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# Designing medical technology for developing countries

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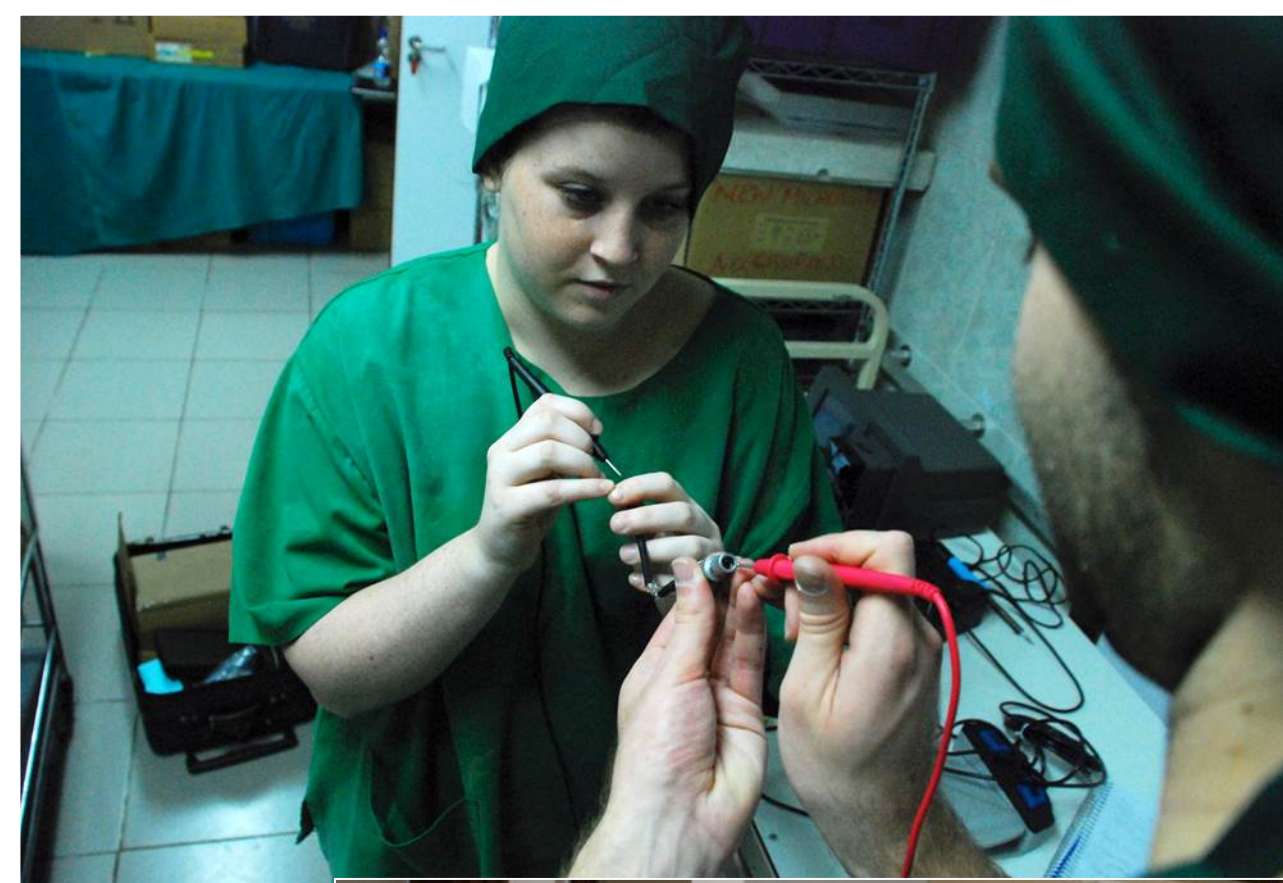
H. Adams, R. Adams, C. Devon, R. Hall, A. Hargett, A. Herbst, P. Ovington, K. Rye, S. Stafford, M. Tibbs, J. Veliz, R. Youngblood, D. Dean, J. Desjardins, K. Gainey, A. Metzger, and J. Rodriguez

## Introduction

Our Creative Inquiry team works to improve global health through the following activities:

- ◆ **Outreach:** groups of students visit hospitals in Tanzania to research need areas, help repair equipment, and conduct equipment surveys.
- ◆ **Medical Device Design:** students work to design sustainable and affordable devices that can be produced and repaired locally.

