Workshop

- Program LEGO Mindstorms robot

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Line Finder

- Move the Sprite forward until it reaches a black line...
- Exercise: Write a Scratch program that finds the black line

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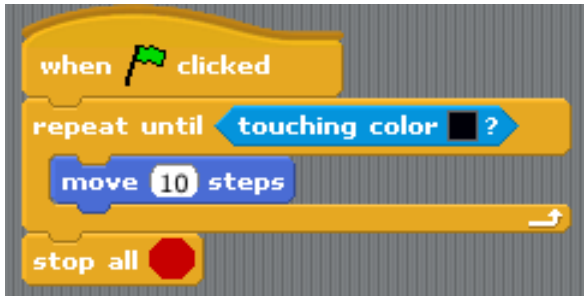
Scratch code



LEGO Mindstorms, NXT

- The NXT brick is called an embedded system
  - Technical specifications (from Wikipedia)
  - 32-bit AT91SAM7S256 main microprocessor (256 KB flash memory, 64 KB RAM)
  - 8-bit ATmega48 microcontroller @ 4 MHz (4 KB flash memory, 512 Bytes RAM)
  - 100×64 pixel LCD matrix display
  - A single USB 2.0 port
  - Bluetooth (Class II) wireless connectivity
  - 4 input ports, 6-wire cable digital platform (One port includes a IEC 61158 Fieldbus Type 4/EN 50 170 (P-NET) compliant expansion port for future use)
  - 3 output ports, 6-wire cable digital platform
  - Digital Wire Interface, allowing for third-party development of external devices
- Input and output to the robot is noisy. This adds extra requirements to the software

Line Finder

- Move the LEGO Robot forward until it reaches a black line...
- Exercise: Write a LEGO Mindstorms program that finds the black line

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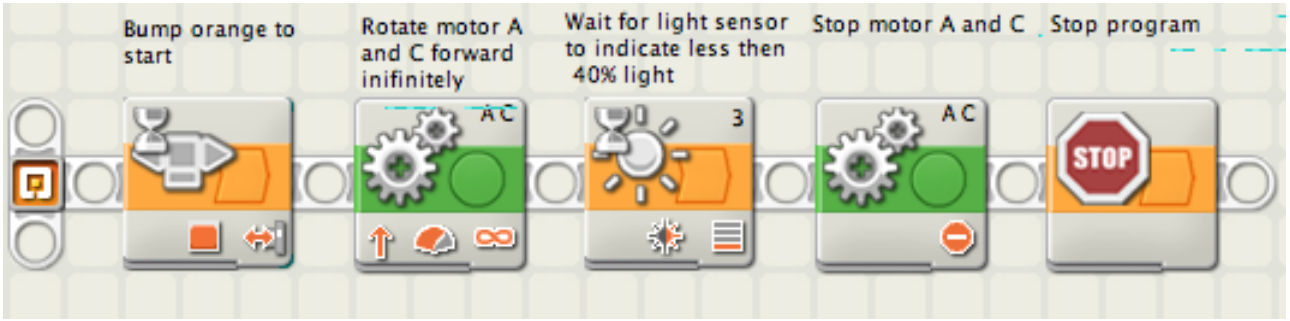
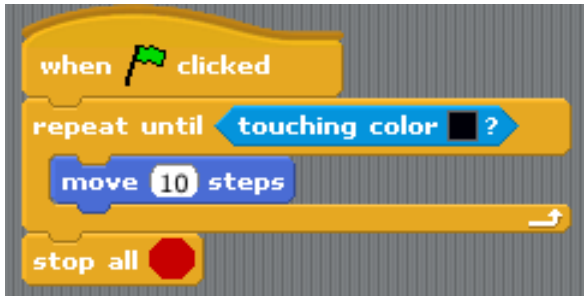
LEGO Mindstorms vs Scratch code





