The Journal of Extension

Volume 54 | Number 2 Article 2

4-1-2016

Resources for Underwater Robotics Education

Michael L. Wallace
Washington State University, mlwallace@wsu.edu

William M. Freitas
Logic Play, williamf@logicplay.us

Recommended Citation

Wallace, M. L., & Freitas, W. M. (2016). Resources for Underwater Robotics Education. *The Journal of Extension, 54*(2), Article 2. https://doi.org/10.34068/joe.54.02.02

Journal of Extension
www.joe.org

April 2016
Volume 54
Number 2
Article # 2TOT8
Tools of the Trade

Resources for Underwater Robotics Education

Abstract

4-H clubs can build and program underwater robots from raw materials. An annotated resource list for engaging youth in building underwater remotely operated vehicles (ROVs) is provided. This article is a companion piece to the Research in Brief article "Building Teen Futures with Underwater Robotics" in this issue of the *Journal of Extension*.

Michael L. Wallace
Extension Educator
Washington State University Extension
Bellingham, Washington
mlwallace@wsu.edu

William M. Freitas
Lego Serious Play Facilitator
Logic Play
Sarasota, Florida
williamf@logicplay.us

A Sea of Opportunity

Automation is a fact of virtually any industry in the 21st century. Young people considering entering any engineering or industrial field will benefit from learning about robotics. 4-H robotics projects can increase youth's exposure to and interest in engineering careers and have been documented to improve test scores in school (Sneider, 2013; Yager & Falk, 2008). Beyond industry applications, underwater robotics are being used as valuable tools in citizen science efforts and water data gathering in a variety of environments (McNeill, Jirik, & Rugg, 2014). Through initial project exploration, citizen science, and national level competitions, robotics projects encourage youth to build critical thinking, problem-solving, and teamwork skills as they become effective engineers in robotic science.

Despite perceptions that robotics projects are costly, beginning projects are reasonably priced, and resources are abundant. Moreover, developing an experiential youth science program focused on the creation of underwater remotely operated vehicles (ROVs) is not restricted to a few individuals with specialized knowledge and skills. Youth who are implementing more advanced projects definitely benefit from working with volunteers who have expertise in engineering and science. However, such volunteers do not have to be involved unless the project skill level makes their engagement necessary. As always, passionate volunteers who have less expertise can learn alongside youth, using numerous beginning-level resources. The section that follows identifies resources that can be used to aid interested groups in getting started in 4-H robotics projects.

Underwater Robotics Resources That Work

Marine Advanced Technology Education (MATE) Center

The MATE Center offers several resources, including a textbook on underwater robotics. The center also hosts national competitions. http://www.marinetech.org/

SeaPerch

SeaPerch is an innovative underwater robotics program that allows youth to learn to build an underwater ROP. Youth can start with a kit comprised of low-cost, easily accessible parts and follow a curriculum that teaches basic engineering and science concepts with a marine engineering theme. http://www.seaperch.org

Build Your Own Underwater Robot and Other Wet Projects

The book *Build Your Own Underwater Robot and Other Wet Projects*, by Harry Bohm and Vickie Jensen, is considered by many to contain the best practical instructions for robotics beginners. It teaches simple projects suitable for elementary-aged youth through more complex projects for advanced high school–aged students. http://www.westcoastwords.com/build-your-own-underwater-robot.html

National Oceanic and Atmospheric Administration (NOAA) Ocean Explorer

This NOAA Ocean Explorer website provides links to a great number of educational resources related to the study of oceans, some of which include ROV information. http://oceanexplorer.noaa.gov/welcome.html

Homebuilt ROVs

The website Homebuilt ROVs, produced by Steve Thone, is dedicated to the activity of building ROVs and contains an impressive page of links to suppliers and designs. http://www.homebuiltrovs.com/

4-H Junk Drawer Robotics

The National 4-H curriculum series *4-H Junk Drawer Robotics* is a good resource for reinforcing inquiry and experiential practices while helping youth learn about engineering robotics, with and without Lego® Mindstorms®. http://www.4-hmall.org/Product/robotics/robotics-curriculum-set/08436.aspx

4-H Science in Urban Communities

Rutgers University offers *4-H Science in Urban Communities*, a guide for accessing resources to start a science, engineering, and technology club project in an urban area. http://urban4hscience.rutgers.edu/

Conclusion

In conclusion, there are vast resources, many of which are accessible and affordable, available for all levels of robotics project participation. Underwater robotics addresses not only National 4-H science, technology, engineering, and math goals but also civic engagement and citizen science goals (Sneider, 2013). For the diehard 4-H players, the opportunities for peer competition are also ample.

References

McNeill, B., Jirik, P., & Rugg, B. (2014). 4-H and aquatic robotics. *Journal of Extension* [online], *52*(6). Article 6IAW7. Available at: http://www.joe.org/joe/2014december/iw7.php

Sneider, C. (Presenter). (2013, March 7). 4-H Science E-Academy, Plenary 4: *Next Generation Science Standards* [podcast]. Retrieved from http://vshow.on24.com/vshow/fourhcouncil

Yager, R. E., & J. H. Falk (Eds.). (2008). *Exemplary science in informal education settings: Standards-based success stories.* Arlington, VA: NSTA Press.