Top: Students inspect surgical equipment.



Below: Students and collaborators from Madaktari Africa presenting their designs to clinicians and nursing staff in a NICU



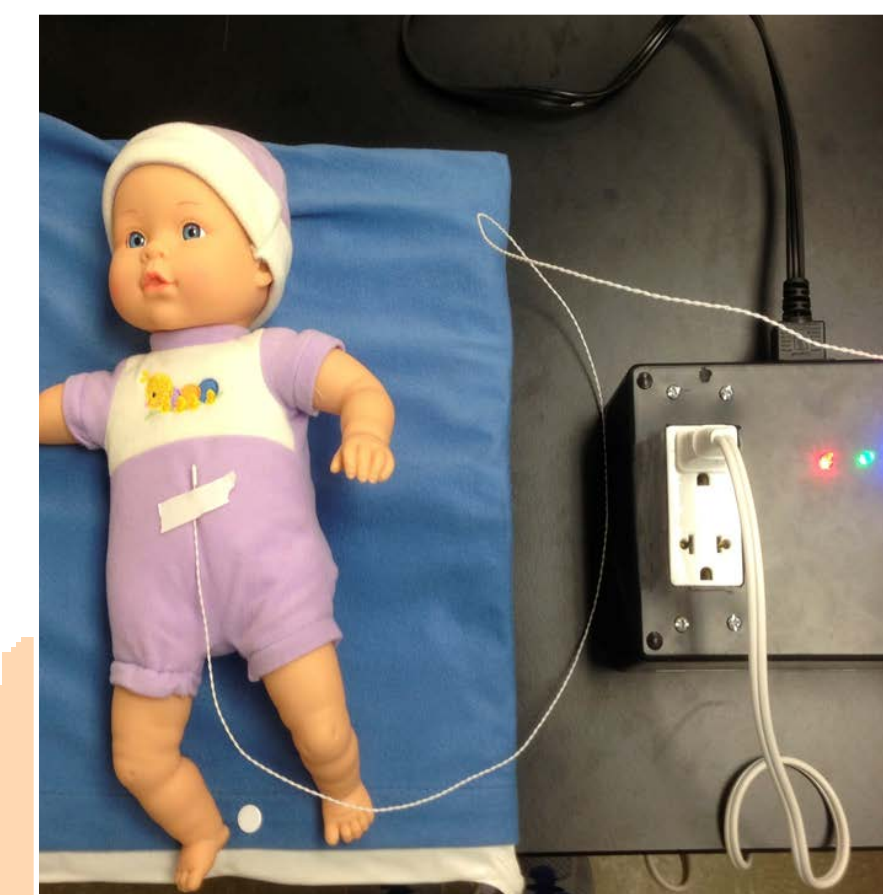
Right: An ENT examination console which students repaired during a trip in January 2014



## Global Outreach

- ◆ During our trips to Tanzania, students have visited Arusha Technical College along with many of the area's hospitals.
- ◆ The group has gained first-hand insight into the needs of hospitals in a variety of settings.
- ◆ We partnered with clinicians to help advise and adapt our designs to fit their needs and resources.
- ◆ Additionally, we have conducted equipment-breakdown surveys in order to better understand why equipment failed, how long it remained inoperable, and what effect it had on the hospitals' operations.

