

# STEAM EDUCATION

## Michael Gray

### The Problem

Modern education tends to teach subjects in a vacuum. Subjects rarely cross academic boundaries, meaning that they do not come together with one another in a manner that enriches the learning process. In order to reach across academic disciplines and demonstrate to students how different disciplines can inform and even augment one another, a more holistic approach is needed.



Fig. 1: Students working on a STEAM activity

STEAM aims to address this problem through robotics, which will allow students a more tactile approach to abstract concepts and interdisciplinary learning.

### Specifications

A solution to this problem will:

- Act as a physical link for students between abstract concepts and real world examples.
- Have interchangeable parts that allow it to demonstrate different academic concepts.
- Cost \$100 or less.
- Be easily manufactured.

### Methodology (Our Work So Far)

- Research other robotics kits, to see how other parties have approached this problem before. (Shown in Fig. 1 and 2)
- Research how engineering and the arts are currently taught in schools.



Fig. 2: The Lego NXT Mindstorms Kit

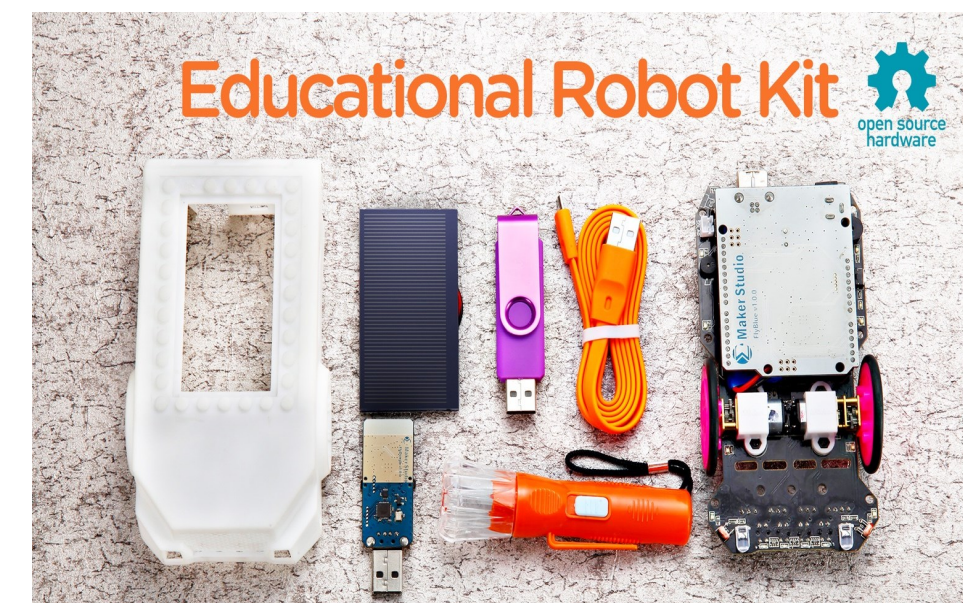


Fig. 3: The Blinkgogo Educational Robot Kit

- We chose a platform on which we could begin to design a modular system. In this case, it was the Arduino-based RedBot Board from Sparkfun (Fig. 3).

