Tomorrow's Innovators Practice Imaginative Thinking and Teamwork

By Toby Days, Sourcewater Specialist

On the inside lane we have the tenacious crew hailing from Terre Haute, IN and defending 2016 National *FIRST* LEGO® League North American Champions – Team Storm. And on the outside lanes, we have hundreds of teams of students ages 9 to 16 from 80 countries, all competing in the 2017/2018 *FIRST* LEGO League Challenge Hydrodynamics Extravaganza!!

On your mark, get set, flow! Each year in August, *FIRST* LEGO League introduces a scientific and real-world challenge on which teams can focus and do research. The robotics part of the competition involves designing and programming *FIRST* LEGO Mindstorms robots to complete tasks. The students work out solutions to the various problems they are given and then meet for regional tournaments to share their knowledge, compare ideas, and display their robots.

This year's *FIRST* LEGO League Challenge is hydro dynamics:

People use water every day, but they don't think much about how and why they use water. Whether it's directly

Claire, Devon and Trevor Langley (pictured) and Team Storm won the 2016 North American *FIRST* LEGO League North American Open Championship in Carlsbad, CA.

Team Storm (L-R): Team mentor Devon Langley, Coach Lori Langley, Aidan Truby age 14, Trevor Langley age 13, Claire Langley age 9, Katie Henthorn age 10, and Coach Tom Langley.

Team Storm doing some water sampling with John Allen at the Seelyville Water Treatment Plant.

(drinking or washing) or indirectly (manufacturing the products they use or producing food or energy), humans have a lot of different water needs. The students' project challenge for the HYDRO DYNAMICS season is to improve the way people find, transport, use, or dispose of water.

MEET TEAM STORM

The 2017 Team Storm is made up of four intuitive students aging from nine to 14. All team members are from the Terre Haute area and are eager to understand how the academic disciplines of Science, Technology, Engineering and Mathematics (STEM) impact their world and can prepare them for the workforce of tomorrow. The team meets twice a week to work on the *FIRST* LEGO League challenge and to get prepared for the *FIRST* LEGO League competition. This year Team Storm decided to take a four-prong approach to address the Hydro dynamics challenge:

- Research & Analysis of the topic
- Find a problem
- Develop an innovative solution
- Share the team's findings with others

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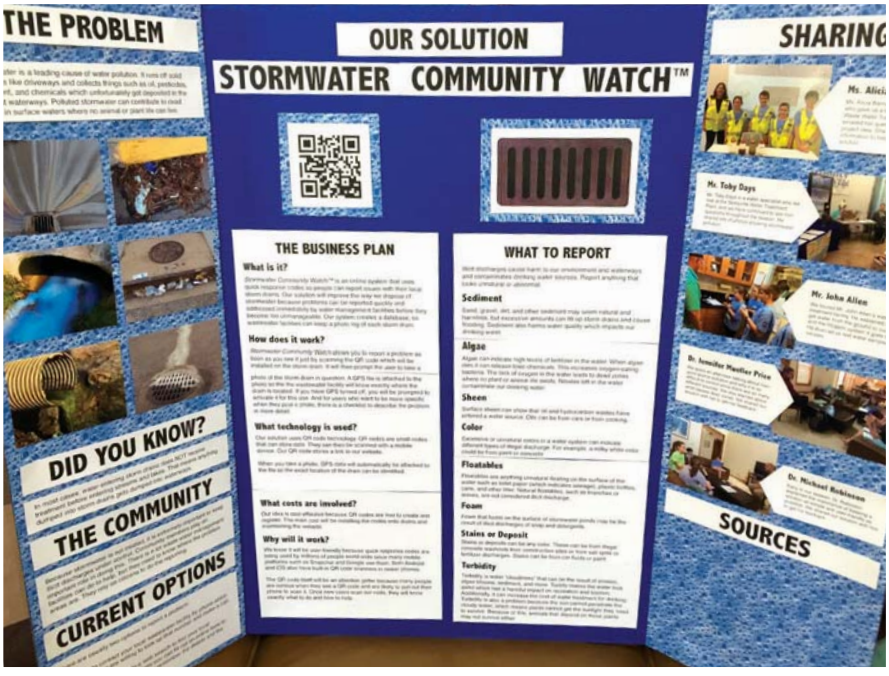
RESEARCH

The team began to investigate the fascinating topic of hydro dynamics by visiting the Seelyville Water Treatment Plant. John Allen, Seelyville Water Treatment Operations Specialist, took the kids on an in-depth tour of the water treatment plant. He explained the fascinating journey water takes to get from the aquifer Seelyvile draws from, through the complicated treatment process, and into individuals homes and businesses as safe clean water that can be used for drinking, bathing, cooking, and even for making the many products and services we all depend on.