Line Follower

- Exercise: Follow an oval black line with a Sprite

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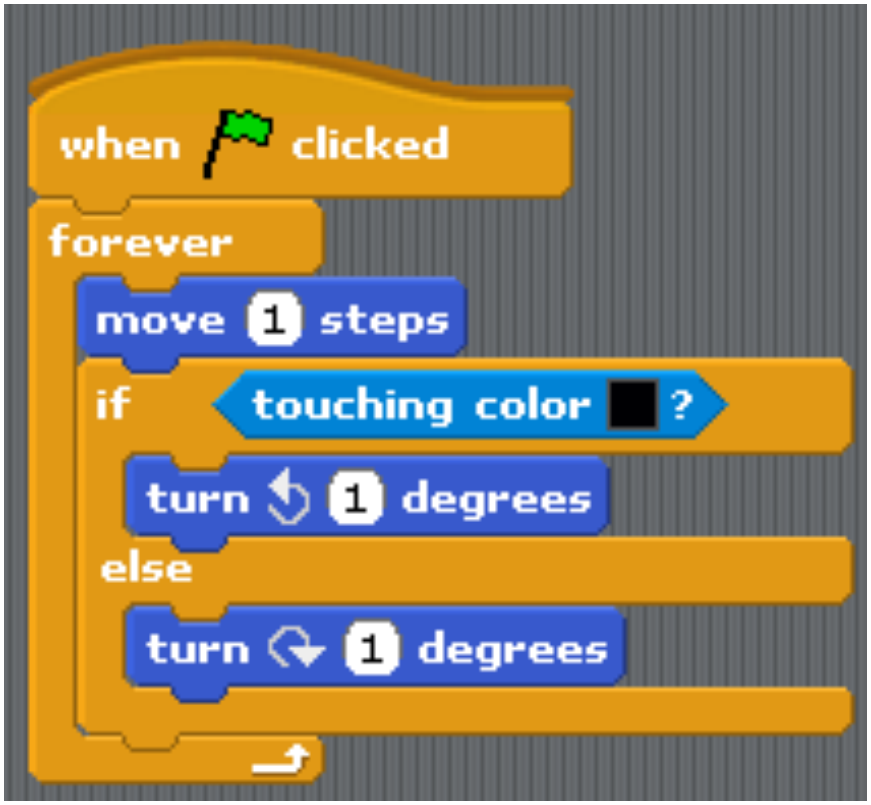
Scratch Line follower

- Program showing a simple Sprite following a circle
  - Loop
    - Move
    - Identify line
      - If on line
        - » Turn left
      - Else
        - » Turn right



Line Follower

- Exercise: Follow an oval black line. Display instructions of how to calibrate and place the robot.

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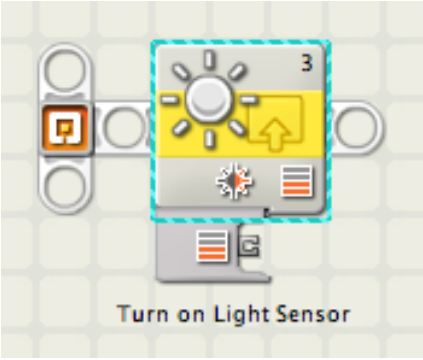
Lego Mindstorms line follower

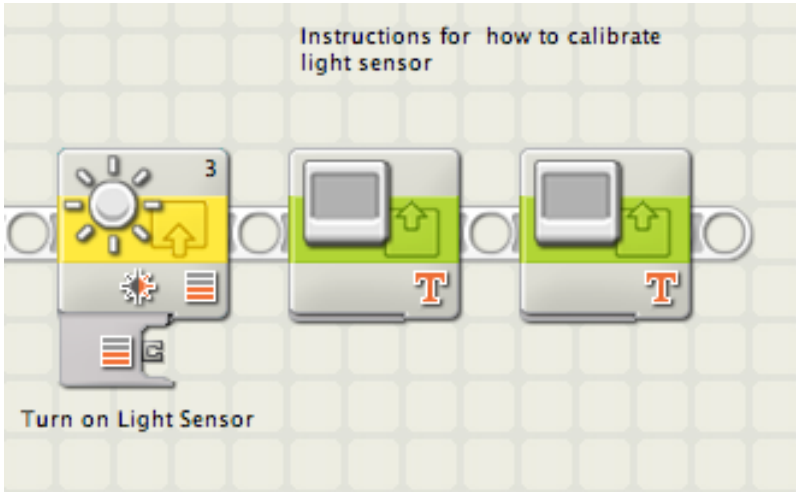
- Adapted from Line Follower project from nxtprograms.com

