



2020 Semi-Finalist Teams and Innovations



8 To Automate, Dublin, Ohio, USA REST: Roof Evaluating Strain Tool

8 To Automate's team mascot is an octopus, because an octopus has eight arms, each with a separate brain, which all work together. They also call themselves the "A Team" because each member has the letter "A" in their name. Each team member has at least one parent born in a different country and they like to eat different foods during snack time to appreciate their cultural backgrounds.

REST: Roof Evaluating Strain Tool uses fiber optic sensors to detect loads on flat roofs, such as snow, ice, or construction defects, notifying owners and sounding an alarm if the load becomes dangerous. This prevents over shoveling, which is expensive, dangerous, and needlessly damages the roof waterproofing membrane. This also prevents under shoveling, which can cause a catastrophic building roof collapse.

Absolute Zero, Martinsville, Virginia, USA The Wheel2Ski

Absolute Zero is a team with grit—together they are passionate and persevere to accomplish goals they set. Coming from a Title 1 school with very high poverty, the team is driven to make the world a better place, and they look at their own city as a place to start the change. They decided on the problem of



walkways that have not been shoveled after learning that a recent death in their community may have been prevented if the EMS had better access to the deceased..

When it snows, sidewalks and public properties that are not cleared can potentially inhibit emergency medical service (EMS) workers from accessing patients in a timely manner. The time spent clearing the entryway can be the difference between life and death in an emergency situation. **The Wheel2Ski** is a sled-like attachment that allows EMS workers to quickly transform their traditional stretchers into an apparatus that can glide through the snow, decreasing response time while providing a safer environment for both the workers and the patient.



Aldeatrón Robotix, Canary Islands, Spain **E=Wall**

Aldeatrón Robotix is a hard-working, fun and attentive team, eager to learn about what surrounds them and to contribute their grain of sand to make this world a better place. The team members are highly compatible and coordinated, all contributing to achieve their goals. They consider themselves a family, supporting, respecting and fully trusting each other. This team always enjoys their time together, and there is never any lack of laughter in their work sessions.

It can be costly to import building materials to the island where this team lives. **E=Wall** is a low cost, lightweight, eco-friendly building block made from recycled cardboard and Fountain grass, which is an invasive species there. This solution, which can be manufactured locally, takes the place of conventional blocks and insulation, offering temperature regulation and noise reduction.

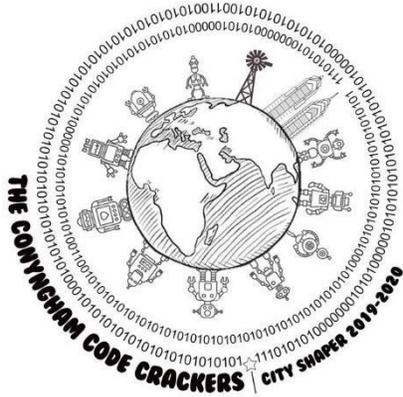
Astro Jelly Dogs, Woodbine, Maryland, USA **Grow Homes**

The **Astro Jelly Dogs** are a group of seven fun, smart, **FIRST**[®] **LEGO**[®] League loving kids. This team enjoys research, planning, and figuring out ways to help the world become a better place. Their practices are filled with a lot of sticky notes, laughs and cookies.

The city where The Astro Jelly Dogs live has over 146,000 of its citizens living in food deserts. Food deserts are an urban area in which it is difficult to buy affordable or good quality fresh food.

The Grow Home focuses on renovating abandoned buildings to create an indoor green house that provides fresh produce and eggs for the community without changing the city's landscape.





The Conyngham Code Crackers - Brobots, Sugarloaf, Pennsylvania, USA The Conyngham Catcher

The Brobots were once made up of the older brothers of an all-girl *FIRST* LEGO League group named The Ladybots. Over the years, The Brobots have rounded their team out to include both older brothers and sisters. Each year, the team partners with other community groups to help improve their small, rural town. They also love to run summer camps to help teach area youth their love of robotics and all things technology.

