

## Project 1

### NOUVO: THE SMART PACIFIER

Amaury Saulsberry  
Akeem Kennedy  
Trevor Sibby  
Siyu Ai

Not pictured:  
Kevin Yu



**Smart Pacifier:** We are creating a smart pacifier that *monitors pH and temperature in a baby's saliva*, and we're using that data as a biomarker for acid reflux detection. Our smart pacifier connects to the users mobile device via bluetooth and all data that is collected will be synched in real time. The data can also be used to help physicians better understand symptoms of the patient and help them decide what is the best possible treatment for each case. We're really focusing on *early detection of systematic diseases in infants and young children*, specifically harmful refluxing. Through customer discovery, we've learned that our patent pending method can be used for a wide range of cases, not just in pediatric care.

### Mentors

1. **Brian Cunningham**, Director, MNTL: Sensors and Biomedical Applications
2. Martin Burke, Director, Molecule Maker Lab: Molecular Synthesis
3. Nadeem Ahmad, MD, MPH, PhD, Carle Pediatrics
4. David Oprondek, Neonatal ICU Dietician, Carle
5. Sarah Church, Mother Baby, Carle
6. Khan Siddiqui, MD, Entrepreneur, Higi, Inc, Chicago
7. Marty Burke, MD, PhD, Chemistry, UI

**Project Contact:** Amaury Saulsberry: [asauls4@illinois.edu](mailto:asauls4@illinois.edu)

**HEART  
HEALTH  
WEARABLE  
DEVICE**

Katherine Chou

**Project 2**

**A Wearable Device for Heart Disease Patients:** This device not only monitors daily heart health, but *also notifies nearby pedestrians with phone emergency notifications* (similar to flood/amber alert, etc.) in a cardiac emergency, providing them clear CPR instructions under the guidance of 911. A device to greatly reduce the barrier to administering life-saving first aid. **Background:** 30000 people/yr passed away unnecessarily based on heart attacks and because of the bystander effect, and that bystanders are usually not confident about first aid. Only 7% of people feel confident in carrying out first aid. 77% of the people lack the knowledge and confidence to administer basic first aid, instead calling 911 and wait until medical help arrives. For details see: ---  
<https://croreisha.squarespace.com/wearables>

**Mentors**

1. Mark Johnson, Carle, Medical Safety
2. Issam Moussa, Carle, Cardiology
3. Haitham Hassanieh, ECE, Wearable Devices
4. Jenny Amos, BioE/CI MED, Bioengineering
5. Laura Frerichs, Innovation and Entrepreneurship
6. Gary Durack, TEK MILL, Innovation, Prototyping
7. Arend van der Zande, MechSE, 2D Materials
8. Paul Braun, Director, MRL, Battery Design

**Project Contact:** Katharine Chou: [croreisha@gmail.com](mailto:croreisha@gmail.com)

**PROGRAMMABLE  
PILL BOTTLE**

Dena Strong

**Project 3**

**Programmable Networked Medicine Dispenser:** To make sometimes-complex medication dosing easier *for people with mental or physical disabilities, an expandable networked medicine dispenser* would contain a distinct pod for each medicine to be dispensed, a refill monitor, and timing control to dispense the medicine to the person at the right time and in the right quantity -- something like an automated change machine at restaurants, **but programmable, refillable, and with a small integrated screen** that could display prompts such as the words "with food" and an image of a plate, or "an hour before / after food" with a clock before or after the plate. Making it modular and snap-together-capable would allow people to connect a distinct dispenser for each medicine taken and scanning the barcode of the medication when adding the pod could connect to the pharmacy's instructions for dosing so that the person wouldn't be responsible for programming it.

**Mentors**

1. Michael Oelze, ECE, Acoustics and Biomedical
2. Casey Smith, ECE lab coordinator, Electronics Design
3. Molly Goldstein, ISE, Product Design Lab Director
4. Rajul Gandhi, PharmD, MBA, Pharmacist
5. Lauren Trisler, Carle, Clinical Oncology Pharmacist
6. Makund Chorgrade, THINQ Pharma/THINQ Discovery, Drug Discovery

**Project Contact:** Dena Strong: [dlstrong@illinois.edu](mailto:dlstrong@illinois.edu)



## COMPRESSION STOCKING

Jay Anderson

*Not pictured:*

Judith Yasunaga

## Project 4

**Adaptable Compression Stocking:** *Lymphedema can be a chronic condition* that impacts patient quality of life and increases risk of infection. A comprehensive treatment plan often involves compression, like a compression stocking. Compression stocking can be very difficult to put on and becomes an even greater challenge for our patient with decreased function whether it be from frailty or post surgical healing leading to poorer compliance. Sometimes applying a compression stocking become the responsibility of a caregiver. A compression stocking that was made out of a material that under one condition was loose and when placed on a limb would get to a prescribed compression could have a significant impact of treatment. Possibly a material that when wet or heated would be a loose enough to easily slip on a limb but as it dries or reaches body temperature generates the prescribed compression. ***Greater compliance with compression therapy would result in improved quality of life*** possibly measured through less pain/discomfort, improved mobility, less of negative psychological impact, improved caregiver engagement, and less infection risk.

