Pin Status

An Arduino Debugging Library for High School E-textile Courses
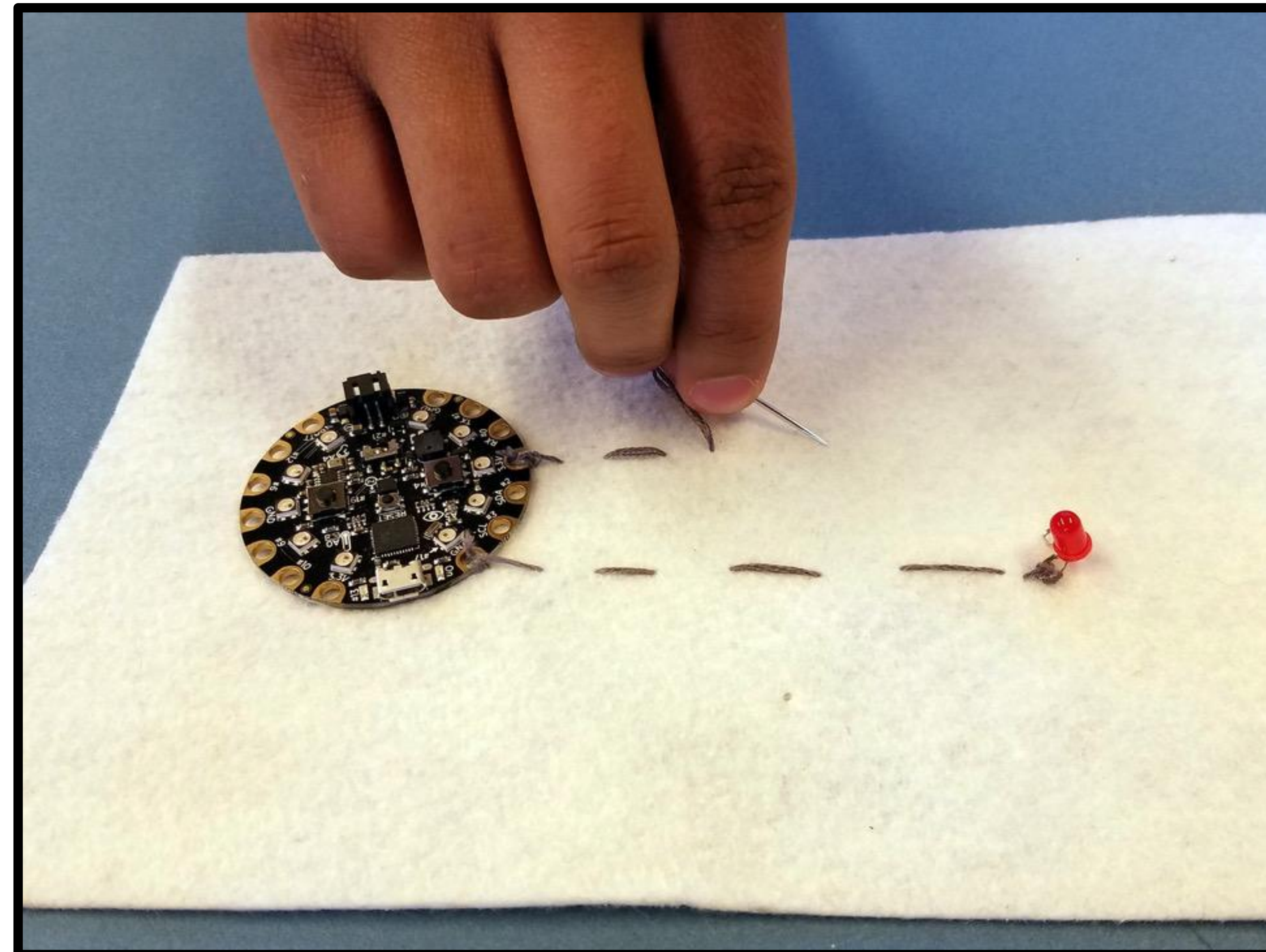
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Problem

The Arduino IDE, while designed for beginners, lacks debugging tools that could help new programmers to find and fix their program bugs.

Proposed Solution

- Arduino (C++) Library
- Works with original Arduino IDE (no modifications)
- Provides debugging info via Serial Monitor
- Tracks variables & allows for updates at runtime
- E-textile specific, uses the onboard neopixel leds to help students visualize the power moving through the system.

Student Experiences

- Students initially assumed the source of a bug, was the hardware (poor component or bad connection).
  - During observations, most bugs were found to be issues with programming logic.
- Students often read the code to try to find bugs and did not utilize print statements.
  - Debugging modifications were heavily facilitated by course assistants.

