# Lesson 8 – Lock box

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| 40BThe big picture – why is this relevant? | 41BLearning objectives: |
| This lesson combines a wide range of peripherals into one device. It draws together what learners have covered throughout the course. | * Understand how to use an actuator * Understand how to combine multiple peripherals to be controlled by one control board |
| 42BEngagement – how can I engage learners? | 43BAssessment for learning |
| * Learners will enjoy drawing together all of the peripherals covered to date in the course * There is a kinaesthetic activity which learners will enjoy completing * Learners will enjoy combing code snippets from throughout the course | **Expected progress:**   * Learners will understand how to trigger an actuator based upon an input from a number of input devices * Learners will be able to combine code snippets into one larger application with support * Learners will be able to add peripherals such as red and green LEDs to highlight whether they have entered the correct PIN   **Good progress:**   * Learners will independently be able to code up the device so that it opens the box once they have entered the correct PIN * Learners will understand the purpose of an array   **Exceptional progress:**   * Learners will be able to add additional peripherals such as an alarm which is triggered when an incorrect PIN is entered |
| 44BKey concepts: | 45BKey words: |
| * A conditional statement can be used to take in a reading from the device and check whether the condition is true. If it is true an actuator can be enabled * An array can be used to hold multiple values under a single identifier | * Array * Actuator * Breadboard * Peripherals * Variables * Data types |
| 46BDifferentiation: | 47BResources: |
| More able learners could explore how to add additional peripherals to the device. More able learners may wish to develop their algorithm using pseudocode. | * .ppt * Worksheet * Arduino. Please note that the teaching materials show use of an Arduino Uno. This project could also be completed using an Arduino MKR1000 or Arduino 1010. * Breadboard * Actuator / servo * Cardboard to make box * 4 push buttons * 4 red LEDs and one green LED * 5 x resistors |
| Lesson flow | |
| * Introduce learners to the project. They will be creating a lockable box which will hold a task. The box will contain four push buttons. The buttons will need to be pressed in the correct order to unlock the box. * Ask learners to plan out the algorithm using either a flow chart or pseudocode. Use the opportunity to discuss variables and the importance of using descriptive names. If there is time, learners should also identify the data type that each variable will be. * Learners should then produce the box. It could be decorated with suitable messages or images. The box should have a cardboard lever which can be opened and closed by an actuator. Provide support where necessary. The teacher should give each student a sealed envelope which contains the contents that are to be locked in the box. * Discuss what peripherals will be needed. Demonstrate how to connect up the device. Learners should then produce the device. Highlight to learners that the project involves: connecting together a sequence of different inputs which result in an output when they are pressed in a given sequence. The project also introduces the use of arrays. * The device should then be mounted to the box. The LEDs and push buttons must be visible. * Discuss the various elements of code that will be needed. From the planning exercise, learners should realise that this is using elements of code from a number of previous projects. Learners should then code the device. | |
| Making | |
| * Learners will have produced the lockable box and hard coded it. * They should then swap devices and try to unlock the box. * Once the box is automatically opened it will allow the learner to open the envelope. The envelope contains the brief for the final project. This will be an open task where learners will have the opportunity to develop an IoT device of their own choosing using any of the hardware that has been used throughout the course. Depending on the kits used, there may also be additional pieces of hardware which learners can explore. Learners may wish to think about this project in their own time prior to it formally commencing. | |