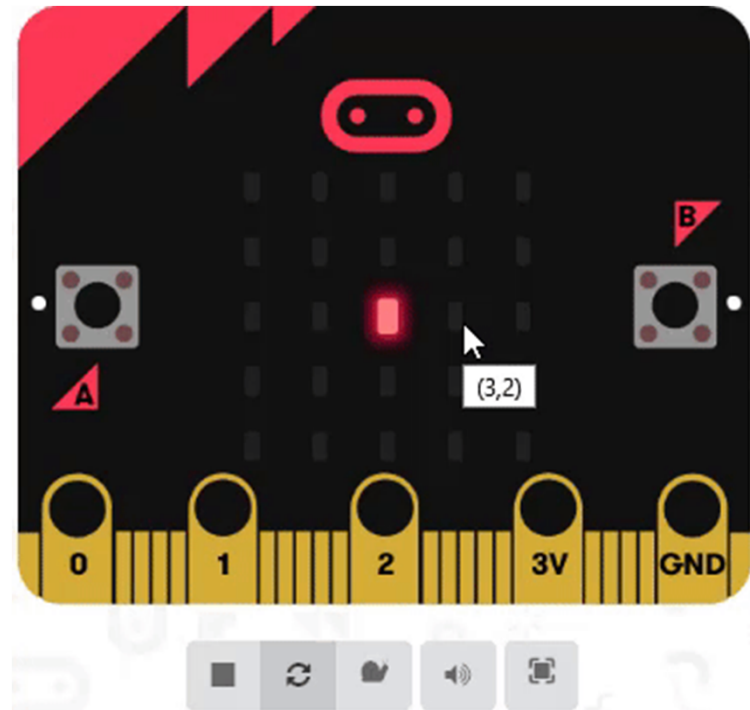
Combine *Roll* and *Pitch*

- Make a program that does this:

Next Time, Make a Game!

- We'll pick two random numbers between 0 and 4.

- Make sure they're not 2, 2.

- When the moving LED hits the target, you win!

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