- Calibrate sensor
- Place robot
- Start robot

Start the sensor



Calibration instructions

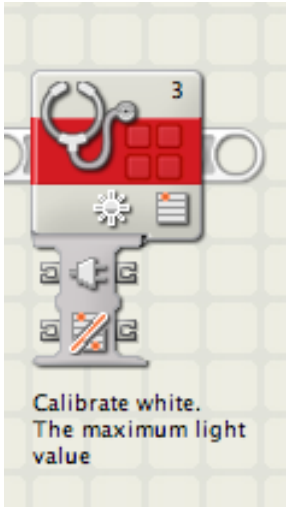


Insert text on the display

Start calibration

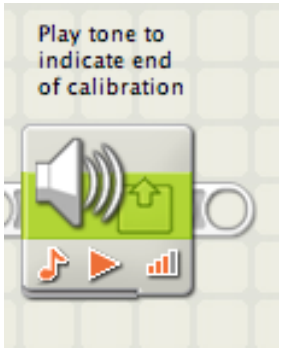
Set bumped

Calibrate white



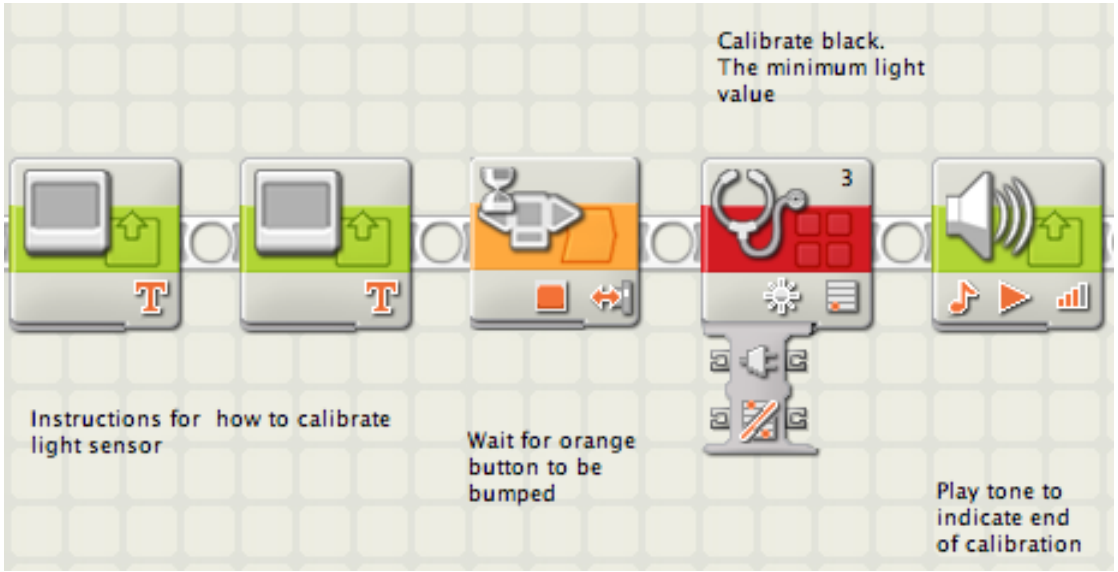
Select maximum

Indicate calibration done



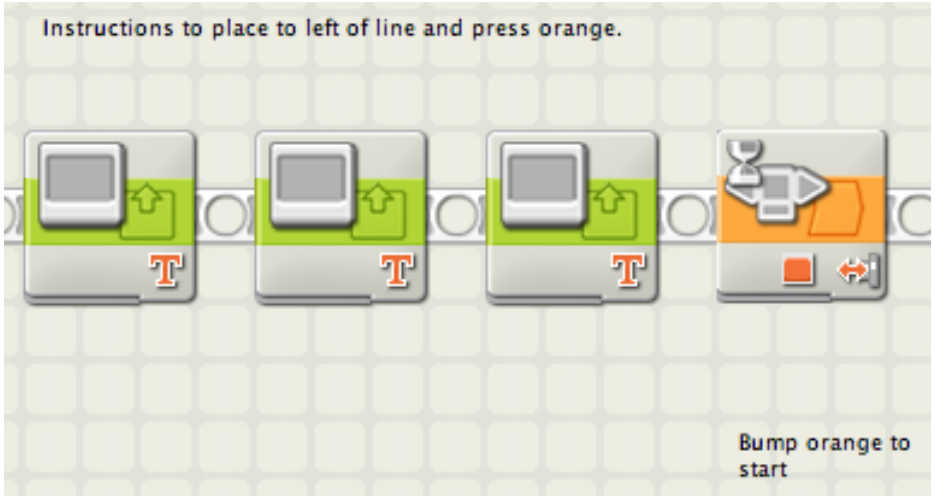
Select tone

Calibration instructions



