

Lindsay Craig

**Curriculum Vitae**  
**Lindsay “Linz” Craig**  
**Consultant, Engineer, Educator and Artist**

**PERSONAL INFORMATION**

Lindsay Craig  
1753 Sunset St. Longmont, CO 80501  
LinzeeCraig@gmail.com  
LinzeeCraig.com, QuestBotics.com  
(+1) 720 900 5469



**EDUCATION**

University of Massachusetts, Amherst  
Bachelor’s Degree w/ Individual Concentration. University of Massachusetts, Amherst, Massachusetts  
Concentration: Multi-Media Education– mix of high level Computer Science, Education & Art classes

**EMPLOYMENT HISTORY**

Zebulon Solutions Inc., Longmont, Colorado	March 2016 – Present
Junior Engineer. Design, build and test prototypes for a variety of clients. Lab upkeep and research.	
QuestBotics, Longmont, Colorado	September 2015 – Present
Cofounder. Design, build, test hardware and firmware of educational tools for users age 3 – 18. Create supportive materials and workshops, coordinate productization process, marketing and sales.	
LC's LLC, Longmont, Colorado	June 2014 - Present
Owner, Consultant, Technologist, Educator and Artist. Curriculum development, rapid electronics prototyping, material sourcing, logistics planning, event coordination, personnel training, hardware and event promotion, in-kind donation solicitation, outreach, technology education and art installments.	
SparkFun Electronics, Boulder, Colorado	2010 - 2014
Educational Outreach Coordinator. Curriculum development, workshop preparation–lead and facilitation–outreach to local and international communities, supportive material development, hardware kit creation, personnel training, event coordination and marketing.	
OpenWorld Learning, Denver, Colorado	2006 – 2010
Site Leader, Teacher and Trainer. Responsible for teaching 30 students, space management and supervising staff. Curriculum development and staff training in educational technology tools.	

**HONORS AND AWARDS**

Golden Mousetrap: Rising Engineering Star, Design News.	2017
Top Tech Teacher, Apex Awards.	2009 (Nominated)

**GRANTS RECEIVED**

Annual Gulu Tech Camp lead and prep grant, Oysters & Pearls-Uganda. \$5,000. 2017.  
Annual Gulu Tech Camp lead and prep grant, Oysters & Pearls-Uganda. \$5,000. 2016.  
Fundi Bots Training/Annual Gulu Tech Camp lead and prep grant, Hesed International. \$10,000. 2014.

Lindsay Craig

Initial consultation and training in Gulu, Uganda grant, Hesed International. \$3,000. 2013

**INVITED TALKS AND WORKSHOPS\***

- Rising Star Engineer: Engineering for Good: How Sharing Design Know-how Can Change the World,  
Design News' Golden Mousetrap Awards, Anaheim, CA February 8, 2017
- Running the Code, STEAM Fest 2015, MakerBoulder, Longmont, CO September 5 & 6, 2015
- X-STEM Symposium and USASEF 2014, Washington D.C. April 27-29, 2014
- Arduino, Processing and MAX, Boulder Museum of Contemporary Arts, Boulder, CO  
February 6, 2014
- Open Source Education Talk, Soldering and Wireless Workshop, Palmetto Open Source Software  
Conference, IT-oLogy, Columbia, SC March 27 & 28, 2013
- Intro to Arduino, Design WEST, EETimes, San Jose, CA April 23 & 24, 2013
- Intro to Arduino with LilyPad for Professionals and Educators, Make A MakerSpace, Artisan's  
Asylum, Somerville, MA February 2, 2013
- Multiple workshops, 2012 RAFT Symposium, RAFT, Denver, CO July 10-14, 2012
- USASEF 2012, Washington D.C. April 27-29, 2012

\*Only events which actively solicited my presence are listed, for a more complete list see resume

**PUBLICATIONS**

For Publications see Appendix A

For Educational Resources see Appendix B

**PATENTS**

- Craig, Lindsay. 2016. Modular Wireless System for Utilizing Electrical Input, Outputs and Input and  
Output Based Feedback During Live Performances. US Patent Application 132962, filed June  
1, 2016. Patent Pending.
- Craig, Lindsay, Lozano, Delfin. 2016. Tray-And-Block Apparatus for Device Programming. US Patent  
Application 15237572, filed August 15, 2016. Patent Pending.
- Craig, Lindsay, Lozano, Delfin. 2016. Safety Oriented Power Source for Conductive Play Dough  
Usage. US Patent Application 15249367, filed August 27, 2016. Patent Pending.

