# Lesson 20 – External Devices

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| The Big Picture – Why is this Relevant? | Learning Objectives |
| * Embedded systems are built into other electronic devices. This lesson explores how the micro:bit can be plugged into other devices to become part of a larger system * The devices built in this lesson have real world utility. Learners will explore how different sensors can be used to develop a weather station. | * Understand how the micro:bit can be used to take measurements from a different device * Understand how to add external libraries to the MakeCode website * Understand how temperature, pressure and humidity measurements can be taken and used to make a weather forecast |
| Engagement – How Can I Engage Learners? | Assessment for Learning |
| * Learners will enjoy being able to expand their micro:bit into a larger computer system * Learners will enjoy the practical exercise where they will be able to take measurements from the external device * This system has real world utility as it can be used for forecasting the weather | **Expected Progress:**   * Learners will understand how to add external libraries to the MakeCode website to allow them to use external devices * Learners will understand how the micro:bit can be used to control external devices * Learners will be able to take measurements from an external device   **Good Progress:**   * Learners will understand how to take measurements from an external device and be able to interpret the readings   **Exceptional Progress:**   * Learners will understand how to use the readings from the enviro:bit to be able to forecast the weather * Learners will be able to independently explore a range of other sensors on the enviro:bit |
| Key Concepts | Key Words: |
| * The micro:bit can be used to control a range of external devices * It can be used as an embedded system and can take readings from a wide range of external sensors * In order to be able to use external devices a new library has to be installed into MakeCode | * enviro:bit * Embedded System * External Device * Library * Temperature * Pressure * Humidity |
| Differentiation | Resources |
| The final Stretch Tasks are unsupported. Learners should try to expand the micro:bit code so that the temperature is displayed when the micro:bit is shaken. More capable learners could explore the use of the sound, colour and light sensors. | * 1 micro:bit per learner * 1 enviro:bit per learner * 1 USB cable to connect the micro:bit to a PC * A PC * Access to <https://makecode.microbit.org> * Lesson 20 ppt |
| Lesson Flow | |
| * Discuss the concept of an embedded system using the ppt for support. Highlight that embedded systems are found in a wide range of electronic devices. The micro:bit can be used as an embedded system and can control a wide range of external devices * Introduce the enviro:bit. The enviro bit has a number of sensors on it. Today we are going to focus on the weather sensors. They can be used to measure the pressure, humidity and temperature. Together these readings can be used to forecast the weather * As the enviro:bit is an external device that lies outside of the core micro:bit it is necessary to install the necessary code blocks to allow us to take the readings from these sensors. To do this we need to install a software library into the main MakeCode development window. Demonstrate how to do this. Learners can then complete this exercise using the worksheet for support. * Once all learners have installed the library, discuss how the different readings can be interpreted. A rapid drop in pressure indicates an approaching storm or rain front. An increase in pressure suggests clear skies and sunshine. Humidity can indicate the likelihood of fog or dew and how comfortable we find the air. * Learners should then develop their weather station using the basic code on the ppt. Learners should add to the code to display a suitable message prior to pressure and humidity being displayed. They should then add the relevant units of measurement. Discuss with learners the difference between a string (any character) and a number (a numerical value). The correct data type has to be used to output the relevant information to the screen. Learners should then add a further control to display the temperature – they could either use ‘on shake’ or ‘a and b’. Learners who complete the task successfully can explore how other sensors on the enviro:bit can be used. * Learners could use the micro:bit throughout the day to take a range of measurements and track trends. They could then see whether the change in pressure was correct in predicting the weather. | |
| Making | |
| There is no making in this lesson. | |