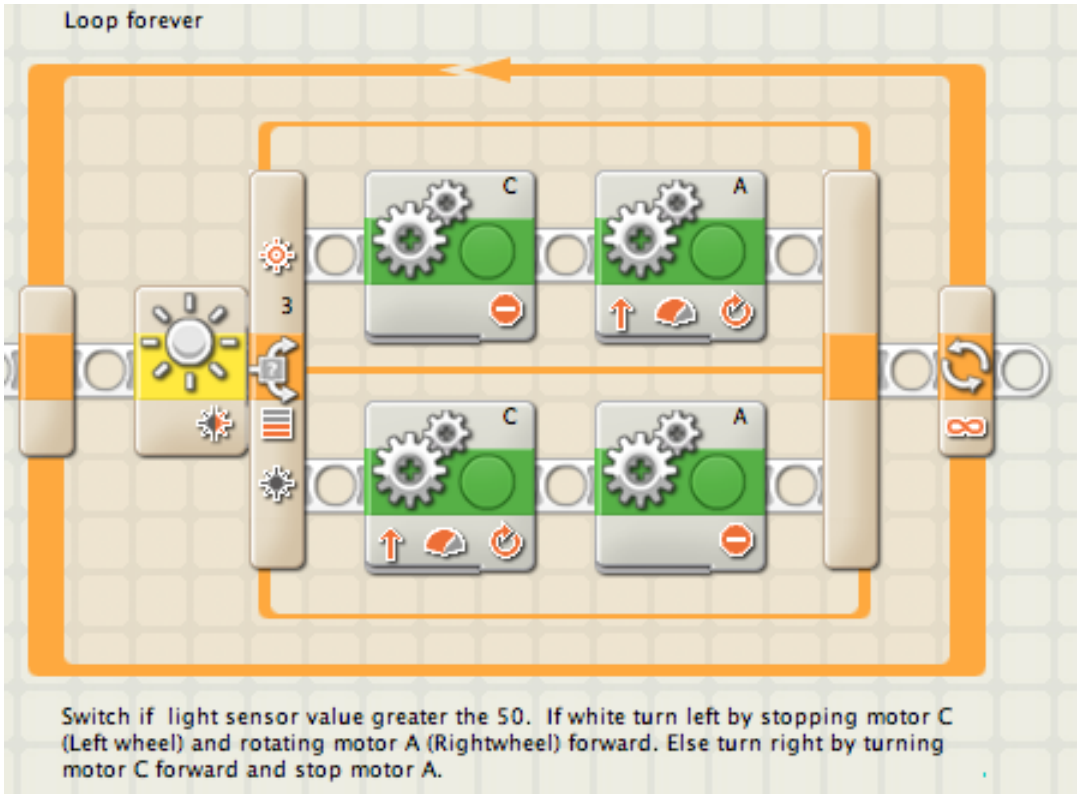
Set text
Set bumped
Select minimum
Select tone

Place robot



Set instructions
Set bumped

Turn robot depending on light



Add loop
Select switch
Set light sensor
Add motor C stop. Add motor A forward
Add motor C forward. Add motor A stop

LEGO TriBot to grab ball

- Follow the instruction from the LEGO Mindstorms of how to make the TriBot catch the ball