Play Drive Electric Car Challenge

Mr. Greg Burnham, Allen High School Allen ISD

Greg Burnham has been integrating engineering projects into science classes in Texas for thirteen years. Currently he teaches engineering and robotics and coaches FRC Team 5417 at Allen High School in Allen, Texas. Greg spends his summer months collaborating with Texas Tech University WCOE and IDEAL Institute to conduct science and engineering camps and teacher training. He received a Bachelor’s of Science in Multi-Disciplinary Science from Texas Tech University.

Mr. Kenyan D Burnham
Please complete this form, save it as a PDF file only and upload it through the ASEE Paper Management system as shown in the K12 Workshop Presenter’s Kit.

All notifications will be by email from the ASEE Paper Management system.
NOTE: To ensure that emails are not obstructed by spam blockers, please make sure to WHITELIST the email addresses: monolith@asee.org and conferences@asee.org and s.harrington-hurd@asee.org.

Direct questions to Stephanie Harrington-Hurd, ASEE K-12 Activities Manager, at s.harrington-hurd@asee.org. Additional workshop details are available at: http://www.asee.org/K12Workshop. Thank you!

**Deadline**
Friday, January 23, 2015 by 5:00PM EST

Presenters will be notified of acceptance status by March 14.
Late submissions will not be accepted.
Advanced Workshop Registration will open December 6, 2013.

**SUBMISSION INFORMATION**

Provide the first and last name of each presenter, including affiliations. If there is more than one presenter, designate one person as the organizer and provide only that person’s contact information. The organizer is responsible for communicating to co-presenters.

Number of Presenters: 2

Presenter Name(s):
1) Last Burnham   First Greg   Affiliation Allen High School
2) Last Burnham   First Kenyan   Affiliation Texas Tech University/Frito Lay
3) Last Burnham   First Stephanie   Affiliation Plano Academy High School

Contact Person’s Name: Greg Burnham
Contact Person’s Email: greg_burnham@allenisd.org
Contact Person’s Phone: 806 392-6516
Contact Person’s Alternate Phone: 972 727-0400 ext 1614
Please provide a one-paragraph bio for each presenter (in the order listed above). The bio should not exceed 70 words and should be written as you would want it to appear on the ASEE website and program materials.

1) Greg Burnham spent ten years of the last eleven years teaching science and engineering in a low socio economic high school where 98% of the students were under represented in STEM fields based on race, gender, sexual orientation or economic classification. He has found creative approaches to engineering like the use of non-traditional materials in engineer projects often times helps inspire creative engineering in students from under represented populations. The presentation will address issues of inclusion and the need for diverse perspectives in engineering in the future.

2) Kenyan Burnham: Undergraduate Electrical Engineering student at Texas Tech University. He has worked with STEM pipeline/education programs for seven years as a participant, mentor and teacher. His primary focus is RobArch research and my current professional internship in robotics and control systems. I am a lab assistant and safety captain in the department of Electrical Engineering, the Robotics and Embedded Systems Lab, Advanced Vehicle Engineering Lab, and the Undergraduate Laboratories

3) Stephanie Foster received her B.S. in mathematics from UT Permian Basin. She received her M.A. in mathematics from University of Texas at Austin concentrating in application of parametric equations. She taught pre-calculus and calculus at Estacado High School in Lubbock TX and dual credit math through Lubbock Christian University. Currently she is planning calculus and pre-calculus curriculum for Plano Academy High School a project based high school in Plano, TX

WORKSHOP INFORMATION

Proposed Title

Play-Drive Electric Car Challenge (STEM Project for Classroom or Outreach)

Abstract: Please provide a concise description that includes the workshop’s learning objectives (maximum 750 characters). The abstract is used on the ASEE website, program materials, and other K-12 Workshop promotional activities.

This workshop incorporates electricity concepts, circuits, iterative process and innovative materials into a Problem Based Learning (PBL) activity. Working with conductive and non-conductive clay teachers will mold an activity they can take back to their classroom and challenge their students with. The project will be embedded with learning objectives including
math, physics and engineering that can be refined or modified for specific classroom or outreach use.

Workshop Description. Please provide a detailed description of the proposed workshop that, at minimum, explicitly addresses the following (maximum 4,000 characters):

a. Learning objectives
b. Hands-on activities and interactive exercises
c. Materials that participants can take with them
d. Practical application for teachers and outreach staff

2. Greg and Kenyan Burnham will share a little about themselves and the innovative programs and classes they collaborate on and the K-12 pipeline to higher education they have contributed to and participated in for over seven years. Greg and Kenyan will share their experiences working with Problem Based Learning (PBL) and STEM in different settings including teams (robotics and other), classrooms, camps, teacher trainings and past presentations. Both will provide ideas for PBL based assignments and competitions that teachers can take can take back to their classrooms and University faculty and professionals can use to start or improve their K-12 outreach.