Student Feedback

- The serial output was found to be helpful, but the neopixel notifications were difficult to map to their corresponding pins
- Students found it difficult to handle "pauses" when testing system components. They would press a button once (instead of holding) and be confused as to why the debugger didn't read the value.

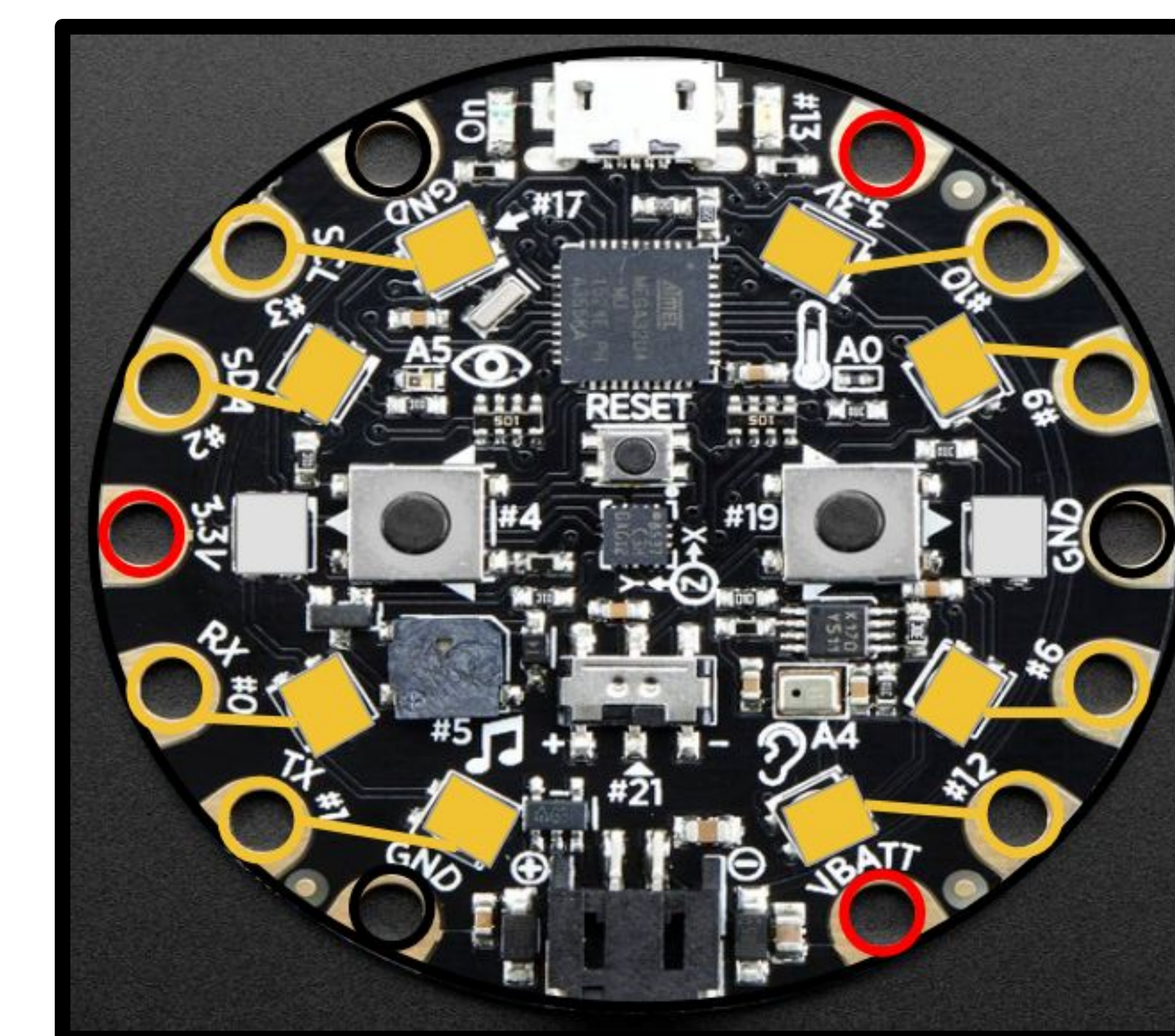## Example Student Code w/ Pin Status

```
byte val = analogRead(A10);
debugger.add(&val, BYTE, "val");
debugger.breakpoint("After analogRead");
if(val > 20 && val < 50){
    debugger.breakpoint("Inside if");
    digitalWrite(3, HIGH);
}
else {
    debugger.breakpoint("Inside else");
    digitalWrite(2, LOW);//Incorrect Pin
}
```

Example Serial Output:

```
        Breakpoint - After analogRead
1. Hardware Pins
2. Variables
What component would you like to view and/or update?
Selection (Q to quit): 2

        Variable Watch
[index] variable_name (type) : value
*************************************************
[0] val (byte): 37
*************************************************
Enter the index of the variable to be updated.
Selection (Q to quit):
```