



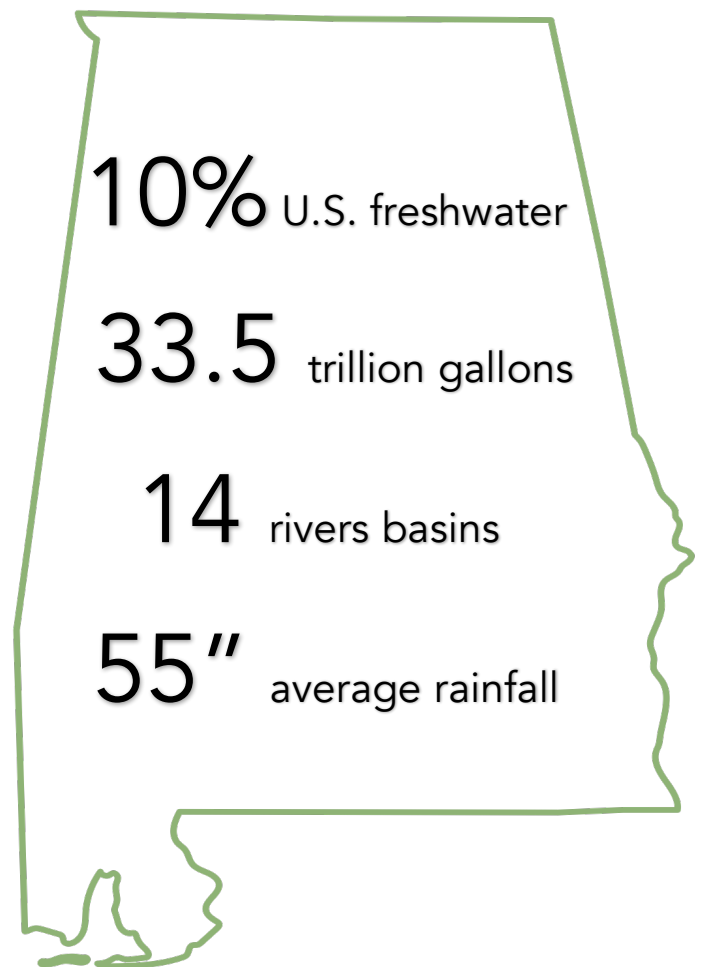
surviv(AL) House

WATER Narrative

www.uab.edu/solardecathlon

WATER Narrative

Alabama is classified as humid subtropical under Köppen climate classification, with very hot summers, mild winters, long growing seasons, and plentiful freshwater resources. Approximately 10 percent of the freshwater resources in the entire continental United States originate in or flow through Alabama, and one-sixth of the state's surface area is comprised of surface waters. Of the 33.5 trillion gallon surface water supply moving through Alabama's 14 river basins and coastal drainage areas, 19.5 trillion gallons are generated from the state's 55 inches of average annual rainfall. Even with Alabama's plentiful freshwater supply, the **s u r v i v (A L)** House is designed to conserve water, capture and reuse plentiful HVAC condensate and storm water runoff, and capitalize on the long growing season for landscaping.



CONSERVATION

SMART WATER MONITORING

S u r v i v (A L) House will incorporate the use of the DRiY system from Ark Labs of Florence, Alabama (www.thearklabs.com).

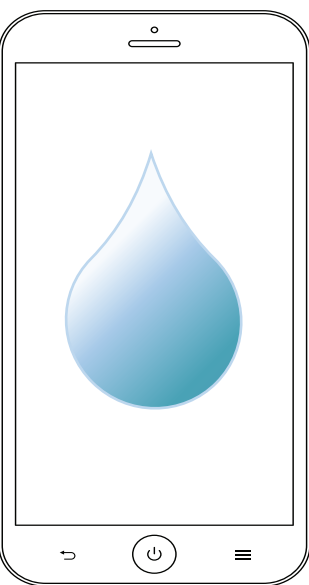


SURVIV(A L) HOUSE : WATER

DRiY is a smart water monitoring device equipped with a remote shut off valve and empowered by artificial intelligence software.

Ark Labs uses machine learning software to build a unique pattern of usage for each residence. By learning the time of day, day of the week, and week of the month of the normal usage over 30 days, the system can build a

model of what is normal. Then through real time monitoring, each time water flows, a powerful analytics server searches through historical data to see if the current water flow is normal for that household. If an anomaly occurs, DRiY will alert the homeowner through a smart phone app, allowing them to shut the water off remotely. If there is significant jump, such as may occur from a



burst pipe, DRiY will automatically shut off the water flow while alerting the homeowner.