## Current Projects



### Infant Warmer

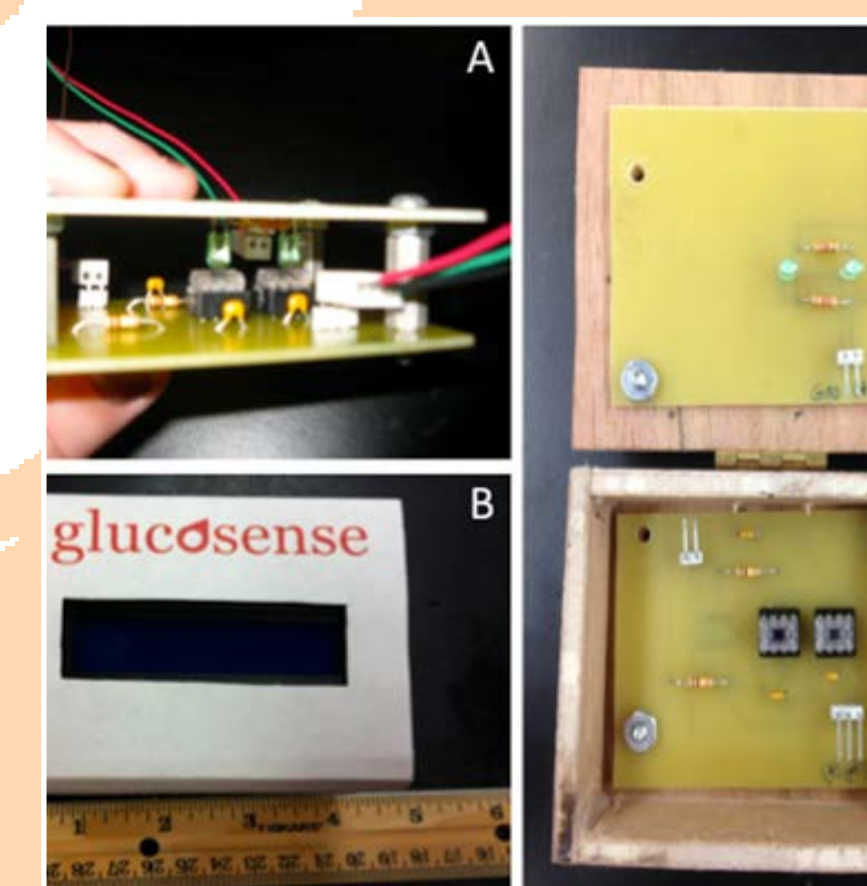
**Need:** Temperature monitoring and warming for neonatal infants.

**Solution:** A sensor on the infant monitors body temperature. A microcontroller indicates temperature with a 3-light system and turns on a heating blanket when the infant is hypothermic.

