# Lesson 22 – The Machine Module

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| The Big Picture – Why Is This Relevant? | Learning Objectives |
| * Keeping check on any computer system is important. Especially the internal hardware. The machine module enables you to track the speed of the CPU and how long the micro:bit has been running for. This type of data is useful in keeping of the health of a system. Is it about to overheat and shutdown? | * Know what the machine module is * Demonstrate a use of some of the features * Adapt the features to use in programs |
| Engagement – How Can I Engage Learners? | Assessment for Learning |
| * The lesson could start off with displaying the ‘Blue screen of death’ error page * Teacher and Learners could discuss what errors they have had and the error codes that are displayed. * Discuss that one type of error is a kernel panic which is part of the machine module. | **Expected Progress:**   * Learners try at least one machine module program   **Good Progress:**   * Learners try several of the machine module programs * Learners will be able to explain the features of the program   **Exceptional Progress:**   * Learners adapt the machine module program to embed it within another program |
| Key Concepts | Key Words |
| * The machine module * Programming the features of the machine module * Using the features within other programs | * CPU * Machine module * Hertz * Kernel * Reset |
| Differentiation | Resources |
| The program code is fairly simple and all Learners will be able to access the programming. Learners may require support where they embed the code into another program. | * Lesson 22 ppt * Lesson 22 Activity Sheet * 1 micro:bit per learner * 1 battery pack for micro:bit * 1 USB cable to connect the micro:bit to a PC * Access to [micro:bit Python Editor (microbit.org)](https://python.microbit.org/v/3) |
| Lesson Flow | |
| * Display the blue screen error message and the learners enter the room * Discuss error message and how the micro:bit uses the machine module to handle errors * Introduce the machine module, also take the opportunity to recap what a module is. * Explain what the kernel program is * Explain the ID program * Explain what the CPU is * Explain the running time program * Learners use the activity sheet to try out some of the machine module programs * Teacher to support as required. | |
| Making | |
| There are no making activities in this lesson. | |