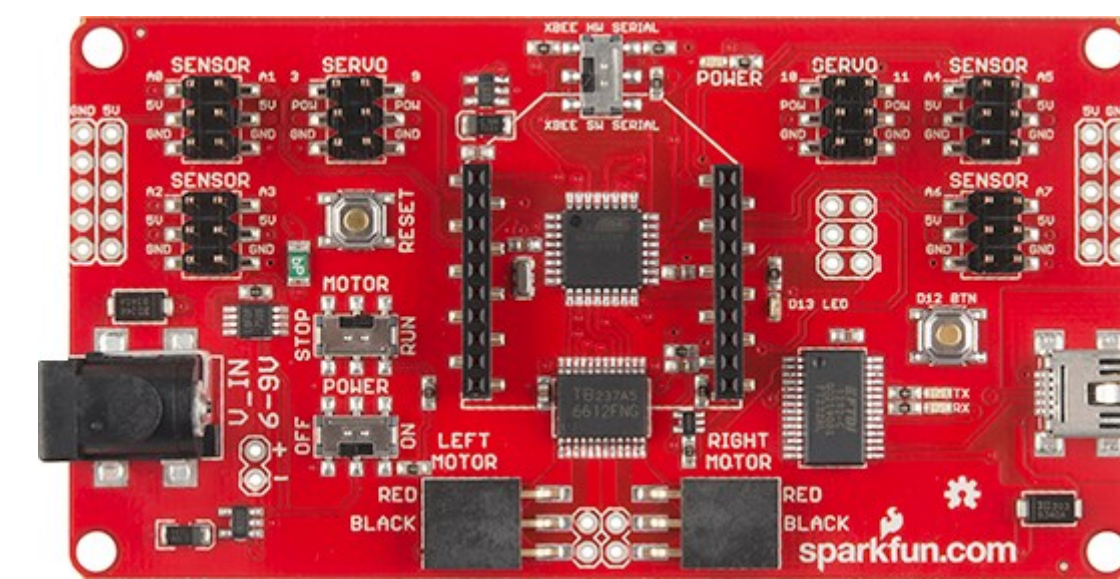


Fig. 4: The Redbot Main Board

- Idea generation: Implement a variety of modules that the kit could contain that would show off its capabilities to the client.

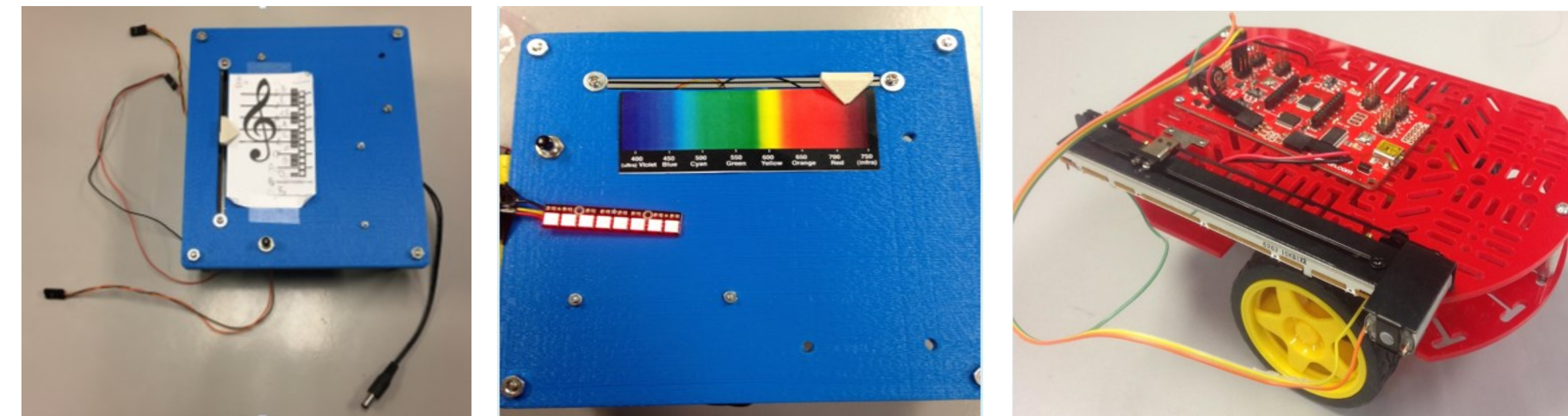


Fig. 5: (From Left to Right) The Music Unit, the Color Spectrum Unit, and the Pythagorean Theorem Unit

### Goals

We will create the STEAM Education kit to aid in changing the culture in schools, starting in the Harrisburg area. We are going to create a kit that demonstrates difficult concepts to grasp in middle and high school, while connecting the arts and engineering, math and science. This kit will have interchangeable parts to demonstrate different concepts.