3. An electricity design project that utilizes conductive and non-conductive clay, simple circuits, resistance, LED and small motors will be introduced. The presenters will introduce concepts of PBL and example learning objectives will be provided for participant’s consideration and a brief discussion of which objectives participants might use the activity for. Basics like applications of algebra, Ohm’s Law, circuits, conductive properties of materials, project cycle and the iterative process and engineering team management.

4. The instructors will introduce the engineering, electricity and math concepts they teach and demonstrate with the activity and lead a brief discussion on how it can be used by workshop participants. A basic check list and learning objective based rubric will be provided to lay out a time line for both classroom and outreach scenarios and demonstrate the possible learning comes of the project. Finally an abbreviated version of the challenge will commence for teachers and outreach faculty to get hands on experience working in teams with the activity. A discussion with the now experienced participants will be used to close the session and create a network for participants that want to continue to collaborate on project based learning after the workshop.

5. Participants will leave with ideas and materials to apply to their own classrooms and outreach events. The workshop write-up and several other PBL activity and competition write ups will be provided, as well as, contact information for the presenters for future assistance. Some participants will leave with the workshop materials and their teams’ final project.
WORKSHOP PROPOSAL FORM

2015 Annual ASEE K-12 Workshop on Engineering Education
“Authentic Engineering: Representing & Emphasizing the E in STEM”
Presented by Dassault Systems

Saturday, June 13, 2015
8:00 A.M. – 5:00 P.M.
Sheraton Seattle | Seattle | WA
**Authentic Engineering Connection.** Identify and describe how you will explicitly address the ways in which your lesson or activity is representative of the processes, habits of mind and practices used by engineers, or is demonstrative of work in specific engineering fields. At least one of those must be within the first four listed, below; i.e., do not only check “other”. Check all that apply:

- ☑ Use of an engineering design process that has at least one iteration/improvement
- ☐ Attention to specific engineering habits of mind
- ☐ Attention to engineering practices (as described in the NGSS/Framework and as practiced by engineers)
- ☐ Attention to specific engineering careers or fields related to the lesson/activity
- ☑ Other (please describe below)

Provide a description of how you will explicitly address these aspects of authentic engineering in your workshop (maximum 2,000 characters):

Emphasis will be placed on the cyclic nature of engineering project design. The plastic and ductile properties of the conductive material make it possible for team participants to complete several iterations of the project in the relatively short period of time the workshop will occur in. This property also augments the physics and math portion of this project making the resistance and conductivity manipulate able. Specifically, algebraic manipulation and Ohm’s Law can be used to determine resistance of the material as it is varied. These qualities of the material carry over well to the classroom, camp or outreach events the participants may want to use the activity for in the future.

**Diversity.** This year is the American Society for Engineering Education’s “Year of Action on Diversity.” It is essential that we have a diverse engineering workforce to solve diverse problems. To do that and to have an engineering-literate public, it is essential that we reach every preK-12 student with high-quality engineering education, drawing on issues of access and equity in the classroom and in the curriculum. Reviewers would like to know how your proposed workshop will address diversity.

Provide a description of how you will explicitly address diversity – e.g., diversity with respect to gender/sex, ethnicity or race, special education inclusion, socio-economic status, or LGBT status – in your workshop (maximum 2,000 characters):

Greg Burnham spent ten years of the last eleven years teaching science and engineering in a low socio economic high school where 98% of the students were under represented in STEM fields based on race, gender, sexual orientation or economic classification. He has found creative approaches to engineering like the use of non-traditional materials in engineer projects often times helps inspire creative engineering in students from under represented populations. The
presentation will address issues of inclusion and the need for diverse perspectives in engineering in the future.

Are there any online components to the proposal or presentation? (Note that these online components may only be available to presenters or those who have their wireless subscriptions, since wireless may not be available during the workshop sessions.)

☐ No
☐ Yes

Please describe:

Grade Level Target Audience (check all that apply):
☐ Primary (EC–2)
☐ Elementary (3–5)
☐ Middle School (6-8)
☒ High School (9-12)

Maximum Number of Participants:
25

If this number is greater than 25, please describe how your workshop will equally engage all participants.

All Seating is Classroom (tables and chairs).

Audio Visual Equipment Requests:
Note: An LCD projector, screen and podium with attached microphone are provided. Requests for additional equipment or resources (e.g., internet connection or laptops) will incur extra charges. If you do not have additional requests, please indicate with “Not applicable.”

Reminder:
Presenters must register and pay the registration fee to support their workshop attendance and audio/video costs.
Thank you for completing this proposal form!
Please review this document prior to submitting it to ensure that all items are complete.

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