

The BBC micro:bit - from the UK to the World

[Extended Abstract]

Lancaster University

Micro:bit Educational
Foundation

Microsoft Research

ABSTRACT

The micro:bit rocks!

1. INTRODUCTION

The micro:bit is a small programmable and embeddable computer designed, developed and deployed by the BBC and partners (including Microsoft, and Lancaster University) to approximately 800,000 UK middle school students in 2015-2016. Part of the BBC's Make it Digital Campaign, the BBC described the micro:bit as its "most ambitious education initiative in 30 years, with an ambition to inspire digital creativity and develop a new generation of tech pioneers." [?]

Figure 1 shows (a) the front and (b) the back of the micro:bit, which measures 4x5 centimeters. Like the Arduino Uno, the micro:bit is a single-board microcontroller that can be programmed via a host computer (usually a laptop or desktop) and then embedded in projects where it runs on battery power. In contrast to the Uno, which has no built-in sensors, the micro:bit board hosts a variety of sensors (temperature, accelerometer, compass, light level), a 5x5 LED matrix, two user-defined buttons, as well as Bluetooth Low Energy (BLE) communications.

The design of the micro:bit hardware was driven by the first two objectives of the micro:bit project: (1) to provide a simple creative experience for physical computing, wearable and Internet of Things (IoT) projects; (2) to supply a device that can continue to provide learning opportunities as the user's expertise grows.

On the hardware side, the micro:bit's built-in sensors, buttons and LED display allow many projects to be completed with no additional hardware or wiring. The holes on micro:bit's edge connector allows additional external sensors and actuators to be connected via crocodile clips. As with Arduino, an ecosystem of micro:bit shields that the micro:bit can plug into expand its capabilities greatly. The micro:bit's BLE capabilities introduces networking to the picture, and enables streaming of data and command/control operations among the micro:bit, smartphones, laptops, as well as other micro:bits.

The design of the micro:bit firmware and coding tools also were oriented towards a simple starting experience with room for progression. In particular, the coding objectives of Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

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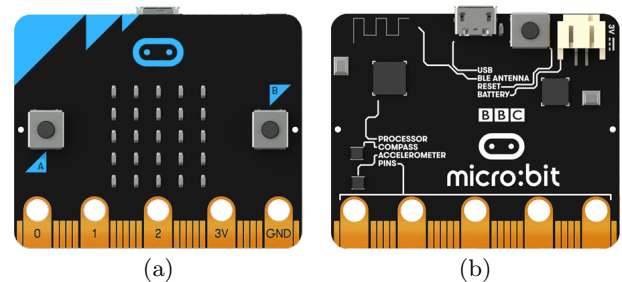


Figure 1: The micro:bit: (a) front, with two buttons, 5x5 LED display, and edge connector (bottom); (b) back, with processor, accelerometer, compass, Bluetooth, USB and battery ports.

the project were: (3) to give students an exciting, engaging introduction to coding; (4) to stimulate curiosity about how computing technologies can be utilized to solve problems that students identify.

[info about the coding solution: BBC identified using a web app and C/C++ compiler in the cloud to create a binary executable that would then be flashed onto micro:bit; final design put the entire toolchain in web app, without need to invoke C/C++ compiler to compile the user's program; ARM DAPlink solution makes micro:bit appear as USB pen drive on all operating systems; MicroPython provided second programming solution with entire toolchain on the micro:bit!!]

What happened:

- implementation and rollout took half a year longer than expected (surprise, with devices landing in classrooms in February of 2016, more than halfway through the 2015-2016 school year in UK);
- first full school year was 2016-2017, during which micro:bit Education Foundation got started;
- now have two full school years complete with experience in more countries
- lots of partners participating (ICSTE and CSTA 2018)!!

2. PHYSICAL COMPUTING

[In this section we show off the kind of projects made with the micro:bit]

3. ACKNOWLEDGMENTS