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Book 2
Using Sensors

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Advanced

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Welcome to Book 2

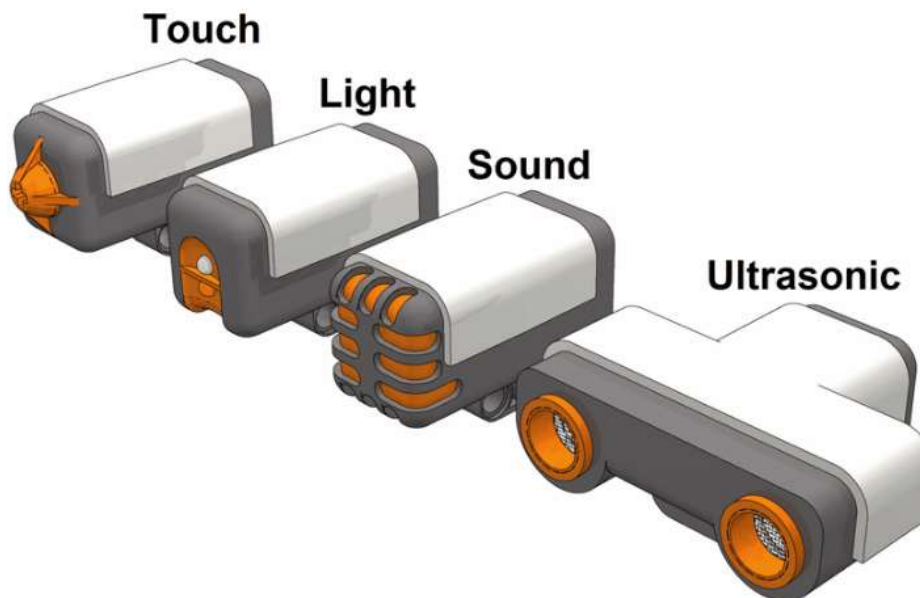
Congratulations on achieving your

Red P plate licence

In this booklet you are going to do some building and learn how to program your robot using **sensors**. This will allow your robot to **respond** to you and its environment.

Challenge 1 – Introducing Sensors

Identify the following sensors:



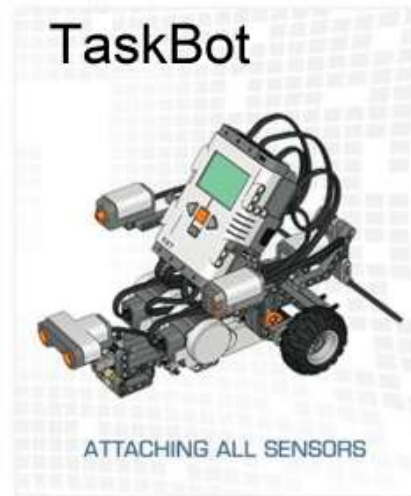
Test your partner on the names

Advanced

Complete the challenge above but also tell your partner what the sensors detect.

Challenge 2 – Adding Sensors to Your Robot

Attach the sensors to your robot using building instructions or (advanced) using your own designs.



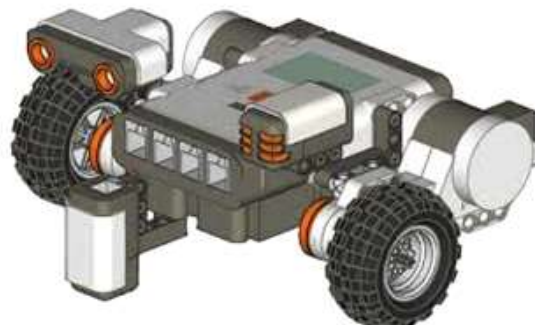
Robot Educator

Model
(not the batting arm)



DomaBot or Flat Top

(don't forget connecting wires)



Challenge 3 – Using the Touch Sensor (detects when the sensor is pressed, released or bumped)

Program your robot to move forwards for an unlimited amount of time and stop when the touch sensor is pressed (see program on opposite page if needed). You may press the sensor with your hand or the robot may hit an object. Remember to plug the sensor into Port 1

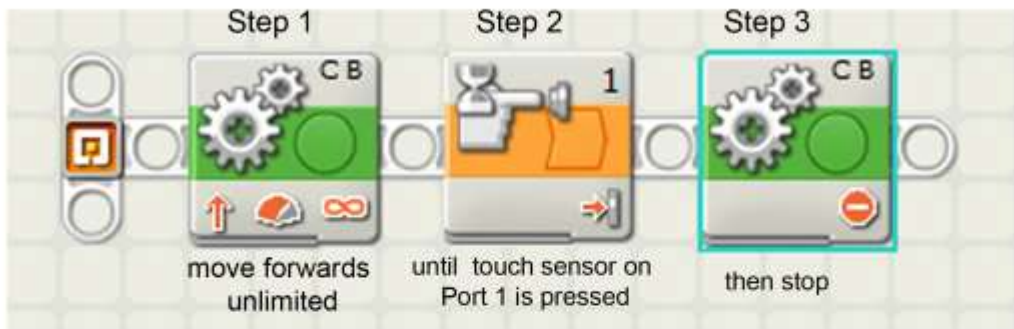
OR

Advanced (only use one touch sensor)

Complete all 3 programs

1. Program your robot to move forwards for an unlimited amount of time and stop when the touch sensor is pressed. You may press the sensor with your hand or your robot may hit an object. See the program on the opposite page if needed.
2. Program your robot move forward when the touch sensor is pressed.
3. Program your robot to start moving when the touch sensor is pressed and stop when the touch sensor is released.