### Mentors

1. Mauro Sardela, Facilities Director, MRL: Materials Fabrication and Characterization
2. Viktor Gruev, ECE, Entrepreneur, Imaging and Device Fabrication
3. Laura Frerichs, Innovation and Entrepreneurship
4. Jeff Ginger, Director CU FabLAB, Fabrication, prototyping
5. Rachel Switzky, Director, SCD, Design Thinking

**Project Contact:** Jay Anderson: [jaytanderson@gmail.com](mailto:jaytanderson@gmail.com)

## ALICE SENSORS

Mikaela Frechette  
Thierry Guigma  
Widya Ramadhani



## Project 5

**ALICE Sensors:** The World Health Organization estimated that 646,000 fatal falls occur each year, making falls the second highest cause of death worldwide due to accidental or unintentional injury, behind automobile injury. Falls are not only physically and psychologically traumatic, but also financially costly. Currently, older adults are at the greatest risk for fall, due to their decreasing physical, sensory, and cognitive capacities. With the prevalence of falls continuously increasing, we believe that ***technological advances in wearable technology could be a potential avenue to reverse this increase in fall risk.*** Our proposed solution for fall prevention is to provide older adults with ***wearable, anti-collision technology*** that is based on the real-time ***detection of trip hazards in their immediate surroundings.*** We have finished the preliminary design of the product, conducted usability test and presented our main idea to the potential users.

### Mentors

1. Rachel Switzky, Director of Siebel Center of Design
2. Deana McDonagh, School of Design and Art, Professor
3. Mehmood Rasheed, MD, Carle, Rheumatology
4. **Jacob Sosnoff, Kinesiology, Motor Behavior control, Aging**
5. King Li, CI Med/Innovation
6. Haitham Hassanieh, ECE, Wearable Devices
7. Jed Taylor, Executive Director, Technology Entrepreneur Center
8. Citali Lopez-Ortiz, Kinesiology, Motor Coordination and Biomechanics

**Project Contact:** Mikaela Frechette: [mikaela5@illinois.edu](mailto:mikaela5@illinois.edu)

**PREEMIE POD**

Amanda Henderson

**Project 6**

**Premie Pod:** Infants staying in the Neonatal Intensive Care Unit are often restricted to their incubators or oxygen hoods throughout the majority of their time in hospital. These infants who are already in high-risk situations, are therefore unable to participate in skin-to-skin contact care with their parents (kangaroo care), which has been proven to provide life long health benefits. The product concept I am proposing is a **wearable incubator pod**, which can be worn by a parent or caregiver to creating a **safe, warm, and oxygenated environment for preterm infants to participate in kangaroo care** – allowing them to bond with their parents and grow to be healthy babies.

**Key Features**

1. Provides controlled environment during Kangaroo Care.
2. Provides body temperature regulation for the infant without view obscuring blankets.
3. Allows infants restricted to oxygen hoods to participate in Kangaroo Care.
4. Creates a private atmosphere for the parent to engage in Kangaroo Care.

**Mentors**

1. Imran Malik, OSF Health, Neonatology
2. Jeff Ginger, CU Fablab, Informatics, User Experience Design
3. Lisa Bievenue, CU Fablab, Director of Informatics
4. Gary Durack, TEK MILL, Innovation and Prototyping
5. Rachel Switzky, Director, SCD, Design Thinking

**Project Contact:** Amanda Henderson: [akhende2@illinois.edu](mailto:akhende2@illinois.edu)

**MOBILE  
PHOTOTHERAPY  
SUIT**

Siddiqua Haswary-Shari'ati  
Yusef Shari'ati

**Project 7**

**Mobile Phototherapy Suit:** The birth of a child is a joyous event. However, a ***diagnosis of neonatal hyperbilirubinemia can quickly turn it into a nightmare.*** Treatment involves phototherapy: the infant is undressed and placed upon a bed under an intense blue light where he or she must remain for a minimum of 12 hours. Hyperbilirubinemia is very common, affecting one in two infants globally. ***We propose a new way to administer phototherapy*** that resolves the problems mentioned above: ***a full-body wearable cloth suit with integrated blue LEDs.*** The light sources are directly adjacent to the skin for maximum therapeutic intensity, and completely contained by the suit. An open-faced cowl leaves the face of the baby exposed, allowing for nursing and beneficial parent-child interactions. No protective eyewear is needed. The whole system is lightweight and portable, unlike the bulky medical units now in use. Blue LEDs that produce the requisite 460-490 nm light are inexpensive, making this treatment affordable and accessible around the world. The ease of use promises to decrease the cost and duration of hospitalization as well as prevent hospital readmissions.