**TEACHING EXPERIENCE\*\***

- Wireless Communication, Various Methods  
Graphical User Interfaces and Video Games  
Introduction to Microcomputers with pcDuino  
Video Game Controller Creation  
Printed Circuit Board Design  
Wearable Electronics  
Prototyping  
Electronics Teaching Tools for Elementary Age

Lindsay Craig

Kinesthetic Technology Teaching Activities  
Audio Editing and Creation  
Solar Energy Technology  
Curriculum Creation Methods  
Technology Education for Educators  
Microcontrollers, Intro and Advanced  
Soldering, Various Methods

\*\*Incomplete listing, for complete listing see Appendix C

\*\*Class listing indicates workshop creation, associated materials development and assistant training

### **PRODUCTS, PROTOTYPES AND LARGE EVENT COORDINATION**

Questies product line, QuestBotics Inc., Longmont, CO. Responsible for design, firmware and marketing of tactile programming tools with wireless connections for an introduction to programming and math skills, users aged 3- 18. Patent pending. April 2016 – present

Run the Code, Longmont, CO. Created original concept using an obstacle course to teach embedded systems, foundational and advanced programming. Concepts include object oriented programming, serial communication, variables and logic flow. Executed obstacle course with local educators and currently conduct workshops for educators. September 2015 - present

Live Performance Wireless System, Longmont, CO. Created solo project consisting of an audio looper system, wireless mp3 trigger, audience input device and leather jacket with “wearable” RGB LED system. Currently used in performances. Patent pending. January 2014 - present

Gulu Annual Tech Camp, Oysters & Pearls-Uganda, Gulu, Uganda. Organized, promoted and led tech camps with a concentration in robotics and prototyping. Responsible for fundraising, outreach to US organizations for donations and university personnel presence. Trained and oversaw instructors as educational staff size grew from four to thirty. June 2013 – January 2017

Farm Automation Collabathon, Gulu, Uganda. Organized, promoted and led a four day “Collabathon” where a team of eleven, including an ECU professor, developed three electronic prototypes designed to monitor and care for livestock and crops. January 2015

Wireless Video Game Controller and Balance Board, Longmont, CO. Solo project consisting of a video game, a joystick controller and balance board. With two different types of wireless technology the system also has an associated workshop and materials. January 2014 – June 2014

### **PROFESSIONAL SOCIETIES AND VOLUNTEER POSITIONS**

UBM plc, ESC Advisory Board	2016 – present
Computer Science Teacher's Association, Colorado Chapter	2016 – present
Tinkermill, Volunteer Outreach and Event Organizer	2015 – present
Fundi Bots, Curriculum Developer, Promoter and Consultant	2014 – present
EETimes, Blogger	2014 – present

### **ADDITIONAL QUALIFICATIONS AND SKILLS**

Class B CDL equivalent driving capabilities

Conversational Spanish

## APPENDIX A PUBLICATIONS

### SparkFun blogs (extensive)

Various educational blogs regarding hardware. SparkFun Electronics, 2010 – 2015  
[www.sparkfun.com/news](http://www.sparkfun.com/news). Accessed November 2016

### EETimes

“What Does It Take To Truly Leapfrog With Technology?” *EETimes*, 12/18/2014,  
[http://www.eetimes.com/author.asp?section\\_id=36&doc\\_id=1325054](http://www.eetimes.com/author.asp?section_id=36&doc_id=1325054)

“A Different Narrative: Meet the Fundis” *EETimes*, 1/13/2015,  
[http://www.eetimes.com/author.asp?section\\_id=36&doc\\_id=1325281](http://www.eetimes.com/author.asp?section_id=36&doc_id=1325281)

“A Different Narrative: The Fundi Lab” *EETimes*, 12/25/2014,  
[http://www.eetimes.com/author.asp?section\\_id=36&doc\\_id=1325106](http://www.eetimes.com/author.asp?section_id=36&doc_id=1325106)