Ark Labs encourages conservation through real time monitoring, daily usage statistics and monthly comparisons. At the end of each day residents of **surviv(A L)** House will know how their daily consumption compared to the same period the previous week, and how it compared to others in their locale. Each day the homeowner will have a chance to earn badges, which will turn saving water into a game or competition. Without the data and knowledge, there can't be conservation. Ark Labs brings this information to the users' smartphone and then presents it in a way to make it simple to understand and utilize. Ark Labs supports a data-based system that empowers the occupants to make simple conservation choices from a smart phone and offers security in case of water supply system emergencies.



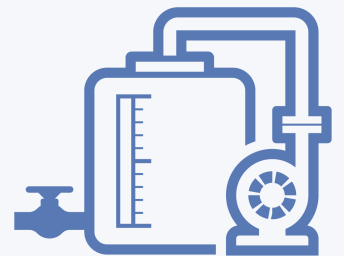
S U R V I V (A L) H O U S E : W A T E R

Occupants are further engaged in water conservation choices and features through visibility of the interior water use of the house. A central water manifold in the equipment room displays water intake and dissemination throughout the home so occupants can see each element of water consumption. These elements of the home then offer regular opportunities to choose water conservation in simple ways, like dual flush toilets, and more complex and gamified ways through the DRiY app's analytics. Other features of the home exceeding code requirements automate water conservation, including the selected low water use combo washer dryer and dishwasher.

RECLAMATION AND REUSE

Alabama's high relative humidity results in significant condensate production from HVAC systems during warmer months. Typically, this condensate is piped out to the receiving storm water system, but the **s u r v i v (A L)** House collects it in an exterior cistern on the east side of the home. The cistern also receives rainwater runoff from the south roof via a guttered conveyance. These two collection streams and the large capacity of the cistern offer reliable reclaimed irrigation supply for the planters for more than a month of drought, which is typical for the late summer growing season in Alabama. The cistern is easily emptied for cleaning and does not receive grey or black water from the home so creates no maintenance or health concerns.

The collection of condensate and rainwater runoff is an effective strategy for eliminating the need for potable water consumption for irrigation. This practice also successfully serves to reduce the pressure on storm water systems to receive runoff during rain events in urban and suburban settings.



S U R V I V (A L) H O U S E : W A T E R

LANDSCAPING

The planters of the **s u r v i v (A L)** House are constructed to support an intentional polyculture of seasonal agriculture plants and herbs, combined with low water use Alabama native perennials suited to the local climate. The selected combinations will offer seasonal fresh produce and herbs as well as habitat for pollinators and other fauna. The plants are supported by low flow drip irrigation supplied from the cistern of reclaimed condensate and runoff water.

The irrigation is designed to deliver each plant the minimal amount of water needed to support the plant canopy while cultivating healthy stress resistance to periods without water.

Occupants will benefit from in-home and porch views of the plants and supported fauna. Combined with the low porches, the plants will offer shade as well as evapotranspirative cooling. Native perennials are low-maintenance selections, requiring only annual trimming. Spaces for agricultural and medicinal plants will be refreshed for spring and fall growing seasons, offering an opportunity for occupants to connect with their own food production and consumption.

WATER PURIFICATION



When tornadoes strike, whole communities can be left without shelter, transportation, phone and cell service, food, and clean water, so the storm shelter in **s u r v i v (A L)** is equipped with a system to chlorinate collected water. The system offers occupants the option to collect and safely consume rainwater or water from nearby freshwater body.



SURVIV(A L) HOUSE : WATER

The device is called the WaterStep M-100 Chlorine Generator, and it was developed in response to a need that affects nearly one billion people around the globe with unsafe drinking water. In fact, waterborne disease claims more lives each day than armed conflict, HIV/AIDS, and cancer combined.

For more than 140 years, chlorine has been added to water to kill disease-causing bacteria and pathogens. The M-100 is a portable, affordable way to chlorinate water for the purpose of eliminating waterborne pathogens.

Through the process of electrolysis, the M-100 creates chlorine gas from salt water. The chlorine gas, which evenly disburses throughout the water, kills waterborne bacteria in two hours.

WaterStep is a non-profit organization that provides safe water to communities in developing countries. Team Alabama collaborated with engineering program students at Thompson High School in Alabaster, Alabama to showcase they system in the **s u r v i v (A L)** House

safe room. Thompson students, under the guidance of their instructor Brian Copes (2017 Top 50 Teachers in the World, Varkey Foundation Global Teacher Prize winner and People Magazine's Top 5 Teachers in 2012) have helped to implement the Chlorine Generator system in three water-stressed villages in Jutiapa, Honduras.

