



The Harvest Manager

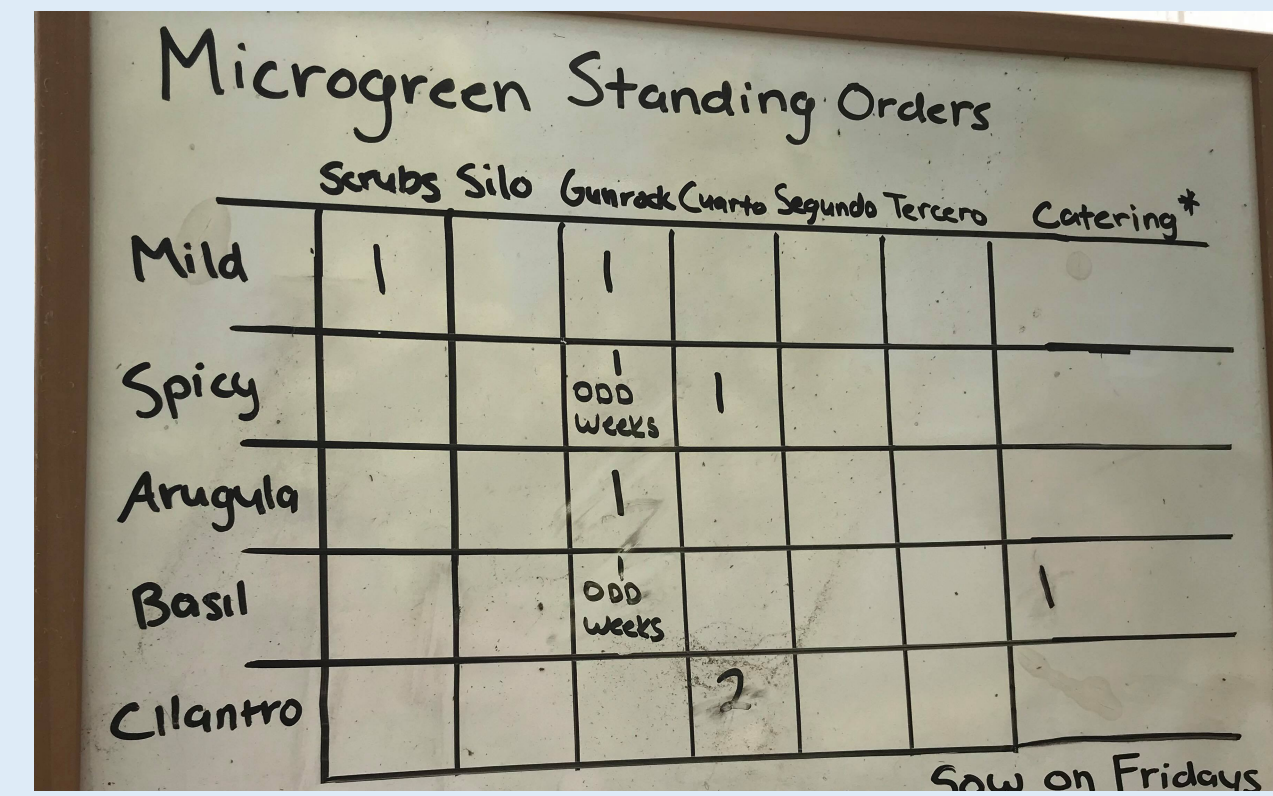
UC Davis - ENG3 Design Project

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The Problem

- Missed communication decreases packing efficiency
- No way to store information once erased
- Increased wait times for produce may frustrate customers
- Can't be updated from a distance
- Legibility of handwriting
- Wastes money on markers



Method

Design an interactive board using I2C enabled LCD displays that allows users to log their name, the crop they harvested, how much of the crop they harvested and at what time. Have the user input text to the screens using the BlueTerm app and clear one row and start over by pushing the corresponding button on the left side of the board. The circuit components would be well protected within a custom, laser cut encasing and powered by a battery, requiring no power outlet.