“Hackathon Adventures in Africa” *EETimes*, 12/24/2015, [http://www.eetimes.com/author.asp?section\\_id=36&doc\\_id=1328560](http://www.eetimes.com/author.asp?section_id=36&doc_id=1328560)

“Open Hardware, Software & Minds” *EETimes*, 5/9/2016, [http://www.eetimes.com/author.asp?section\\_id=28&doc\\_id=1329647](http://www.eetimes.com/author.asp?section_id=28&doc_id=1329647)

### Make Robots Not War

“Outreach Over to Rwanda and Down to A Younger Generation”, *Make Robots Not War*, 11/7/2014, <http://makerobotsnotwar.com/outreach-rwanda-younger-population/>

“A Thrilling Introduction to Programming and Bungee Jumping By the Nile”, *Make Robots Not War*, 10/8/2014, <http://makerobotsnotwar.com/outreach-rwanda-younger-population/>

“Building Boards and Whittling Away at Workshops”, *Make Robots Not War*, 9/30/2014,  
<http://makerobotsnotwar.com/building-boards-whittling-away-workshops/>

“Creating a Vibrant Community “Fundi Space” One Step at a Time”, *Make Robots Not War*, 9/12/2014, <http://makerobotsnotwar.com/fundi-space/>

“Technological Leadership, Not Horsing Around”, *Make Robots Not War*, 8/26/2014,  
<http://makerobotsnotwar.com/uganda-tech-leadership/>

“Teaching in Uganda, Hitting the Ground Running”, *Make Robots Not War*, 8/14/2014,  
<http://makerobotsnotwar.com/uganda-week-1/>

“Othermill on My Doorstep”, *Make Robots Not War*, 7/18/2014,  
<http://makerobotsnotwar.com/othermill-doorstep/>

“What Does a Mobile Hackerspace or Makerspace Look Like?”, *Make Robots Not War*, 7/16/2014, <http://makerobotsnotwar.com/mobile-hackerspace/>

“Evolution of a Workspace”, *Make Robots Not War*, 7/14/2014,  
<http://makerobotsnotwar.com/evolution-workspace/>

“Hello World”, *Make Robots Not War*, 7/11/2014, <http://makerobotsnotwar.com/hello-world/>

“Artistic Soldering with PCBs”, *Make Robots Not War*, 7/5/2014,  
<http://makerobotsnotwar.com/artistic-soldering-pcb/>

“MOSS Review, Magnetic Robotics Construction”, *Make Robots Not War*, 6/15/2014,  
<http://makerobotsnotwar.com/moss-review-magnetic-robotics-construction-set/>

“Graphene, Overhyped or Truly a Wonder Material?”, *Make Robots Not War*, 6/11/2014,  
<http://makerobotsnotwar.com/graphene-overhyped-truly-wonder-material/>

Lindsay Craig

**Oysters & Pearls-Uganda**

“A Ticket to Uganda”, *Oysters & Pearls-Uganda*, 10/11/2014,  
<http://www.oystersandpearls.org/blog/>

**LinzeeCraig.com**

“The Othermill Day Zero”, *LC's LLC*, 7/8/2014, <http://www.linzeecraig.com/about-2/my-hardware/the-othermill-day-zero/>

Lindsay Craig

## APPENDIX B EDUCATIONAL RESOURCES

**SparkFun Inventor's Kit Teacher Resource Binder:** [www.linzeecraig.com/educational-resources/sikbinder](http://www.linzeecraig.com/educational-resources/sikbinder)

**The SparkFun Five Days of Prototyping Binder:** [www.linzeecraig.com/educational-resources/five-days-prototyping/](http://www.linzeecraig.com/educational-resources/five-days-prototyping/)

**Creating Video Games and Controllers with Analog Pong and Processing:**  
[www.linzeecraig.com/educational-resources/pong/](http://www.linzeecraig.com/educational-resources/pong/)

**Run the Code Handout- Teaching Programming Concepts with an Obstacle Course:**  
[www.linzeecraig.com/wp-content/uploads/2014/06/Obstacle-Course-For-Teachers-Handout-Short.pdf](http://www.linzeecraig.com/wp-content/uploads/2014/06/Obstacle-Course-For-Teachers-Handout-Short.pdf)