The Team then contacted Alicia Barnarnd MS4, City of Terre Haute MS4 Coordinator, who took them on a tour of the Terre Haute Wastewater Treatment plant. She explained where all the wastewater comes from, the type



Team Storms poster board that explains their *FIRST* LEGO League Hydro Dynamics project.

Alicia Barnard giving Team Storm a tour of the Terre Haute Wastewater plant.

of pollutants for which they treat and monitor, and the treatment processes involved to remove all of the contaminants and produce water that is safe to return to the environment. Throughout Alicia's presentation the kids became particularly interested in knowing what the response would be for the various kind of pollutants reported, specifically how each problem would be addressed.

Team Storm continued their research by talking and visiting with professors at Rose-Hulman Institute of Technology, Alliance of Indiana Rural Water, Terraform Creative Services and Hannum Wagle & Cline Engineering.

FIND A PROBLEM

This season, our team learned that stormwater is a leading cause of water pollution. It runs off solid surfaces and collects pollutants such as oil, pesticides, sediments, bacteria, and other chemicals, and then deposits them into the nearest waterway. And in most cases, stormwater runoff entering drains does not receive any treatment before entering streams, lakes, and other surface waters.

"Our solution will improve the way we dispose of stormwater runoff because problems can be reported quickly and addressed immediately."

Because of this, water management and treatment facilities across the country depend heavily on citizens to bring problems to their attention so they can take the necessary measures to address the problem. However, the current method for reporting this information relies on citizens to make a phone call or complete an online form, and people do not always know whom to contact. "And let's face it, people are unlikely to do something that requires a lot of time and effort," said Lori Langley, Team Storm coach.

QR Code attached to a storm drain.

DEVELOP AN INNOVATIVE SOLUTION

We want to make it easy for people to report a problem so it can be corrected quickly. So we created: The Stormwater Community Watch, an online system using QR Codes to create an easy way for people to report storm drain and outfall pollution as well as educate people on the problem. QR Codes are a type of barcode that is a machine-readable optical label that contains information about the item to which it is attached.

Our solution will improve the way we dispose of stormwater runoff because problems can be reported quickly and addressed immediately. All you have to do is scan the QR code easily visible on a storm drain and you will be taken right to the website where you can instantly upload your photo, and you're done! (The code in the photo actually works and will take

And the winners are... Team Storm!

Team Storm competing.

Team Storm won the Champion's Award (best overall team) and earned the highest robot score in the robot game. They also were honored to receive a nomination for the Global Innovation Award, recognizing their QR Code project solution.

you to a mock website in progress in case you want to scan it.)

Your photo message will be sent to the management system that can address the problem and GPS will be attached to the photo file, reporting the exact location of the problem. You can also provide more information if you like by checking off boxes to indicate if there is sheen (oil), sediment, or algae present.

Our idea is cost-effective because QR codes are free to create and register. The main cost will be installing the codes onto drains and maintaining the website. Many water management facilities already have websites, so our page could be added to already existing sites.

We know it will be user-friendly because quick response codes are being used by millions of people worldwide since many mobile platforms such as Snapchat and Google use them. Both Android and iOS also have built-in QR code scanners in newer phones."

"We hope that our simple, easy solution will allow more people to take an active role in protecting their community's stormwater," says Lori Langley, Coach for Team Storm.

At the end of November, Team Storm had an incredible day at the qualifying tournament hosted by Purdue University (located at McCutcheon High School in Lafayette). They will advance to the Northern Indiana State Championship on December 9, hosted by IPFW (Indiana University/ Purdue University, Fort Wayne). Team Storm won the Champion's Award (best overall team) and earned the highest robot score in the robot game. They also were honored to receive a nomination for the Global Innovation Award, recognizing their QR Code project solution. They will now participate in an additional competition to determine the best two solutions in the State of Indiana.

You can send encouraging messages and follow Team Storms progress in the *FIRST* LEGO League challenge by following their social media pages.

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Flow on Team Storm!!! ★