# Lessons 15-16 – Smart Cities Project

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| The Big Picture – Why is this Relevant? | Learning Objectives |
| * Physical computing/Internet of Things (IoT) is the future * Designing systems is a fundamental part of IOT * Programming is an important skill but programming physical devices allows much more creativity and engagement | * Understand what IOT is * Understand the IPO model * Understand what makes something smart * Understand what a micro:bit peripheral is * Understand what the challenge involves |
| 2BEngagement – How Can I Engage Learners? | 3BAssessment for Learning |
| * The competitive element of this lesson should motivate some learners * The activities are group based which most learners will engage with * The activities are creative and tech based which again will engage most learners * IoT is a modern and relevant technology and so should be exciting to design new products * The winners of the design competition will attend a hackathon and there will be prizes | **Expected Progress:**   * Learners work in teams to design a street light that uses some of the micro:bit’s features * Learners partially explore the context on the design template.   **Good Progress:**   * Learners work in teams to design a street light that uses the micro:bit’s features and some of the peripheral’s features. * Learners have explored the context on the design template and have designed the IPO processes as well as considering the user.   **Exceptional Progress:**   * Learners work in teams to design a street light that uses the micro:bit’s and peripherals features. * Learners have fully explored the context on the design template and have designed the IPO processes in detail as well as considering the users and how the product can be improved. |
| Links to KS3 Programme of Study | |
| * Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems * Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users * Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability | |
| Key Concepts | Key Words |
| * A micro:bit is a microcontroller * IPO model * What inputs and outputs are available? * What sensors are * How a street light works | * micro:bit * Microcontroller * IPO * LED * Sensor |
| Differentiation | Resources |
| Most learners will be able to follow the instructions, however some learners will need prompting to fully engage with the design process especially with the process modelling and thinking of how to use the sensors effectively. More able learners can be given the stretch tasks to add additional features to their smart lights. | * Lesson 15-16 ppt * Stretch tasks ppt * micro:bit * 1 x scroll:bit. Please note that the scroll bit which is used in the ppt can be swapped for any LED matrix display * Design template A3 * Building materials/tools (card, glue, scissors etc) |
| Lesson Flow | |
| * Introduce learners to the concepts using the intro slides * Discuss potential uses for IoT on slide 7 * Discuss the IPO model on slide 8 * Introduce the challenge using the Stretch Task slides * Go through the Success Criteria and emphasise the importance of meeting them * As discussed in the previous lesson students should be in groups of 4 with each member undertaking one specific role within the team. Students will rotate roles in different projects. * Teams design a product using the design templates * Teacher rotates round teams and questions features and supports team interaction * Give Stretch Tasks to teams that require them * Design sheets collected in for judging   **One winning team from each school is needed to attend the hackathon** | |
| Making | |
| * Build the prototype street light model to meet the Success Criteria | |