**Mentors**

1. Imran Malik, MD, OSF Health, Neonatology
2. Mauro Sardela, Facilities Director, MRL: Materials Fabrication and Characterization
3. **Dipanjan Pan, BioE, Entrepreneur**
4. Nadeem Ahmed, MD, MPH, PhD, Carle, Pediatrics
5. Ben Barbieri, PhD, CEO ISS, Inc. Imaging, sensing commercialization

**Project Contact:** Siddiqua Haswary-Shari'ati: [siddiquahaswary@gmail.com](mailto:siddiquahaswary@gmail.com)



## SMART TOILET

Gwendolyn Derk  
Yusi Gong

## Project 8

[https://healthmakerlab.medicine.illinois.edu/video\\_submissions/5c85d2c9ad4a2/full-toilet-video-final.mp4](https://healthmakerlab.medicine.illinois.edu/video_submissions/5c85d2c9ad4a2/full-toilet-video-final.mp4)

### Mentors

1. **Temitope Shodunke, Carle, Nephrology**
2. Deana McDonagh, School of Design and Art, Professor
3. Laura Frerichs, Innovation and Entrepreneurship
4. Jenny Amos, BioE/CI , Med: BioEngineering
5. Makund Chorgrade, THINQ Pharma/THINQ Discover, Drug Discover
6. Rachel Switzky, Director, SCD, Design Thinking
7. Ben Barbieri, Instrumentation/Entrepreneurship, Startup Café

**Project Contact:** Gwendolyn Derk: [gderk2@illinois.edu](mailto:gderk2@illinois.edu)



## MINIATURE HORSE POWER

Sarah Nixon

## Project 9

**Miniature Horse Power ©:** Miniature Horse Power © proposes a one-of-a-kind *equine-facilitated therapy model* for complex childhood trauma and related conditions. My vision is a campus and community alliance that will span a miniature therapy horse assisted intervention for at-risk children (and their parents) during the summer, sited at Allerton Park, and a *unique research undertaking* that will teach us about how horses read and respond to human body language and emotions during their training, and their work, as therapy animals. My project seeks to create collaboration between experts in trauma-informed child psychology, human development and family studies, animal sciences, and neuroengineering, and will engage community wellness advocates such as Karen Simms of the Trauma Resiliency Initiative Working Group. Gentle, patient, intelligent and loving, tiny horses are uniquely suited for trauma therapy work with children. And far from being a breeder's folly, they have an ancient ancestry: the oldest known equid, the 65 million-year old Sifrhippus, was the size of a house cat!

### Mentors

1. Wendy Heller, UIUC, Psychology, Emotion-Cognition Interactions
2. Molly Baldes, UIUC, Horse Farm Manager
3. Neal Cohen, UIUC, Psychology, Cognitive Neuroscience
4. Gary Durack, TEKMILL, Innovation and Prototyping
5. Lyndon Goodly, UIUC, Director of Division of Animal Resources
6. Brandi Barnes, IHSI, Research Development Manager

**Project Contact:** Sarah Nixon: [miniaturehorsepower@gmail.com](mailto:miniaturehorsepower@gmail.com)



## 4-IN-1 VITAL SIGN READER

Maaz Imam  
Haajar Amin Mansour  
Kabir Fakoya

## Project 10

[https://healthmakerlab.medicine.illinois.edu/video\\_submissions/5c915285d17ea/Health-Maker-Lab-2019-Submission.mp4](https://healthmakerlab.medicine.illinois.edu/video_submissions/5c915285d17ea/Health-Maker-Lab-2019-Submission.mp4)

### Mentors

1. Irfan Ahmad, System Integration/ Sensors
2. Kesh Kesavadas, ISE, Design and Manufacturing
3. Nahil Sobh, Deep Learning, Data Science Research
4. **Joerg "George" Heintz, Analytics, Health Care Engineering Systems Center**
5. Dan Banach, Educator, Autodesk CAM/CAD Software
6. Viktor Gruev, ECE, Entrepreneur, Imaging and Device Fabrication

**Project Contact:** Maaz Imam: mimam3@illinois.edu

**\*Anchor mentor**