Design Challenges

- Width limitation of acrylic sheets restraining three screens to a row
- Two large rectangular holes required in the back to access circuitry
- Soldering a column of the LCD I2C backpack together in order to reference them individually in the code using unique serial numbers
- The bluetooth module cannot function with iOS (Apple) devices

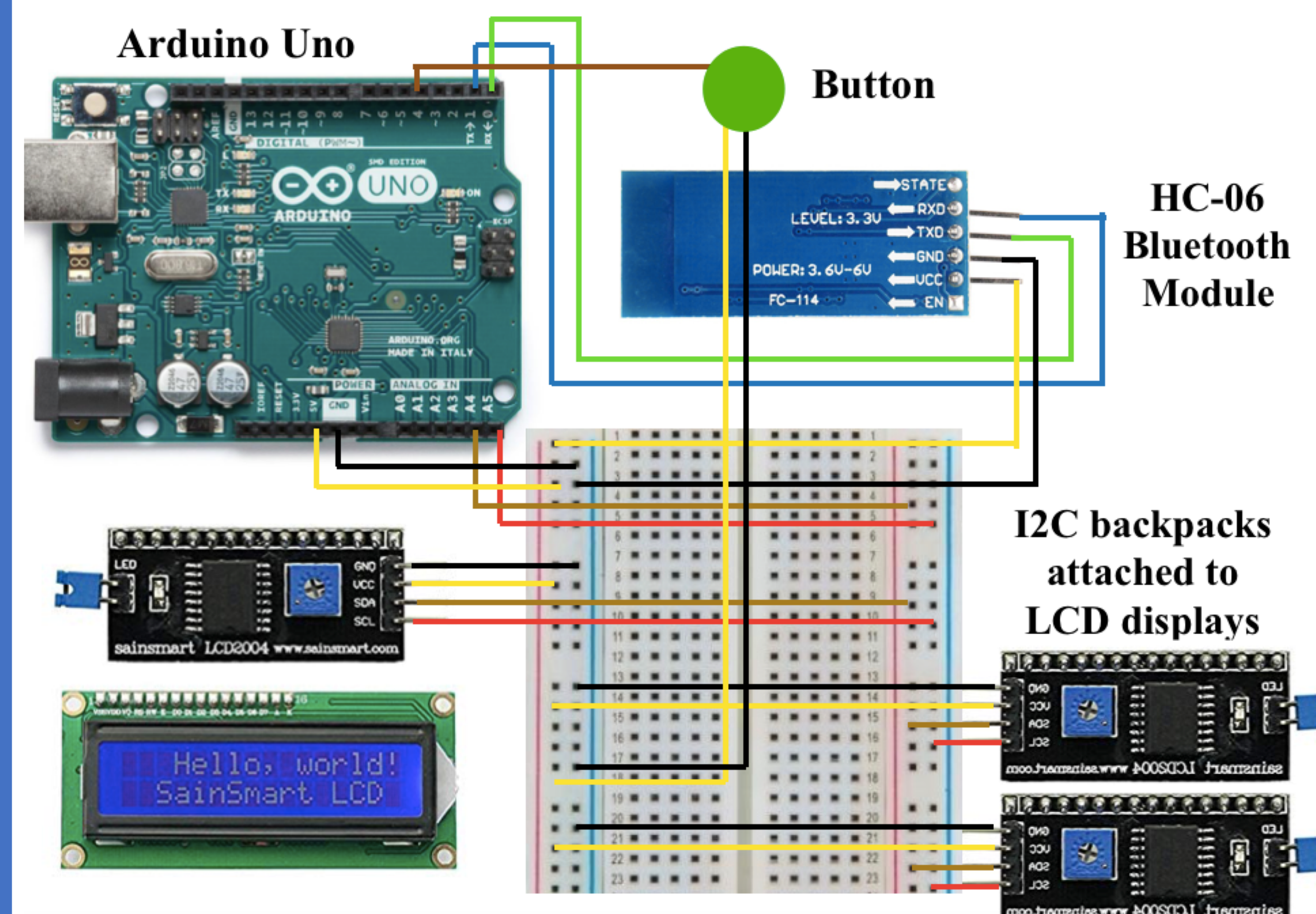
Components and Cost Estimation

• Arduino Uno	-----	\$15
• Breadboard	-----	\$5
• Bluetooth module	-----	\$3
• 4 large buttons	-----	\$6
• 9V Battery	-----	\$1
• 3- 12" by 24" 1/8"		
acrylic sheets	-----	\$24
• 13- 16x2 I2C enabled		
LCD displays	-----	\$32.50
• Jumper wires	-----	\$3
• Screws, nuts, and washers	--	\$3
• Glue and mounting	-----	\$2