### Glucometer

**Need:** Low-cost test strips for diabetics to measure glucose levels in their blood.

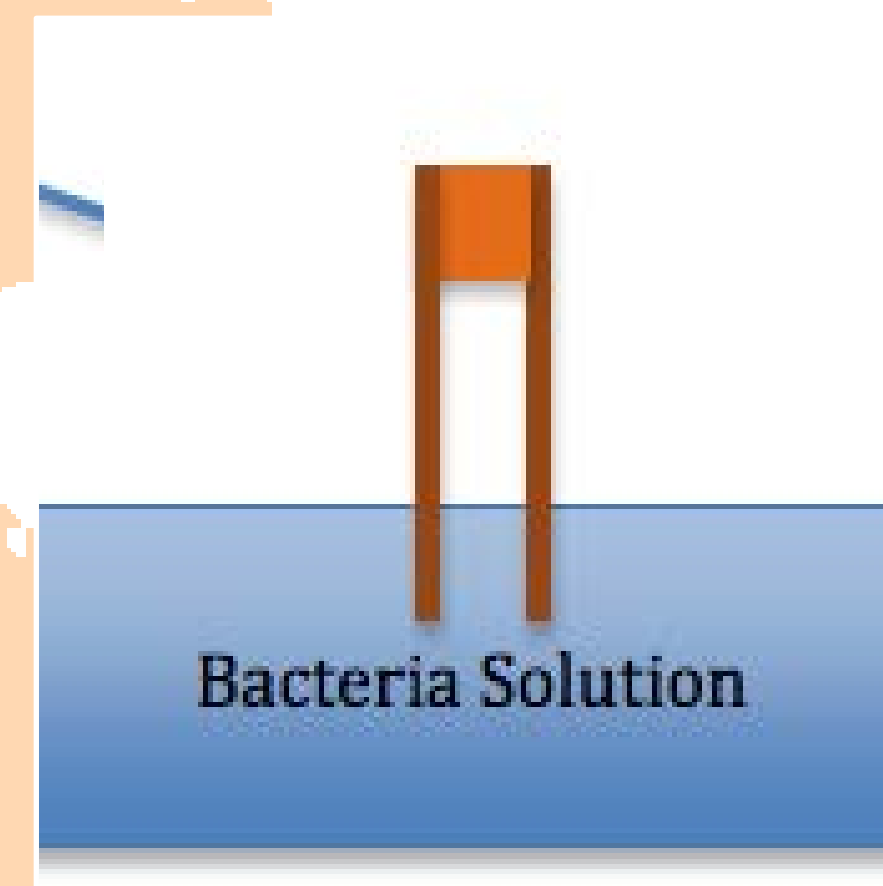
**Solution:** Test strips that can be printed from an ink-jet printer. They are inexpensive and can be produced locally, which excludes the high cost of shipping.



### Rapid Bacteria Sensor

**Need:** Rapid test for bacterial infections.

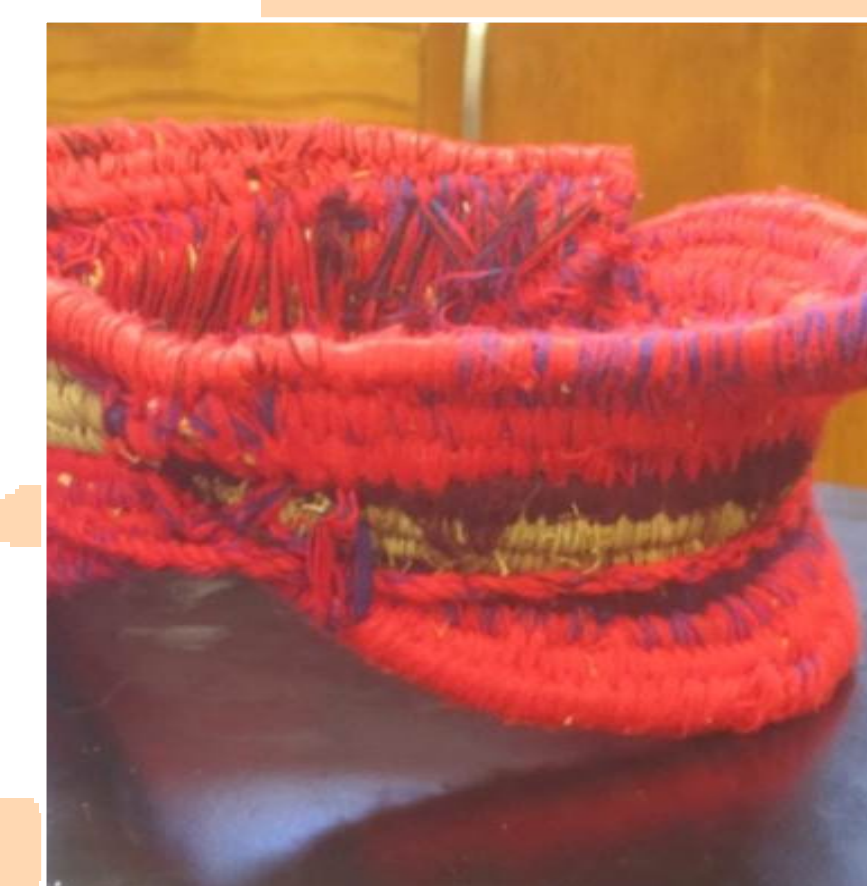
**Solution:** Impedance-based sensor that can quickly determine the presence of bacteria in a patient's sample.



