# Lesson 20 – Smart Car Collision Avoidance System

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| The Big Picture – Why Is This Relevant? | Learning Objectives |
| * Identifying how we can reliably use sensor data and the calculations behind the plugins that we use | * Understand how an ultrasonic sensor can be used to create a collision avoidance system * Calculate the distance to an object * Design an algorithm for a collision avoidance system * Create and test an algorithm for a collision avoidance system |
| Engagement – How Can I Engage Learners? | Assessment for Learning |
| * Give Learners plenty of opportunity for Learners to test and adjust their algorithm | **Expected Progress:**   * Learners can complete basic calculations and are able to organise and test an algorithm   **Good Progress:**   * Learners are able to create an algorithm to solve the problem making adjustments through testing (the car stops at the right point)   **Exceptional Progress:**   * Learners have attempted a Stretch Task |
| 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 | |
| Key Concepts | Key Words |
| * How distance is measured using ultrasonic sensors | * Ultrasonic * Sonar * Distance * Time * Speed of sound * Pseudocode |
| Differentiation | Resources |
| Some Learners may require support when completing the calculations – especially when converting between units.  Some Learners may become frustrated with the reliability of the sensor in classroom environments. | * Lesson 20 ppt * Lesson 20 Activity Sheet * PC * Paper, Pens, Pencils * Access to <https://makecode.microbit.org> * micro:bit * Bit:Bot * HC-SR04 Ultrasonic Sensor * Wires and clips as required |
| Lesson Flow | |
| * Introduce the Learning Objectives * Explain how the ultrasonic sensor works – create mental links with bats and submarines * Explain and demonstrate how to calculate distance using sound * Give the Learners the Lesson Activity Sheet and ask them to complete the calculations * Get Learners to work out the order of the pseudocode for the algorithm * Remind Learners how to add the sonar extension and show the block that returns the time in microseconds * Get Learner to use the algorithm they wrote to build a block of code that stops the car 10cm from the wall. * Give Learners the opportunity to test and improve their algorithm * Discuss the objects that cars might see during a normal journey, focus on everything from signs and pedestrians to other vehicles. * Encourage Learners to attempt the Stretch Tasks | |
| Making | |
| No making activities in this lesson. | |