**Run the Code Keynote Presentation- Teaching Programming Concepts with an Obstacle Course:**  
[www.linzeecraig.com/wp-content/uploads/2014/06/Running-the-Code-Obstacle.key.zip](http://www.linzeecraig.com/wp-content/uploads/2014/06/Running-the-Code-Obstacle.key.zip)

**Processing the Danger Shield:** [www.linzeecraig.com/educational-resources/processing-the-danger-shield/](http://www.linzeecraig.com/educational-resources/processing-the-danger-shield/)

**Introduction to Arduino:** [www.linzeecraig.com/educational-resources/intro-to-arduino/](http://www.linzeecraig.com/educational-resources/intro-to-arduino/)

**Driving to Scratchville:** [www.linzeecraig.com/educational-resources/driving-to-scratchville/](http://www.linzeecraig.com/educational-resources/driving-to-scratchville/)

**Soldering PTH:** [www.linzeecraig.com/educational-resources/soldering-ptb/](http://www.linzeecraig.com/educational-resources/soldering-ptb/)

**Soldering SMD:** [www.linzeecraig.com/educational-resources/soldering-smd/%20](http://www.linzeecraig.com/educational-resources/soldering-smd/%20)

**Soldering Stencil:** [www.linzeecraig.com/educational-resources/soldering-stencil/](http://www.linzeecraig.com/educational-resources/soldering-stencil/)

**Resistance Board:** [www.linzeecraig.com/educational-resources/resistance-board/](http://www.linzeecraig.com/educational-resources/resistance-board/)

**Serial Communication b/w Arduino and Processing:** [www.linzeecraig.com/educational-resources/serial-communication/](http://www.linzeecraig.com/educational-resources/serial-communication/)

**TEI Gaming Workshop Materials:** [www.linzeecraig.com/educational-resources/tei-gaming/](http://www.linzeecraig.com/educational-resources/tei-gaming/)

**LilyPad, no Programming:** [www.linzeecraig.com/educational-resources/lilypad-sew-easy/](http://www.linzeecraig.com/educational-resources/lilypad-sew-easy/)

**LilyPad with Programming:** [www.linzeecraig.com/educational-resources/lilypad-with-programming/](http://www.linzeecraig.com/educational-resources/lilypad-with-programming/)

**Giant Functional Breadboard:** [www.linzeecraig.com/educational-resources/giant-breadboard/](http://www.linzeecraig.com/educational-resources/giant-breadboard/)

**Giant Functional Components:** [www.linzeecraig.com/educational-resources/giant-components/](http://www.linzeecraig.com/educational-resources/giant-components/)

**Squishy Circuits:** [www.linzeecraig.com/educational-resources/squishy-circuits/](http://www.linzeecraig.com/educational-resources/squishy-circuits/)

## APPENDIX C TEACHING EXPERIENCE

(Listing in order of ascending difficulty, not sequential order.)

- Squishy Circuits (Conductive Playdough):** Using conductive playdough learn connectivity, Ohm's law, electron flow, voltage dividers, capacitance and how to use a multimeter.
- Run the Code (Obstacle Course Technology Activity):** Obstacle course teaching coding concepts such as logic flow, iteration, conditionals, variables, object oriented programming and, depending on student level, other advanced physical computing concepts.
- Fun with Makey-Makey:** Using Makey-Makey hardware create a silly interface for controlling a computer. Examples of potential interfaces include bananas, donuts, people, slip and slides, etc. Introduction to capacitance and variety of interface possibilities.
- Intro to E-Origami (Paper Circuits):** Use conductive tape and conductive ink to light up LEDs, create interfaces, integrate basic sensors and make other electronic circuits on paper. Introduction to electron flow, electrical circuits, rework, voltage dividers and multimeters.
- Intro to Scratch:** Build a basic video game in MIT's drag and drop programming environment. Great for kids as young as six. Provides an introduction to animation, logic flow, variables, conditionals and more. Given sufficient time digital DJ project can also be pursued.
- Scratch with Sensors:** Learn how to integrate sensors into a project made with MIT's Scratch.
- Soldering, PTH:** Introduction to soldering techniques necessary for creating projects with electronics.
- Intro to E-Textiles (Wearables):** Using conductive thread create wearables circuits. Circuit includes LEDs, buttons, power source and basic sensors. Concepts covered include connectivity, multi-meters, electron flow, basic wearable interface creation and electrical circuits.
- Giant Functional Breadboards & Components (and other tools):** Create 10X functional electronics and prototyping tools useful for teaching younger students. Additional tool: Ohm's law board.
- Intro to Solar Technology:** Get hands on experience with solar cells, parallel and serial application, discussion of orientation techniques and multimeter usage.
- Solar Village Activity:** Create a miniature smart city or village that runs on solar. Simple version includes a single cell and LEDs. Advanced version involves Arduino, a solar array with servo orientation, inputs and outputs such as sensors, motors and water pumps.
- Introduction to Animation with Scratch or Processing:** Pursue more advanced animation techniques and applications with MIT's Scratch or freeware Processing/JAVA.
- Intro to Arduino (Drag and Drop Programming):** Microcontroller basics including logic flow, input, output and serial communication using a drag and drop programming environment.
- Open Source/Free Software to Get The Job Done:** Educators and entrepreneurs tend to be strapped for cash, but have a lot of problems to solve. Explore free and low cost Open Source solutions, hardware, software and educational resources.

