

# Automatic assessment of students' code using CodeRunner

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Basic questions for UK Mathematics departments:

- Should we teach our undergraduate students to programme a computer?
- If so what should we teach and how?

# UK Benchmark statement

*§3.16 All graduates have some knowledge and understanding of mathematical computing, with direct experience of specialist software **and/or of programming**, with an awareness of the appropriateness of the software for the problems being addressed and, when feasible, the nature of the algorithms on which it is based. (p. 16, QAA 2015)*

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*I was a pretty good physicist in my time. Too good — good enough to realize that all our science is just a cookery book, with an orthodox theory of cooking that nobody's allowed to question, and a list of recipes that mustn't be added to except by special permission from the head cook.*

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*Mustapha Mond*

# Background: computing in schools

July 2013: National Curriculum for schools in England Changed.



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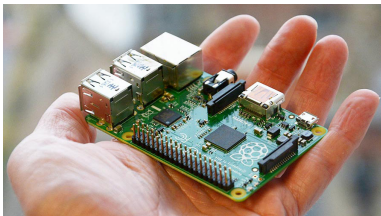
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School students, from the age of 5 will

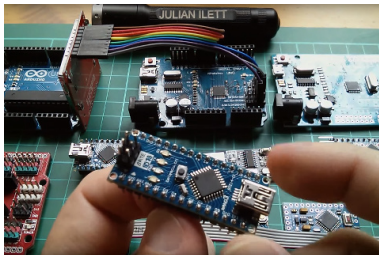
- learn foundations of computing science
- will be taught to write programs

# Initiatives

## Raspberry Pi



## Arduino

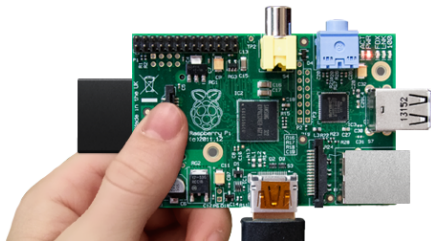


Additional hardware is needed.  
(keyboard, monitor, network connection, ...)

# Mathematica

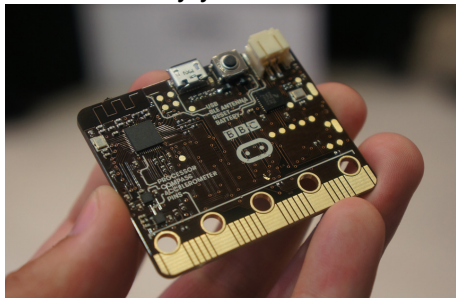
<http://www.wolfram.com/raspberry-pi/>

*Wolfram Language & Mathematica  
free on every Raspberry Pi!*



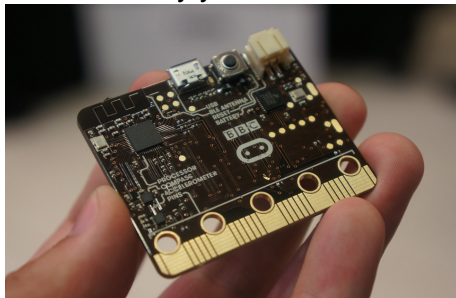
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Given to every year 7 student in 2016.



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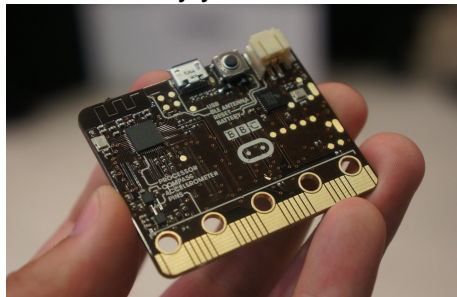
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- 25 LEDs, buttons, a compass, motion detection.
- Bluetooth, micro USB port, buttons, edge connector.

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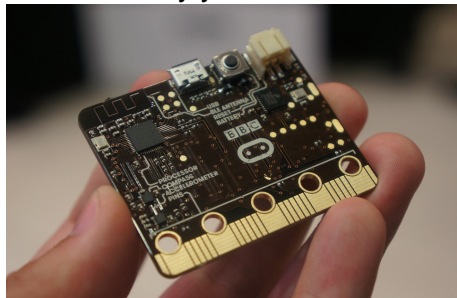
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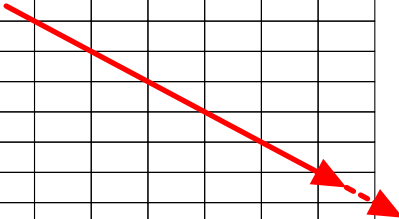
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(1/70 the size and 18 times faster than BBC Micros.)

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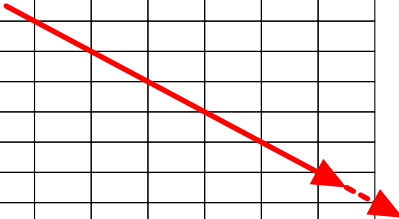
	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13
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Year 7 in 2015-16 could arrive at university in 2022-23.

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- No computer science school teaches programming as a service subject to mathematicians!

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- 2007-2014: computer science had the highest rate of unemployed graduates of any (STEM) subject in the UK.
- Gender balance (% of women)
  - ▶ Mathematics: 40%
  - ▶ STEM: 32%
  - ▶ Computer science 13%



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(Following Peter Rowlett I used *programming* and meant it in his sense...)

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Let's have a look....

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- Correspondence with the developers

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- MATLAB
- Increasing use for R



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- Students really appreciate the practice
- Students like the green ticks (when they get them....)
- We would not go back to lectures for code

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- Plagiarism/integrity is a worry and a potential issue



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- Fully online Python course?

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- ... and there are plenty of alternatives
- A small number of colleagues have picked this up
- Potential for much wider use