After surveying their community, the team learned that many citizens feared the excessive mosquito problem on a local walking trail. The team innovated a special biodegradable mosquito trap to place near heavily trafficked areas of the trail, called **The Conyngham Catcher**. This 3D printed model uses a special carbon monoxide mixture to lure mosquitoes inside the device.



Electric Eagles, Emek Hefer, Israel GLL - Great Leg Lock

The Electric Eagles is part of the “Wings of Dawn” robotics club, whose young mentors are *FIRST* LEGO League alumni, now participating in other *FIRST* programs. The team member’s club motto is “Luck favors the prepared!”

A standard public bathroom door requires touching the doorknob for opening, closing and locking. **GLL - Great Leg Lock** offers a cheap and simple mechanism that enables locking the bathroom door using a foot-operated, mechanical device. GLL is comparable in cost and complexity to a simple doorknob, but provides a safer, more pleasant public bathroom locking experience.



The Fidgety Pokémon, Phoenix, Arizona, USA The Dust Collar

The Fidgety Pokémon are a small community team made up of fidgety, homeschooled members, and CITY SHAPER® is their first year! After visiting a local Fire Department in their community, the team decided to look into fire safety. They then did a community survey to decide which problem to focus on.

The Dust Collar is a carbon fiber collar that fits around existing smoke alarms and helps prevent nuisance alarms due to dust, which is a big problem where the team lives. It is a low cost solution for buildings and can be reused indefinitely. Not only does the prevention of nuisance alarms save the local fire departments money, it helps to save lives by keeping the alarms active and clear to detect real fires.



THE F.O.U.R., Clinton, Wisconsin, USA Rodent Repelling Housewrap

The F.O.U.R is an acronym for the Fantastically Observant Unrelenting Rebels, and no four words could describe the team better! The team is made up of two sets of siblings. After learning about SMART goals, The F.O.U.R. set many seasonal goals and have worked hard to get those completed.

In the United States, 21 million houses are infested each year as rodents look for a safe place to nest. **Rodent Repelling Housewrap** is a new building product and the first-of-its-kind rodent repelling insulation product that uses harmless but effective ferret pheromones embedded in polyisocyanurate insulation.

Golden Pandas, Westfield Indiana, USA Sporalizer

The Golden Pandas is a team of 8 students from a variety of school environments: homeschool, online school, and public school. The team enjoys researching and solving problems creatively, while making sure to celebrate their achievements with Gatorade, Mexican food, and escape rooms.



Hospital Acquired Infections (HAIs) kill 99,000 Americans every year. The most lethal HAI is Clostridioides Difficile or C. diff. **The Sporalizer** uses terbium chloride (TbCl₃) wipes along with UV light and a 3D camera to help hospital cleaning crews see where C. diff spores are located. The TbCl₃ in reaction with spores glows under a UV light. The camera spots this glow and sends the real-time data to a computer screen attached to the tripod.



The Greenscapers, Canton, Michigan, USA **The Greenscaper**

The team name Greenscapers represents part of this year's *FIRST LEGO* League theme, with an emphasis on green spaces. The team loves to learn by doing experiments and analyzing the results. When deciding on a problem for this year's Challenge, the team conducted a survey of over 200 members of their community.

In future cities, we need plants for environmental and health benefits. However, some people find it hard to keep their plants alive, due to different watering needs of different plants. **The Greenscaper** is a "smart" plant watering system that can water your home's plant(s) automatically or alert the user in real time when a plant needs water via a display or email notifications. It detects soil moisture level for each plant using soil moisture sensors and compares sensor reading to each plant's watering requirements. The Greenscaper is designed to be scalable to up to 64 plants, so it is customizable based on user's needs.

