

Background Information for Leaflet

Mark Scheme Requirements

1. Client Criteria
2. Appreciation of context (social, environmental, economic)
3. Design solution
4. Competitor analysis (USP, market size)
5. Commercial viability (price/cost)

Client: Micro:bit Foundation

Background

Our client miro:bit is a not-for-profit organisation that makes pocket-sized codeable computers to encourage digital creativity and develop a new generation of tech pioneers. The micro:bit has reached more than 5000 schools in the UK and is used by hundreds of students globally.

Task

While the small-sized micro:bit module is great for coding, teachers find it difficult to demonstrate a student's work on their own micro:bit to a large group of students in a classroom setup. That is where the mega:bit comes in! Initially the idea was kick-started by a teacher himself who identified this need and many designs and prototypes were explored by several engineers.

The existing mega:bit model is essentially functional and demonstrates the function of a child's miro:bit onto a large board. However, the existing model requires every child's micro:bit to be soldered on making it impossible for easy demonstration by a school teacher.

We were presented with the challenge of having a well-designed mega:bit board in which any micro:bit could be simply plugged in without any additional coding or soldering and would then showcase the work of a student!

Client Criteria

1. Ergonomic Design
2. Ease of Use
 - micro:bit simply needs to be plugged into the mega:bit allowing teachers to easily demonstrate student's work to the whole class
 - it is powered by batteries
3. Safety
 - Since mega:bit is used in schools, the safety is of high importance. Following the successful design of the micro:bit, the mega:bit will replicate this design making it safe for the use in schools
4. Reliability

- Having to be used for the showcase of student's work, reliable operation of the mega:bit is essential. As teachers are only expected to plug in the micro:bit for demonstration, the design of mega:bit needs to be robust to allow high reliability
- 5. Scalability/Manufacturing
 - With over 5000 schools in the UK using the micro:bit and with teachers interested in having a mega:bit for demonstrations, the production and manufacturing is required to be on a large scale (How will this be achieved?)
- 6. Cost-Friendly
 - Mega:bit will be used in schools with a possibility that each school would get more than one mega:bit for demonstration purposes requiring the price to be affordable to an average school
- 7. Additional enhancements
 - To help the teachers use the mega:bit, additional push buttons are added to the back of the mega:bit along with another LED matrix facing the teacher and allowing an even easier demonstration

Challenges

1. Physical design of mega:bit that takes into account all of the sensors so original code's performance is not distorted
2. Consider the design trade-offs. Will all the micro:bit functions (light sensing, temperature sensing, accelerometer, compass) still work with our design?
3. Constructing a board that does not demand excessive certification requirements
4. Functioning with micro:bit with no additional soldering/coding from the teacher's side
5. Taking into account scalability and cost factors

Market Research

Current market has alternatives to micro:bit which include the following:

CodeBug - very similar to micro:bit in terms of price, functionality and use of online editor for programming. This device can also be powered with a watch battery allowing it to be more compact when not connected to a computer.

Crumble Controller - a small circuit board that allows children to learn coding in a similar way to micro:bit by using the online editor.

Sphero, InO-Bot and BlueBot - much more expensive than the micro:bit and slightly different as they are programmable robots that help children learn simple coding.

LegoMindstorms - more hardware (easy software- only their platform)

Even though alternatives to micro:bit exist, the idea of creating mega:bit is unique as none of the products above can be easily demonstrated by a teacher to a class of students. As the mega:bit is complementary to micro:bit and is designed in such way to support showcase functionality of a child's micro:bit, there is no direct competition in the market.

<http://mb4ps.co.uk/alternatives> (2016)

2. Other people building components/complementary products for micro:bit.

Game zip 64

<https://www.kitronik.co.uk/wp/wp-content/uploads/2018/03/game-zip-64-microbit-hero-1000.jpg>

Design Solution

To satisfy all the client criteria for a mega:bit that allows easy demonstration of a student's micro:bit code, the following solution was implemented.

Mega:bit replicates the design of the micro:bit with 5x5 LED display and two push buttons at the front but is a much larger allowing the whole class to see the operation of the code. The student's micro:bit is plugged in to the front side of the mega:bit without the need to do any additional soldering or coding from the teacher's side which allows for an easy use.

Previous Attempt for Mega:bit design

<http://www.makerspace-uk.co.uk/megabit/>

http://www.pocketmoneytronics.co.uk/?page_id=398

Required teachers to design it. ("So, the question is: is this new mega: bit design of interest to anyone? Are there any teachers out there who would be interested in making their own and helping develop the design?") – 2017

Microbit Stats

New BBC stats reveal micro:bit impact: <http://microbit.org/en/2017-07-07-bbc-stats/>