### Woven Neck Collar

**Need:** Neck stabilization for injured patients

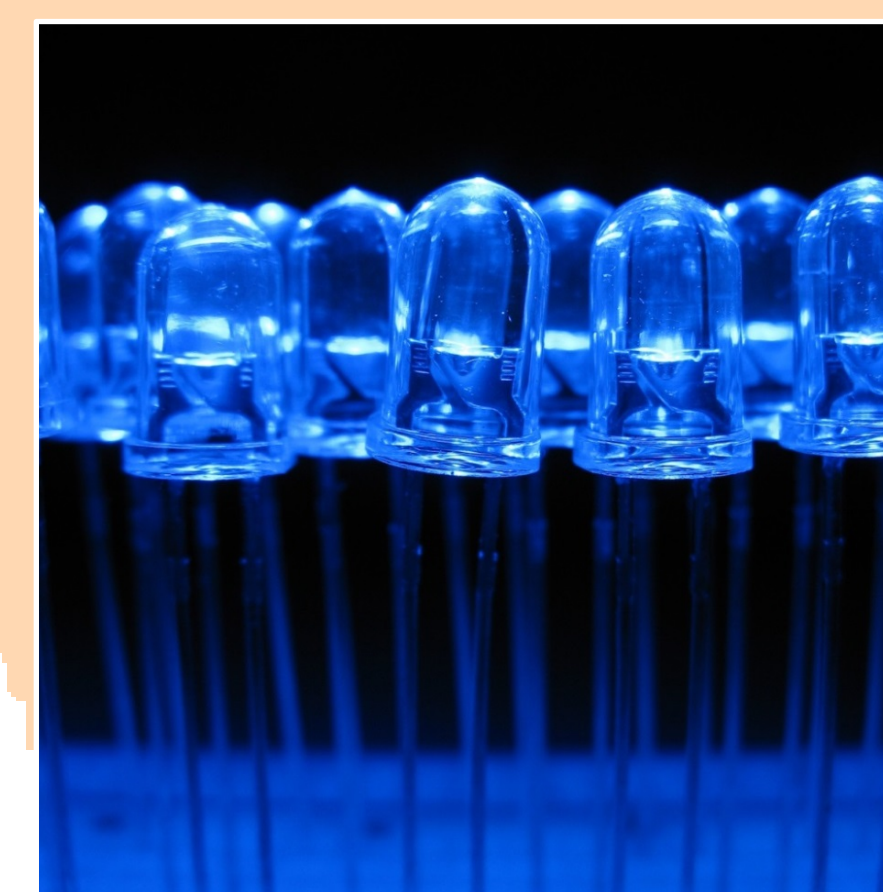
**Solution:** Collar woven from African plains grass. It can be produced by local basket weavers from readily available materials.



