Resource Template

### Submit a Resource Form:

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| **Resource Title:** | Experimental Testing of Vehicles | | | | | |
| **URL:** offsite location url (for Resource File field) not needed for CAAT entered resources |  | | | | | |
| **Date Resource Developed:** date that the resource is published to the site. | 10/9/2017 | | | | | |
| **Author Name and Title:** author1, title, inst; author2, title, inst; etc | Vladimir Vantsevich, Professor | | | | | |
| **Author Phone Number:** semi-colon separated, same order as name |  | | | | | |
| **Institution Name** semi-colon separated, same order as name | University of Alabama | | | | | |
| **Institution Phone Number:** semi-colon separated, same order as name | (205) 348-6010 | | | | | |
| **Recommended Review Date for Currency:** if not specified, set to 3 years | 10/9/2020 | | | | | |
| **Resource to be housed on:** CAAT Site / Your Site | CAAT Site | | | | | |
| **Keywords:** alpha order, comma separated \*no spaces\*, no more than 10, find in resource | Automotive technicians,engineering,guage,hybrid electric vehicle,vehicle repair,sensors | | | | | |
| **Short Description:** for resource description in search page try to keep to < 150 characters | A course for community college students and automotive test technicians in the area of vehicle experimental testing. It can be included in an automotive engineering curriculum. | | | | | |
| **Long Description:** for in-depth description on resource page for seed funded projects be sure to include NSF Grant statement at the bottom | Description Students will do practical laboratory-based studies on various sensors and data acquisition systems (DAQ), setting up test procedures, wiring up sensors for measurements, conducting experiments, recording experimental data, and analyzing test results. Gaining experience on estimating experimental vehicle characteristics and writing a test report is an important part of the course.  An experimental project based on the testing of a virtual hybrid-electric vehicle with the use of an actual DAQ is included in the course. The lab work and the course project are supplemented by lectures. National Instruments LabVIEW and myRIO, MATLAB/Simulink are in use for laboratory work and course project. The course is designed to meet over a period of 15 weeks, 2 meetings per week, and 1h 30min per meeting. Course Learning Outcomes (CLOs) The course learning outcomes are to have students**:**  The course learning outcomes are to have students:   1. Understand the role and types of experiments in vehicle engineering 2. Realize the importance of providing safety during experiments and study major safety instruciton 3. Set up test procedures, wire sensors, condusct experiments, obtain and analyze experimental data, write a report 4. Gain knowledge on major experimental test characteristics and on estimating experimental vehicle characteristics 5. Be familiar with some FMVSS and NHTSA test procedures and SAE standards related to the course project 6. Understand calibration procedures 7. Gain sufficient knowledge on test instruments 8. Understand static and dynamic characteristics of signals 9. Gain and apply practical knowledge on DAQ for measuring electrical signals and recoerding experimental data 10. Gain knowledge on strain gauge designs 11. Apply practical skills to conduct experimental studies with strain gauges for measuring forces and torques 12. Be familiar with Hall-effect sensors and their vehcile applications 13. Gain and apply skills to conduct experiments with Hall-effect sensors in e-motor control systems 14. Understand principles of sensors to measure wheel normal reactions 15. Gain practical skills to measure wheel normal reactions 16. Understand and conduct unique tests to measure off-set of the wheel normal reaction 17. Gain knowledge of wheel transducers to measure forces and moments at the wheel axis 18. Gain knowledge on acceleration sensors and applications 19. Learn and apply knowledge on e-motor and controller tests 20. Apply knowledge and skills on wheel transducers to measure data and determine tire rolling radii in the driven and driving modes of operation 21. Be familiar with a 4x4 vehicle chassis dynamometer and test procedures 22. Set up and conduct experiments on a 4x4 vehicle chassis dynamometer 23. Set up a project on experimental estimaiton of wheel rotational velocity of a 4x4 hybrid-electric vehicle   **This material is based upon work supported by the National Science Foundation under Grant No. 1400593.**  **Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.** | | | | | |
| **Audience:** most relevant audience  (may include more than one) | X Educators | \_ General Public | | | \_ Researchers | |
| \_ Students | \_ Industry Professionals/Practitioners | | | | |
| **Education Level:** most appropriate for…  (may include more than one) | \_ Elementary | | \_ Middle School | | | \_ High School |
| X Undergrad (lower) | | \_ Undergrad (upper) | | | \_ Graduate Level |
| **Engineering Technology:** (may include more than one) | X Adv Combustion Engine \_ Alternative Fuels & Lube \_ Automated & Connected \_ Electric Machines & Power Elec \_ Energy Policy \_ Energy Storage & Battery Tech | | | \_ Grid Interface (power & comms) \_ Fuel Cells / Hydrogen X HEV/EV System Tech \_ Integration Nework & Comms \_ Material Lightweighting X Other: | | |
| **Product Lifecycle:**  (may include more than one) | X Pre-production: research, design, development, testing, tooling  X Production: manufacturing, assembly, operations  \_ Post-production: service, reuse, recycling | | | | | |
| **Type:**  (may include more than one) | \_Animation | | X Course | | | X Presentation |
| \_ Article | | X Exam | | | \_ Prof Development |
| \_ Book | | \_ Image | | | \_ Paper/Report |
| \_ CAAT | | \_ Homework | | | \_ Software |
| \_ Case Study | | X Lab Activity | | | X Syllabus |
| X Classroom Activity | | X Lesson Plan | | | \_ Webinar |
| \_ Conference Material | | \_ Module | | | \_ Other |
| **Resource File:** if on CAAT: upload single item or zip file if offsite: leave blank | CAAT RELATED\CAAT Website Development\Resource Library\Classified Material for Library\univ of Alabama\ Experimental\_Testing\_Vehicles | | | | | |

**Completion List for Website Content Coordinator**

* **Classifying Document**
* **Add to Elktron CMS**
* **.xml Metadata**
* **Maintain .xmls for the NSDL, AMSR, and ATE Central**
* **Resource Tracking**
  + **\CAAT Website Development\Analytics\**
    - **Master Analytics Graph.xlsx -> tab “resource downloads”**
  + **\CAAT Website Development\Resource Library\Resource Library w Totals.xls**
    - **All Resources tab**
    - **External Links tab (if files saved outside autocaat.org)**
  + **\CAAT Marketing Material\Newsletter\2017 Issues\[Month]**
    - **What’s New in the RL for [month][year].doc**
  + **\CAAT Website Development\Resource Library\ATE Central Archiving\  
    (if it is owned by CAAT and falls under our copyright)**

**If approved:**

* **Archived Resources at ATE Central.xls  
   - Print new list and add to ATE Archive book  
   - Print copy of resource page from our library  
   - Print copy of resource from the ATE Central Library  
   - Add both to the ATE Central Archive binder.**
* **Save acceptance email in ATE archive correspondence binder**
  + **Initials \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**