Lindsay Craig

- Personalize a Video Game:** Intended to help art educators, and others unfamiliar with coding, incorporate computer programming into their skillset. Using an example video game written in Processing/JAVA attendees go from placeholder graphics to customized graphics with extremely minimal code writing. Those familiar with Processing/JAVA can incorporate sensors to control the video game or add new levels.
- Intro to Arduino (Text Based Programming):** Microcontroller basics including input, output and serial communication. Available in formats varying from “speed” two hour format, a two day in-depth workshop or a full semester exploration. Foundational skills for robotics.
- Printed Circuit Board Design for Kids:** Using kid friendly tools create documentation such as images of electrical systems and schematics. Take the schematics and create a printed circuit board design for milling or ordering. Core skill necessary for advanced prototyping.
- Advanced E-Textiles (Wearables):** Microcontroller basics including input, output and serial communication in wearable designs. Exploration of wearable specific concepts such as modularity, washing, “soft” sensors and textile specific interfaces. Available in formats varying from “speed” two hour format, a two day in depth workshop or a full semester exploration.
- Intro to Processing/JAVA:** Foundational coding skills with immediate results. Basic animation, graphical user interface skills and introduction to core concepts such as variables, methods and objects. Attendees also learn how to use inputs such as mouse and keyboard to control code.
- Intro to Serial Communication:** Building on Processing/JAVA and Arduino skills this workshop introduces the concepts necessary to communicate between a computer and microcontroller. Skills also useful in communicating between microcontrollers or using wireless.
- Audio- Introduction to Sound Editing:** Using freeware perform basic audio recording, editing and layering. Useful for video soundtracks, video game sound effects, audio samples and ringtones.
- Audio- Incorporating in Embedded Systems:** Take existing audio samples and incorporate them into an embedded system or physical computing project. Available with microcomputers, mp3 triggers or Processing/JAVA.
- Circuit Bending (Repurposing Existing Hardware):** Existing electronics circuits are easy to repurpose given basic troubleshooting skills. Examples of circuit bending include using a digital watch as a timer or alarm unit on a more complex system or repurposing an electronic toy interface to control motors instead of simply beeping.
- Art & Technology:** Incorporate technology into an art project. Skills and project depend on art form. Hardware examples include simple LED usage, wireless network pieces or capacitive touch interfaces. Examples of application include fashion, mural installations, audio projects, haunted houses, wood work or glass work integration and motor or servo actuator based sculptures.
- Soldering, SMD:** Advanced soldering skills for production level electronics and ICs (microchips).
- Soldering, Rework:** Advanced soldering skills necessary for fixing, removing and replacing production level electronics and ICs (microchips). Hot air rework machine and troubleshooting skills with multimeter.



Lindsay Craig

**Soldering, Stenciling (Production Techniques):** Production techniques for using stencils, solder paste and reflow techniques. If commercially produced stencils are not available stencil creation techniques are also covered.

