THE WILLIAM STATES LEE COLLEGE OF ENGINEERING

Company Information

Company Name	*Kaleideum (interactive science and children's museum) – sponsored by the Bosch Community Fund*	Date Submitted	*11/15/2021*
Project Title	*Design a portable AR sandbox for outreach events* **(KALEID_SANDBOX)**	Planned Starting Semester	*Spring 2021*

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical	2	Electrical	1-2
Computer	0-1	Systems	
Other ( )			

Company and Project Overview:

Kaleideum was formed in 2016 with the merger of two beloved educational and cultural institutions in Winston-Salem: SciWorks (a science museum) and The Children's Museum of Winston-Salem. Kaleideum's mission is to inspire wonder, curiosity, and lifelong learning in their children and community through interactive play and discovery. They achieve this through the overlapping lenses of literacy, the arts, and STEM.

Kaleideum is a community leader in creating opportunities for open-ended, self-directed, and interactive learning about Science, Technology, Engineering, Art, and Math (STEAM). Kaleideum utilizes a learner-centered educational approach and provides North Carolina visitors with STEAM school-group programs, field trips, STEAM summer camps, multigenerational family programming, and interactive STEAM exhibits for all ages.

Kaleideum currently has two locations, Kaleideum North and Kaleideum Downtown, as it

constructs a new building for their merged institution. Together, these two locations serve 200,000 people annually and more than 2,000 member families. Kaleideum primarily serves the Winston-Salem, High Point and Greensboro areas of North Carolina, which together form the Piedmont Triad area. More information is available at Kaleideum.org.

Kaleideum is seeking an addition to the school based programming that enable children and adults to interactively explore scientific principles. The UNC-Charlotte Senior Design project will provide a portable version of an existing exhibit. This project is financially supported by the Bosch Community Fund. The Bosch Community Fund, the corporate foundation for Bosch in North America was established in 2011 to provide community engagement and philanthropic support on behalf of our company. The Fund focuses on the enrichment of science, technology, engineering and math (STEM) education and advancing environmental sustainability initiatives. We partner with 501(c)(3) organizations and educational institutions across the country to provide quality project-based learning hands-on learning opportunities for students and professional development for teachers.

Project Requirements:
This project will produce a portable version of an existing Augmented Reality Sandbox currently on display. This portable version will allow use to create programming specifically for school groups and outreach opportunities.

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The student designed exhibit will be associated with the classroom/outreach efforts located at the Kaleideum North location. Currently, the AR sandbox is a permanent exhibit in the Mountains to the Sea gallery and is often not available for small group programming or outreach. This portable version will allow our educators to engage students and adults in offsite areas and illustrate the concepts of geography, geology, contour lines, water sheds and topography. These topics are all part of the NC Science Essential standards.

The engineering students will need to create a portable version of the exhibit that includes an approximate 2'x3' rectangular box with wheels that will hold white playsand (with no leakage), a projector, X-box connect and laptop (provided). The box will need to be electrified and easily collapse to be transported. Design should be sturdy yet light enough to be easily transported.

Kaleideum staff will give design feedback to students and help steer them toward a portable design that is likely to be successful in the museum environment.

Expected Deliverables/Results:

- A fully functional portable AR sandbox that can collapse and be easily and safely transported.
- Should be light yet sturdy and able to withstand 5 years of use by education staff.
- Safe to operate with children and not pose any physical or electrical risk
- Unit should be on wheels, preferably with a locking mechanism to keep all equipment safely inside
- Size to be determined by discussions with museum staff but within the range of 50-75 lbs and easily wheeled from location to location and able to fit in a normal size car/trunk.
- The exhibit should include electrical wiring so that the projector, laptop and X-box connect are able to be powered from a simple extension cord into a normal household 110v outlet.
- Case should be pleasing to the eye with no obvious electrical wires or rough edges.
- Case should include protective padding to safely store the projector and X-box connect during transport
- Projector should be small yet still produce enough lumens to be visible in normal classroom lighting.
- Sand should be contained within the unit to avoid spilling of material during transport.
- Deliverable unit must be clearly marked giving credit to the Bosch Community Fund for Sponsoring the project.

Disposition of Deliverables at the End of the Project:

Unit to be delivered within 7 days after display at the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):
- Travel to the museum will be required to view and explore the full size exhibit as well as observe

firsthand the specs of the original exhibit. Travel will also be required to deliver the completed unit and instruct on it's use. Travel will be in compliance with the CDC and University guidelines.

● Interest in completing all aspects of a STEM exhibit to deliver a functional unit that is portable, light and sturdy.