Hældagerskolen (DOAM), Kolding, Denmark **The IllumiLeglnator**



The Hældagerskolen (DOAM) team mascot is a cardboard figure of Perry the Platypus, who has been a great encouragement and moral support to the team. The team prides themselves on their teamwork, because everyone will happily work with any other person on the team and they never work alone. By not working alone they ensure that everyone always has someone to discuss new ideas with.

The team chose to focus on improving their community's multifunctional sports field, where they noticed that the markings have been worn down, making the park more difficult to use. **The IllumiLeglnator** focuses on encouraging community use by making sport's field lines more visible by on putting a net of LEDs in the top layer or tuft instead of typical markings. With an

App you can choose what sport you want to play and where that field will be. The LEDs will make it easy to see where the markings are, even at night.



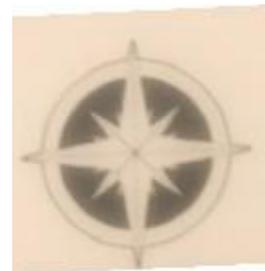
Hardhat Hackers, Portland, Oregon, USA **Biometric Hardhats for Construction Site Safety**

The Hardhat Hackers is made up of kids from three families, who work well together. The team enjoys collaborating with other teams by sharing code, helping with robot designs, and sharing project presentations

Despite the priority on safety at constructions sites, this team found that there are still workplace safety issues due to problems like heat exhaustion/over exertion that result in the 2nd highest rate of workplace related injuries and missed workdays according to the US Bureau of Labor Statistics. **Biometric Hardhats for Construction Site Safety** adds constant monitoring of the worker's health/environmental data to an existing piece of safety gear (hard hat) and provide alerts when a worker is in danger of heat exhaustion, over exertion, or other potential problems (such as heart attacks).

North 40, Oakland, Maryland, USA **Bird Buddies Window Spray**

Team members of North 40 have fun and focus on helping others learn about *FIRST* and STEM by volunteering in the community and visiting the local University to help future teachers and give workshops to help classroom teachers develop activities that will help their students.



Windows are dangerous for birds because they see reflections of trees or the sky and fly into the glass, which causes severe injury and usually death. We developed **Bird Buddies Window Spray** so people could have an unobstructed view while making their windows visible for birds. Our no-splat formula utilizes the phosphors from highlighters in a long-lasting window spray that is invisible to people but can be seen by birds because they can see on the ultraviolet spectrum.



QuickBots, Dayton, Ohio, USA Polar Play

The QuickBots are an internationally competitive team that is competing for the second time in the Global Innovation Award tournament. They have filed a utility patent for their first-year project from the Hydrodynamics season and are working on a patent for this year's project. When not competing or volunteering at *FIRST* tournaments, the team is actively involved and competing in athletics, music, drama, and chess.

Hot playground equipment can cause serious burns on children's skin and can also contribute to other serious injuries. **Polar Play** is a coating that reduces injuries by cooling outdoor play equipment. It is a solar-reflective, thermochromic (color-changing) coating that can be applied to existing and new playground equipment to reduce the surface temperature up to 30°F. On extremely sunny days, the thermochromic pigment will react and change color to warn parents and children that the equipment is not safe for play.

Rebel Robotics, Norfolk, Nebraska, USA The SafeStep



In their fourth year, Rebel Robotics has learned to work together really well. This year each team member took a Strengthfinder test to learn our top five strengths. The team credits the test for a better understanding of what each team member is naturally good at and that they now understand each other better. Their favorite thing about *FIRST* LEGO League is the way that teams are always willing to help each other.

The SafeStep focuses us on pedestrian safety at roundabouts. This solution is a pressure-sensitive, solar-powered, light-up pedestrian safety mat that helps make motorists aware of a pedestrian needing to cross the roundabout. The mat is self-powering with a flexible solar panel, making it simple to install and more cost-effective for cities than other existing pedestrian safety systems.