### Methodology (Current Progress)

- Most recently, we have designed a case for our modular system.
- Case dimensions: 6.25" x 3" x 1.625"
- Contains:
  1. Redbot Board
  2. Potentiometer Slider
  3. Battery Case (4x AA Batteries)
  4. LCD screen
  5. Power Switch

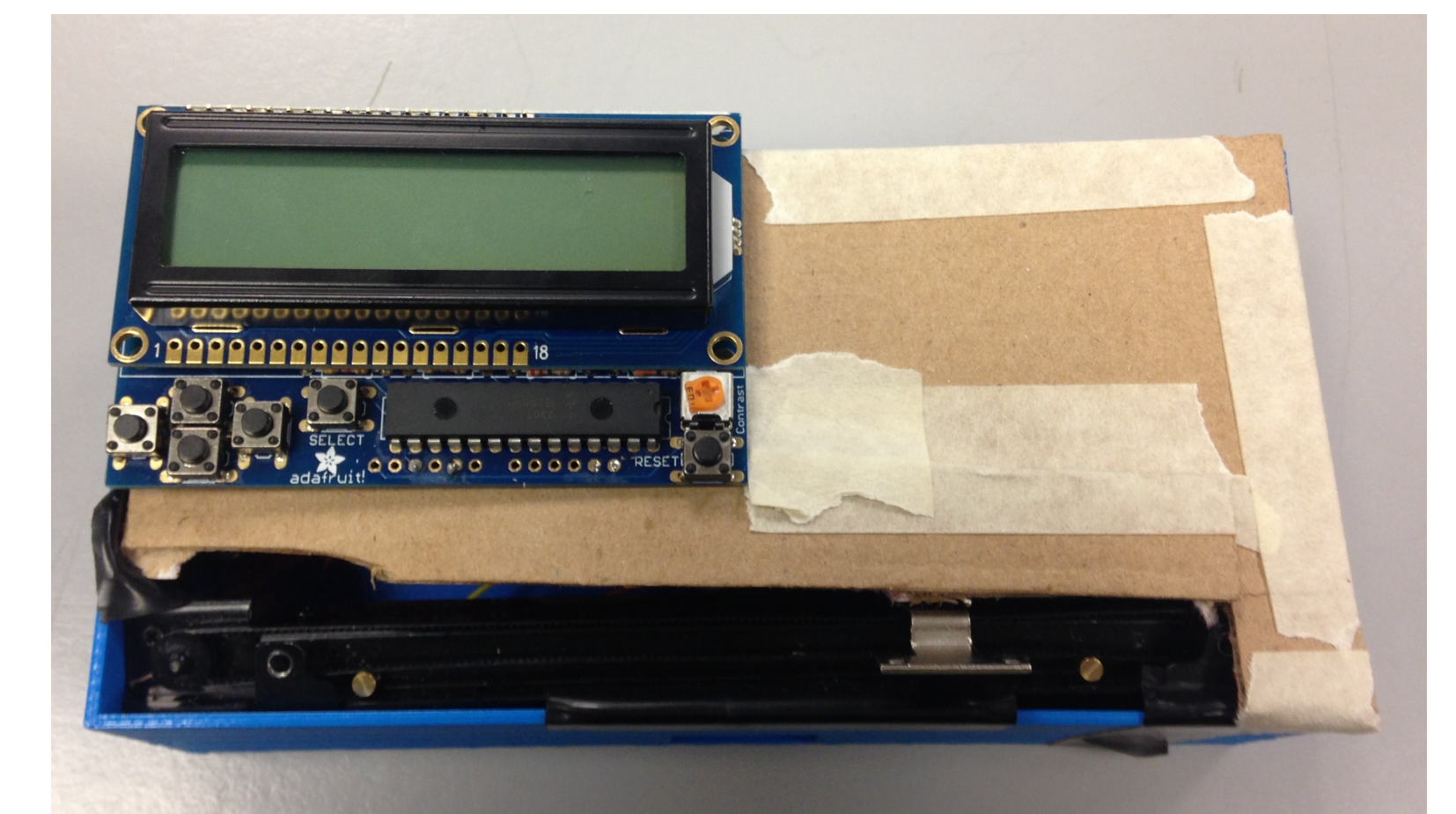


Fig. 6: Prototype of final device

### Conclusions

The STEAM Education kit is an ongoing process that has begun with the development of a music module. The ultimate aim is to design and implement more such modules that will cross the boundaries between different subjects and demonstrate a more holistic way of learning. Looking into the future, the STEAM education group will focus on generating more new ideas for modules and developing them into working prototypes, suitable for presentation to prospective clients. The group will also look into further polishing the function and aesthetic of each individual module while continuing to develop a means of making them interchangeable.

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