Using a touch sensor



Step 1



Step 2



Step 3



Challenge 4 – Using the Ultrasonic Sensor (measures the distance from an object).

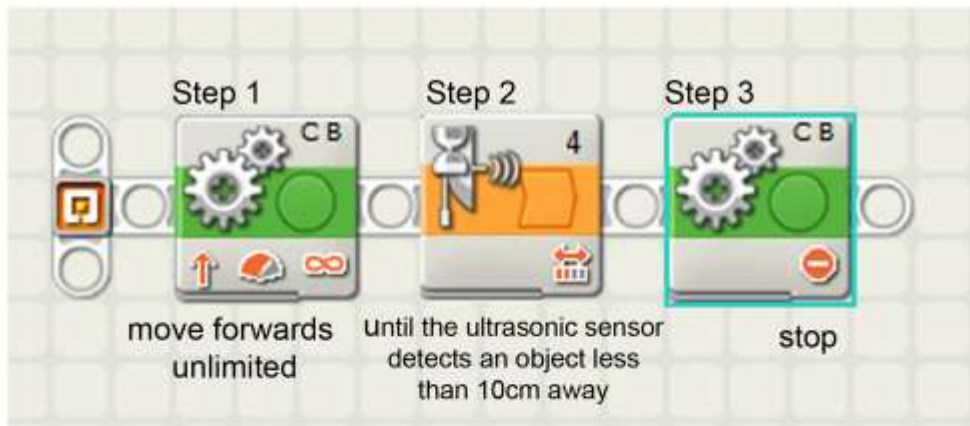
Program your robot to move forwards for an unlimited amount of time and stop when you put your hand in front of the ultrasonic sensor. Your hand must be closer than 10cm to the ultrasonic sensor.

OR

Advanced (Complete all 3 programs)

1. Program your robot to move forwards for an unlimited amount of time and stop when you put your hand in front of the ultrasonic sensor. Your hand must be closer than 10cm to the ultrasonic sensor.
2. Program your robot to wait for you to put your hand within 10cm of the ultrasonic sensor and then move forward.
3. Program your robot to wait for you to put your hand within 10cm of the ultrasonic sensor and then move forward for an unlimited amount of time until you put your hand within 20cm of the ultrasonic sensor, then your robot reverses for 3 seconds and stops.

Ultrasonic Sensor



Challenge 5 – Using the Light Sensor (measures % reflected light).

Your light sensor must be **facing down** for these challenges.

Program your robot to move forwards for an unlimited amount of time on a white piece of paper and stop when it comes to a black line.

OR

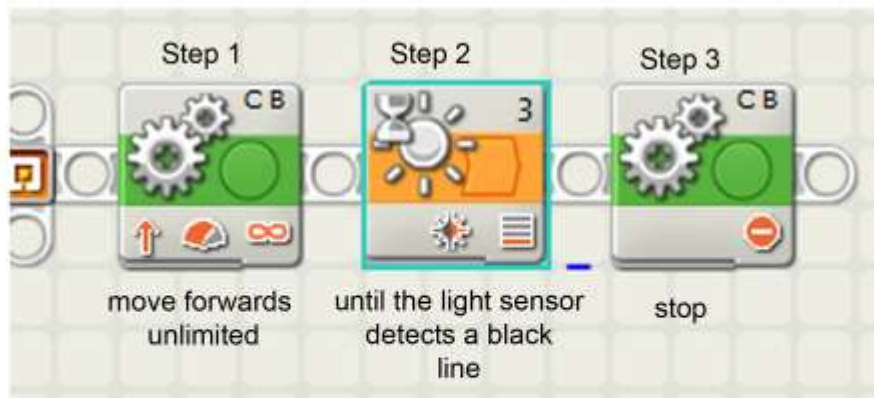
Advanced - (Complete all 5 programs)

1. Program your robot to move forwards for an unlimited amount of time on a white piece of paper and stop when it comes to a black line.
2. Program your robot to move forwards for an unlimited amount of time on white paper and reverse when it comes to a black line.
3. Program your robot to move forwards for an unlimited amount of time on white paper and stop when it comes to a red line.
4. Program your robot to pass over a red line but stop at a black line.
5. Program your robot to reverse when it sees a red line and go forwards when it sees a black line.

Remember

- Pure white is 100% reflected light and
- Pitch black is 0% reflected light

Light Sensor



Check your light sensor is pointing down

Challenge 6 – Advanced only

Program your robot to move forwards unlimited until you clap and it stops.