**Advanced E-Origami (Paper Circuits):** Create advanced circuitry on paper and cardboard using conductive tape, conductive glue, conductive ink, graphite and solder. Components used include SMD and ICs (microchips). Optional pursuit of DIY conductive glue.

**PCB Design for Adults:** Use Autodesk's Eagle to design schematics and create printed circuit boards.

**Datasheets and Part Sourcing:** How to find the information needed to assess if an electronic part meets your needs, avenues to search for sourcing parts and additional resources.

**Prototype 1- Idea to Design Plan:** Take an idea, assess it for potential market viability, identify features necessary for a minimum viable product, future features, BOM and schematic.

**Prototype 2- Design Plan to Prototype:** Take a design and build an electrical circuit and write rudimentary code for proof of concept.

**Prototype 3- Prototype Revision:** Create a PCB, enclosure and user interface. Lean methodology to test existing prototype and build a new revision that meets requirements found in testing data.

**Prototype 4- Prototype to Minimum Viable Product:** Taking a functional prototype to an aesthetically pleasing minimum viable product without unnecessary features.

**Prototype 5- Testing and Productization:** Taking a final prototype and conducting tests to determine functionality in consumers hands. Lean methodology, environmental and user testing. Discussion of supportive materials for consumers and those who may work on the project later.

**Wireless- Intro to Shortwave Radio:** 434 MHz radio communication. Datasheets, range testing, open networks vs. channels and an introduction to radio communication. Available with other shortwave radio models.

**Wireless- Shortwave Radio Application:** Incorporate a 434 MHz radio into an Arduino IO project.

**Wireless- Intro to XBees Series 1:** Use XBee Series 1 radio/microcontrollers to create networks. Simple point to point network, chat applications and pin to pin communication. XCTU and AT commands.

**Wireless- Intro to XBees Series 2 (ZB & 2B):** Use XBee Series 2 radio/microcontrollers to create networks. Capabilities include mesh networking, API usage and pin to pin communication. XCTU and AT commands.

**Wireless- XBee Application:** Apply the skills learned in Intro to Xbee classes to create a network. Possibilities include mesh networks, pin to pin sensor networks.

**Wireless- Intro to Bluetooth:** Learn the commands necessary to configure a Bluetooth unit and incorporate Bluetooth into an Arduino project. Please note, this workshop does not cover communication to a computer, just between Bluetooth units.

**Wireless- Bluetooth with Processing GUI:** Create a basic GUI in Processing/JAVA and connect it to an Arduino via Bluetooth. Bluetooth facilitates input from GUI to Arduino output and input from Arduino to control aspects of GUI.

Lindsay Craig

**Wireless- Advanced:** Reprogram XBee or Bluetooth units via an Arduino interface. Read unit Ids, switch connected units and discover nearby devices.

**Video Game Controller Design and Prototype:** Design a video game controller to control a game made in Processing/JAVA. Go from breadboard circuit to embedded functional controller and from wired cable connection to wireless. Controller provides input to control game and output from game to indicate life lost or bonuses collected.

**Arduino IDE with Alternative Boards & Advanced Concepts:** Debugging skills, interrupts, setting fuses, writing to EEPROM, working with boards other than Arduinos and more. (Additional concepts covered depend on skill level of participants.)

**Intro to AVR Programming (Microchips):** Program the Atmel chips that Arduino uses. Set fuse bits, do bitwise operations, create circuits that will meet your needs while leaving programming pins available and GCC based make files.

**Intro to Microcomputers (PCDuino or Raspberry Pi):** Covers the basics of setting up and using a microcomputer, accessing I/O pins and using a microcomputer in an embedded capacity.

### EDUCATOR CLASSES

**Kinesthetic Technology Activities:** Activities to teach a wide variety of technology skills through physical activity. Examples of concepts covered include logic flow, variables, electron flow, sensors, actuators and digital communication.

**Run the Code (For Educators):** The ultimate physical activity to teach coding, educators learn how to coordinate physical education class with technology class, customize the obstacle course, advanced concepts as stretch goals and strategies to differentiate running of the course.

**Leveraging Video Games in the Classroom:** Use existing video game culture, narrative and programming concepts in code design and classroom management.

**Technology Curriculum Creation:** Take a new technology or project and create useful curriculum that will help students internalize how to use the new technology and the underlying concepts.