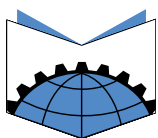


Journal of Humanitarian Engineering

Volume 4, Issue 2

ISSN 2200 4904



JOURNAL OF
HUMANITARIAN
ENGINEERING





engineers
without borders
australia



Journal of Humanitarian Engineering (JHE)

The Journal of Humanitarian Engineering (JHE) is an open access publication that publishes outcomes of research and field experiences at the intersection of technology and community development. The field of “humanitarian engineering” describes the application of engineering and technology for the benefit of disadvantaged communities. The field spans thematic areas from water to energy to infrastructure; and applications from disability access to poverty alleviation. The JHE aims to highlight the importance of humanitarian engineering projects and to inspire engineering solutions to solve the world’s most pertinent challenges.

For more information, visit: www.ewb.org.au/journal.

EDITOR-IN-CHIEF

Dani Barington

PRODUCTION EDITOR

Emilia Wisniewski

ASSOCIATE EDITORS

Cristian Birzer
Scott Daniel
Tony Marjoram
Paul Medwell

MARKETING

Kira Hayashi

PRODUCTION ASSISTANT

Amira Haruwarta

PUBLISHING

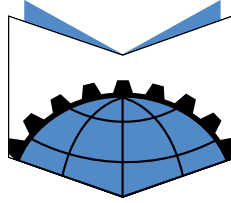
Engineers Without Borders Australia

INDIGENOUS AUSTRALIAN ACKNOWLEDGEMENT

EWB respectfully acknowledges the Traditional Owners of the Country on which we work. To learn more about our commitment to reconciliation, read EWB’s Reconciliation Action Plan.

Cover photos:

Top - Collaborating on women’s health projects in Malawi (photo courtesy of Taylor, et al., this issue); Middle right - Clemson engineering students with concrete masonry unit plant employees in Haiti (courtesy of Gordon, et al. this issue); Middle left - Designing solar home systems in Cambodia (courtesy of Watts, Smith and Thomson, this issue); Bottom - Solar still prototype testing in Zambia (courtesy of Maambo and Isaac, this issue)



Lighting the way for a better future

Guest Editorial

In early September, my wife gave birth to a beautiful, wonderful, amazing little girl. Before, during and after the delivery, we had access to essentially the best health care. During the pregnancy, we had multiple ultrasounds and a range of blood tests to check for any health issues. During labour we had an army of well-trained midwives; an excellent obstetrician if intervention was needed; an anaesthetist; and access to all the equipment we would need if any complications arose -there were complications and intervention was needed. We then had the next five days in a maternity ward to get all the support needed for our roles as new parents. At no stage did I think anyone's life was at risk.

In many developed countries, this is the norm. Yet for billions of people around the world, access to even electricity is a struggle, let alone all the equipment that requires electricity, including basic lights and refrigeration for medicines. People are literally dying because of a lack of access to utilities, equipment and resources. This point was made very clear to me when I heard from Dr. Laura E. Stachel at the 2014 IEEE Global Humanitarian Technology Conference. In 2008, Dr. Stachel was in Northern Nigeria studying maternal mortality. What she saw was that women were dying in hospitals because there was no lighting to perform emergency C-sections, or any other operations, at night. The first proposed solution from Dr. Stachel was to help a hospital become completely solar-powered: an array of solar panels, batteries and therefore power for all the equipment they may, or may not, actually have. A long story made short is that the first idea wasn't really appropriate; and didn't take into consideration what the end-users wanted. However, using input from end-users, Dr. Stachel co-founded WE CARE Solar and started to produce the Solar Suitcase: a solar-powered medical kit, which includes lights, ultrasound systems, a solar panel and a battery pack. With over 1,500 suitcases built and deployed around the world, WE CARE Solar have efficiently and effectively help address a major problem.

To me, the story is inspirational, and more so now that I have seen my daughter born safely, despite complications. However, the story of WE CARE Solar also highlights the need for solutions to focus on human-centred design and working for and with end users to develop solutions.

The Journal of Humanitarian Engineering provides a mechanism for scientifically rigorous research to be available, not just to other researchers, but also to practitioners and community members. It helps facilitate cross-pollination of ideas, such that a solution tailored for one part of the world can be adapted and modified to another part of the world. The current issue includes papers that do just that. The design and installation of Solar Home Systems in rural Cambodia, (Watts et al. 2016) provides insight into solar home installation in rural Cambodia, but the results could be modified for anywhere else in the world, with community input. Similarly, A Sustainable Engineering Solution for Pediatric Dehydration in Low-Resource Clinical Environments (Taylor et al. 2016) provides insight into paediatric hydration in Malawi but could be just as easily applied to any other resource-constrained community in the world. This can then help education, provide technology concepts for subsequent tailoring, and enable implementation of new ideas; all in order to raise the quality of life for those most in need.

Dr. Cristian Birzer

New Dad, Board Member and Associate Editor, *Journal of Humanitarian Engineering*

Journal of Humanitarian Engineering

Volume 4, Issue 2

ISSN 2200 4904

CONTENTS

- 1 Partnership to Improve the Quality of Local Construction Materials in Haiti's Central Plateau
Aaron Gordon, Jeff Plumblee, Kayla Dimarco, David Vaughn, Jennifer Ogle
- 8 Performance Improvement of Solar Water Stills by Using Reflectors
Humphrey Maambo, Isaac Simate
- 16 The Design and Installation of Solar Home Systems in Rural Cambodia
Rebecca Watts, Jeremy Smith, Andrew Thomson
- 24 A Sustainable Engineering Solution for Paediatric Dehydration in Low- Resource Clinical Environments
Ashley R. Taylor, Jeffrey Turovskiy, Benjamin Drew, Andre Muelenaer, Kerry Redican, Kevin Kochersberger, Lissett Bickford