You will need to do this activity outside so you can escape the background noise from the classroom. (Ask permission first)

Turn over the page for the Robot Drivers' Licence Test

Book 2 – Robotics Licence Tick Off Sheet

Challenge 1 – Introducing Sensors

Identify the sensors and test your partner on the names.

Advanced

Complete the challenge above but also tell your partner what the sensors detect.

Marking partner name _____ signature _____ date _____

Challenge 2 – Adding Sensors to Your Robot

Attach the sensors to your robot using building instructions or (advanced) using your own designs.

Marking partner name _____ signature _____ date _____

Challenge 3 – Using the Touch Sensor

Program your robot to move forwards for an unlimited amount of time and stop when the touch sensor is pressed (see program on opposite page if needed). You may press the sensor with your hand or the robot may hit an object. Remember to plug the sensor into Port 1

Advanced (only use one touch sensor at this stage)

Program your robot to move forwards for an infinite amount of time and stop when the touch sensor is pressed. You may press the sensor with your hand or your robot may hit an object. See the program on the opposite page if needed.

Program your robot to not move forward until the touch sensor is pressed.

Program your robot to not start moving until the touch sensor is pressed and then stop when the touch sensor is released.

Marking partner name _____ signature _____ date _____

Challenge 4 – Using the Ultrasonic Sensor

Program your robot to move forwards for an unlimited amount of time and stop when you put your hand in front of the ultrasonic sensor. Your hand must be closer than 10cm to the ultrasonic sensor.

Advanced

Program your robot to move forwards for an unlimited amount of time and stop when you put your hand in front of the ultrasonic sensor. Your hand must be closer than 10cm to the ultrasonic sensor.

Program your robot to not move forward until you put your hand within 10cm of the Ultrasonic sensor.

Program your robot to not move forward until you put your hand within 10cm of the Ultrasonic sensor. Then it moves forwards for an infinite amount of time until you put your hand within 20cm of the ultrasonic sensor then your robot reverses for 3 seconds and stops.

Marking partner name _____ signature _____ date _____

Challenge 5 – Using the Light Sensor

Program your robot to move forwards for an unlimited amount of time on a white piece of paper and stop when it comes to a black line.

Advanced

Program your robot to move forwards for an unlimited amount of time on a white piece of paper and stop when it comes to a black line.

Program your robot to move forwards for an unlimited amount of time on a white piece of paper and reverse when it comes to a black line.

Program your robot to move forwards for an unlimited amount of time on a white piece of paper and stop when it comes to a red line.

Program your robot to pass over a red line but stop at the black line.

Program your robot to reverse when it sees a red line and go forwards when it sees a black line.

Marking partner name _____ signature _____ date _____

Challenge 6 – Advanced only

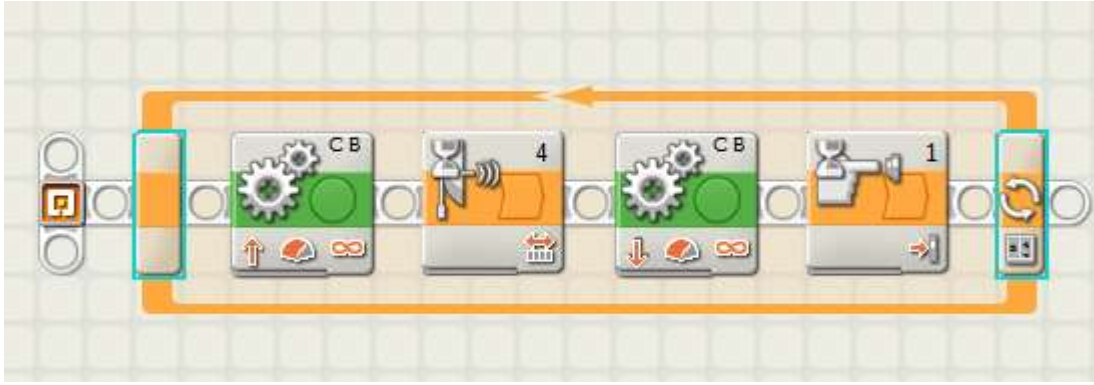
Program your robot to move forwards unlimited until you clap and it stops.

Marking partner name _____ signature _____ date _____

Drivers' Licence Test Marking Sheet

Attach your touch sensor to the back of your robot.

Program your robot to move forwards unlimited until you put your hand within 10cm of the ultrasonic sensor then your robot will go backwards unlimited until the touch sensor hits a wall. Use a loop and repeat this action 3 times. Look at the program below if needed.



Teacher's signature _____ date _____

Or

Advanced

Program your robot to move forwards unlimited until you put your hand within 10cm of the ultrasonic sensor then your robot will go backwards unlimited until the touch sensor hits a wall. Use a loop and repeat this action 3 times. (Look at the section of the program above if needed). The robot stops for one second and moves forwards unlimited until it passes over a yellow line and stops at a black line. Say 'You're good' and display a smiley face on your display to finish.

Teacher's signature _____ date _____

Congratulations you have earned your **Green Ps (regular or advanced)**.

Please collect your new licence plate, attach it to your robot and move onto

Book 3 – Switches, My Blocks and more. This has **Green Ps** on the cover.