The Ruling Robot Falcons, Newport News, Virginia, USA The Bee Byway

The Ruling Robot Falcons is a community team in their 7th year. A highlight of their tenure has been attending the World Festival in St. Louis and Detroit, where they got to meet teams from around the world.

After visiting local public places to learn about pollinators' role in maintaining the flowering plants in those spaces, the team found that only 7 of the 60 visited sites in their community had complete bumble bee habitat. These gaps leave bumble bees isolated from unrelated bees, which leads to low genetic diversity, reducing their ability to survive. The **Bee Byway** is a pollinator corridor with the goal of increasing connected habitat for bumble bees. Bumble bees have a foraging range of about 1/3 of a mile, and without habitat in that range, they can't reproduce or survive. The Bee Byway has over 80 total established waypoints that are 1/3 of a mile apart, creating a continuous 13-mile bee habitat.

SESI Biotech, Barra Bonita, Sao Paulo, Brazil ECOPAVI - Cold-applied ecological asphalt sealant

When the team first formed in 2011, The name "Biotech" was chosen because "bio" means life and "tech" means technology, implying that the team "gives life to technology." The team prides themselves on being united and joyful, and always trying to transmit joy to others, and the team's color uniform is orange, which means joy and creativity.

One of the major problems found in the cities are the fissures and cracks in paving and the potholes they create. To solve the problem, this team created **ECOPAVI**, a cold-applied ecological asphalt sealant, which has the capacity of expanding to fill the cracks, penetrating in the lower layers of pavement and protecting it from the harmful action of water, retarding the crack progression.



TITANS L.J., Goiás, Brazil Sustainable Solvent Liquid (SSL)

More than a team, TITANS L.J, is a family made up of 8 people. They are inspired by the Teen Titans, who are young scientists and seek new solutions to solve everyday problems, just like them. They are young warriors, and together learn and create strength to not give up. The team motto

is overcoming day after day, because they know that to achieve their goals, focus and perseverance are needed.

Between the months of November to March, a natural phenomenon hampers the daily lives of Brazilian drivers: the fruiting of the *Syzgium Cumini* tree, popularly known as *Jamelão*. It coincides with the rainy season and causes accidents on the roads where it is present. The **Sustainable Solvent Liquid (SSL)** is made from the juice of the orange peel because it has limonene, a type of natural degreaser capable of removing the accident causing grease. The SSL would be applied to roads before the rainy season starts.

Wizarding 8, Fuquay Varina, North Carolina, USA **The VOICE (Verbal Operational Inclusion Communication and Equity) Board**

The Wizarding 8 is a team of fifth grade students who love LEGO® bricks. They realize that their strength lies in their ability to combine their talents and ideas creatively and that their combined unique skills create a stronger team. Their name comes from the eight team members creating “magical” solutions with the goal of bettering their community and the world.



The VOICE (Verbal Operational Inclusion Communication Equity) board is a communication board that uses pictographs on the playground so that nonverbal children can communicate requests for what they want to do to other playground attendees, making play more inclusive. Additionally, this solution contains 3-D printed tactile pieces that can attach to flat areas on traditional playgrounds. Tactile sensory pieces reduce anxiety and sensory overload by giving children a place to center and calm themselves.



X-LANDERS 10.0, Kruisland, The Netherlands **The Mudmaster**

The X-LANDERS 10.0 is a rookie team, consisting of seven team members. They come from a small village in the countryside where agriculture is a big part of their community. The name MUDMASTERS stands for: Motivated, Underaged, Dutch, Miniscule, Awesome, Spontaneous, Talented, Elementary, Relaxed, and Stars.

In the rainy season when crops are harvested, tractors leave sticky mud on the road, causing dangerous situations for drivers. Even after cleaning, the roads can remain slippery.

The

Mudmaster uses nozzles mounted to a tractor's mudguard to clean the tractor tires with water in the field before the tractors enter the roadway, so the mud doesn't transfer to the road. The solution is easy to use and requires little effort or additional time on the part of the farmer.