



Zackariah Horn is from Crawfordsville, Indiana. He received his undergraduate degree in Agricultural Engineering from Purdue University in 2017. He then continued on at Purdue to pursue a Master's Degree as part of Dr. Stwalley's lab group. Zack also served as a TA for ABE 545, ABE 330, ASM 345, and ASM 222. Zack was involved as an undergraduate and graduate student in the Purdue Utility Project (PUP). Zack intends to pursue a career in a mechanical related field.



# Agricultural & Biological ENGINEERING

## Thesis Defense

**Speaker:** Zackariah Horn  
**Title:** Well-Driver PUP (Purdue Utility Project)  
**Major Professor:** Dr. Robert Stwalley III  
**Date:** Friday, April 12, 2019  
**Time:** 8:30 am  
**Location:** ADM 145 A/B

### Abstract:

People living in developing countries or undeveloped regions often do not have proper access to quantities of safe, clean water to fulfill their daily needs. Certain members of the families, often women and children, walk miles every day to collect surface waters that are frequently contaminated. To improve water availability and quality, a sustainable mechanical solution to more safely access groundwater has been developed.

A well-driving attachment for a PUP (Purdue Utility Project) vehicle provides a low-cost means for installing driven type wells in areas of high to medium water table heights. PUP vehicles have a niche in developing countries, as they offer impressive value and utility in comparison to other powered machines. The vehicles are built and sourced using locally available materials with basic tooling. A hydraulic post driver has been attached to the rear of a PUP frame to serve as an impact mechanism, driving a well point and a series of inter-connecting pipes to serve as a permanent casing for the well.

Water wells were tested at four different test sites around central Indiana, with the deepest well reaching 23 feet. This suggests that the Well-Driver PUP can install driven water wells in areas of medium to high water tables and may be suitable for a development setting.

### Application:

The Well-Driver PUP could provide safe, sustainable, and low-cost water access options for those in developing or underdeveloped countries. The well-driver attachment may serve as a powered way to install water wells where a drilling rig may not traverse. Improving the supply of clean and safe water could provide immediate health benefits, improve the education of future generations, and a better standard of living to those who it impacts.