### Bililight Calibration System

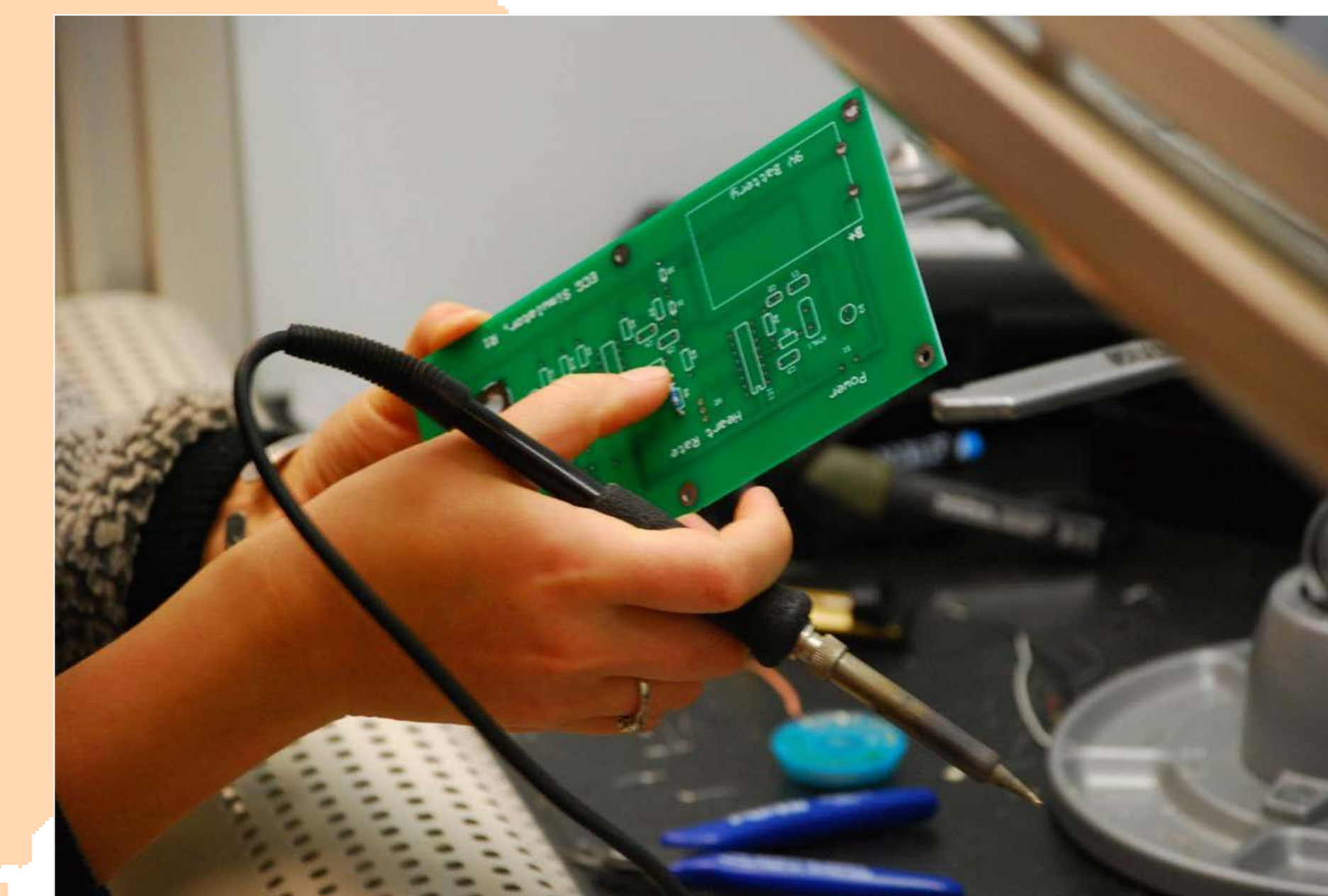
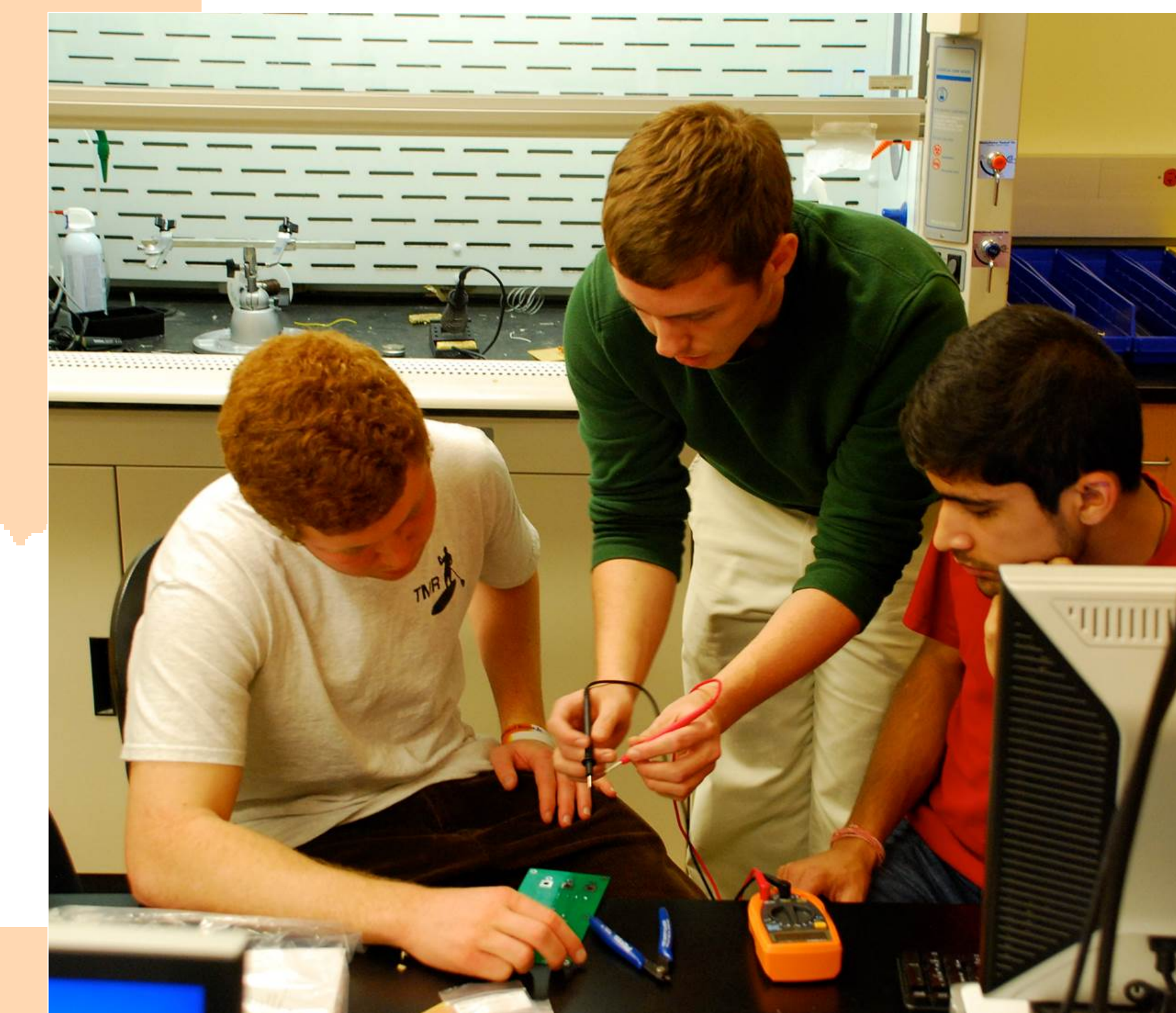
**Need:** Equipment to treat jaundice in newborns is often donated to these hospitals, the intensity and effectiveness is often in question.

**Solution:** An inexpensive tool that allows hospitals to test both newly donated equipment as well as equipment already in use for effectiveness.



## Kit Building

- ◆ Developing countries lack equipment to test whether or not their medical devices are functioning properly.
- ◆ EWH has designed kits that can be used for testing medical equipment and for teaching tools. The club raises money to purchase these kits and then assembles them so they can be sent to developing countries.



## Learn More!

If you would like to know more, please visit our website at [www.clemson.edu/ci/sites/ewh](http://www.clemson.edu/ci/sites/ewh) or scan the QR Code.