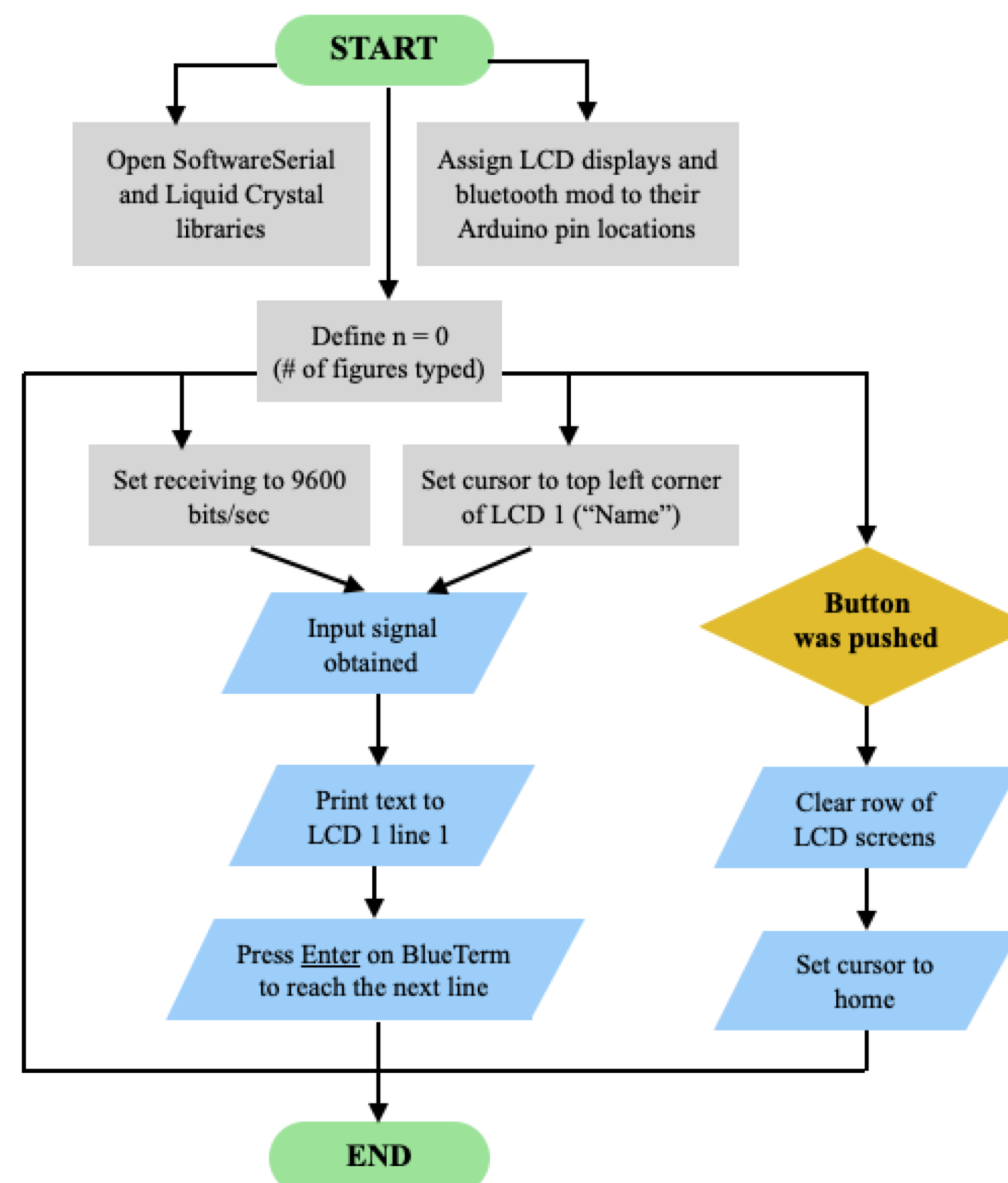
**Approximate
Manufacturing
Cost:**

\$95

Circuit Diagram



Logic Flow Chart

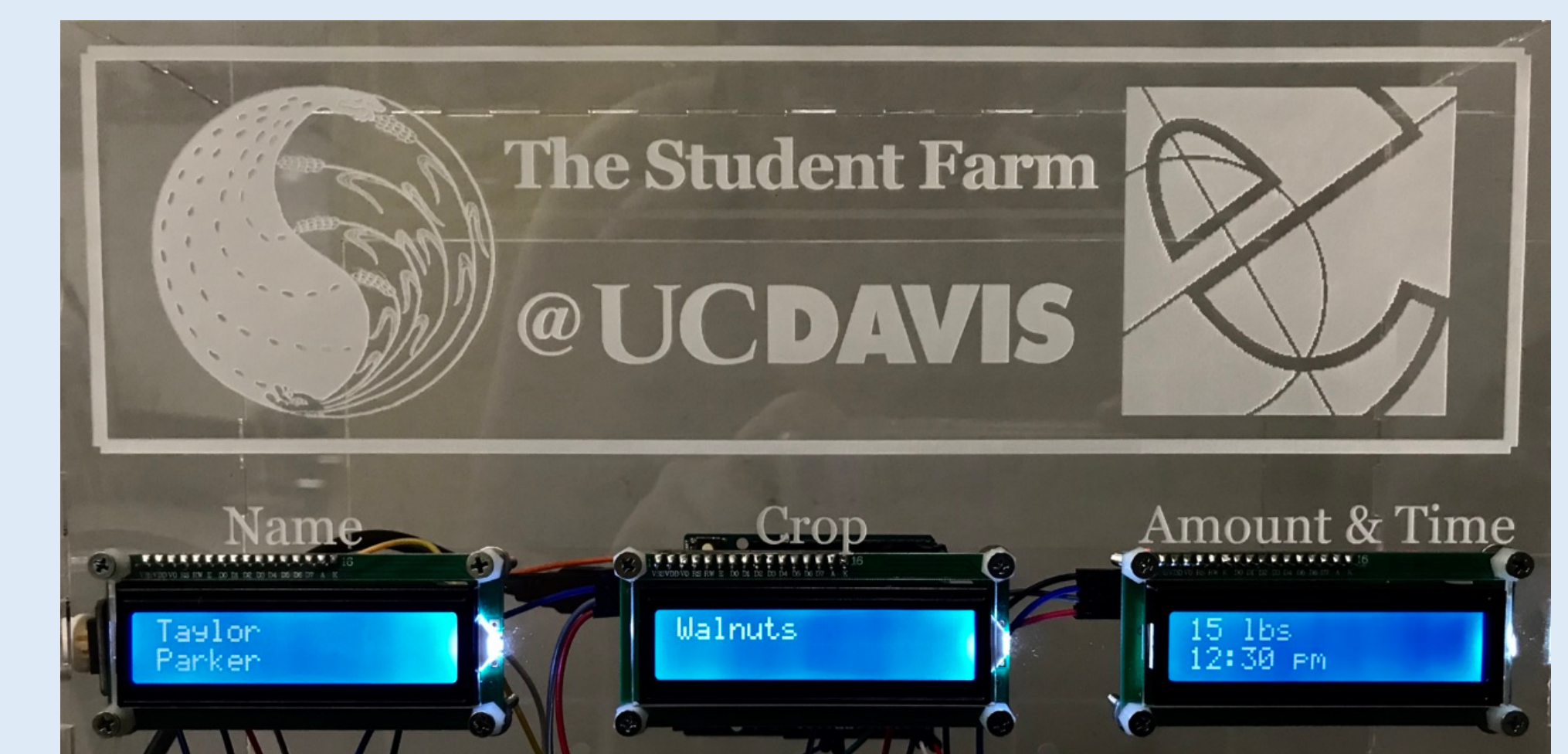


NOTE:

With three screens with two lines of text each, the user would switch their cursor to LCD 2 ("crop") after pressing enter twice, and LCD 3 ("Amount & Time") after pressing enter four times.

Results

The final prototype was a success. Users are able to easily type to the screens and clear info using the BlueTerm app to enter harvesting information as we designed. The app works within 40ft of the board, which is well within the spatial range of the packing shed and washing areas. All components are also held firm and protected in the acrylic body.



Moving Forward

- Add and code for the remaining 10 screens and 3 buttons
- Reduce board thickness to make wall mounting easier
- Remove the access openings for better protection of circuitry components, and avoid mounting with zip ties
- Use less pixelated screens and develop a custom app for easier user interaction
- Code the Arduino to save the board contents once per day
- Use a bluetooth module that works with iOS and Android

Acknowledgements

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References

- "Basics of the I2C Communication Protocol," *Circuit Basics*, Feb-2016. [Online]. Available: <http://www.circuitbasics.com/basics-of-the-i2c-communication-protocol/>. [Accessed: May-2019].
- "What character represent 'Enter' for serial communication?," *Stack Overflow*. [Online]. Available: <https://stackoverflow.com/11996553/what-character-represent-enter>. [Accessed: May-2019].