

# Students make Future City nationals

Stover High School students competed Saturday, Jan. 26 in the Future City Competition at Missouri University of Science and Technology in Rolla. The team, named Kal Ka Shahar won first place in the Missouri competition and will compete Tuesday, Feb. 19 at nationals in Washington, D.C.

Students participating included seventh-grade students Daxton Payne, Hannah Bauer, and Joey Menning and eighth-grade students Raelynn Minter, Sara Hauck, and Tharyn Payne.

The theme for the 2019 Future City Competition was energy resilience after a natural disaster. Students selected Bhuj, India, which suffered a devastating earthquake Friday, Jan. 26, 2001.

Students renamed their city Kal Ka Shahar and redesigned the city to address the theme. The buildings are earthquake resistant, with the exception of a few retained for historical purposes.

The city's electric grid contains three levels. The lowest level is the nanogrid which is at the building level. Each building has wind or solar power on the roof in addition to solar paint or solar glass. Each nanogrid is connected with others on the block to make a microgrid which stores excess power underground in large lead acid batteries. The nanogrids are connected to form a megagrid which receives power from a large solar farm located on the edge of the city. All power lines are under the city and remotely disconnected from the megagrid in the event of a disaster until they can be checked for breaks.

In the event of a break, each building relies solely on its own power with priority outlets throughout the building receiving electricity if there isn't enough for the entire building.



**Tharyn Payne, from left, Sara Hauck, and Raelynn Minter received first place Saturday, Jan. 26 during the Missouri Future City competition at Missouri University of Science and Technology in Rolla. (social media photo)**

Outlets for safety and medical would receive first priority followed by food storage devices.

Since long-term societal problems contribute to recovery efforts, students included a large women's and children's center in their city for abused women to live, be educated, and work.

The model the students created has a scale of 1 inch for every 50 feet above ground and one inch for every two feet below ground. This allowed students to show several city blocks above ground while still able to show their utility pipes and batteries below ground.

Students also had to plan a budget and track their spending during the project. Students used a variety of recycled materials to create their city including plas-

tic bottles, CDs, broken solar lights, and Legos®. They came in \$9 under their \$100 budget after assigning value to items not purchased, such as the used plywood for their base and a handful of donated Legos®.

Students included three moving parts in their model. Their two medical buildings have Christmas ornaments representing windmills on the roofs. They connected them to motors, a battery, and a switch to make a simple circuit. While it is a basic circuit, students used the engineering design process to get them to work correctly.

Originally, the motor was spinning too fast so students added a second motor to the circuit. They then added sand to the ornaments to increase the mass. Once students were satisfied with the speed, they then had to attach them to the roofs so the motors weren't visible and the ornaments were still free to spin.

Their other moving part is a different type of wind turbine which uses a blade suspended horizontally above a Gatorade® bottle with a hole cut in the lid and a straw inserted in the middle to create a simple pneumatic device. Students drilled a hole in the bottom of the bottle and put an old shower hose through it. The other end of the shower hose is hooked to a small air pump. When the students push on the hand pump the blade spins.

The model must also be visu-

ally attractive. Students selected a color scheme of blue, purple, silver, and white for their buildings. They painted a backdrop that includes a cityscape of Indian-inspired buildings and a sunrise.

For their transportation system, students laid out roads using electrical tape and designed 3D-printed buses; blue for transporting people and purple for transporting goods. The lid from a razor represents a park 'n' ride. To add light and interest, students created a building composed of glow stick bracelets stacked on each other. The bracelets were not activated until the morning of the competition. A small star-shaped light that changes colors and acts as a building is also used.

Eighth-grade students were responsible for the research paper, designing the model, and delivering the presentation. These students explained their model to a panel of engineers and later delivered a seven-minute presentation before a different panel of judges.

Seventh-grade students were responsible for city planning and testing ideas using SimCity, designing posters, 3D printing, and other miscellaneous tasks.

Ethan Shackelford, SHS alumni and civil engineer for Waste Corporation of America, acted as a mentor for the students. He met with students to discuss their progress and provide feedback.



**Students were required to build a scale model as part of the Future City Competition. (submitted photo)**