SER 494/540: Internet-Enabled Embedded Devices

Catalog Description:
Accessing hardware devices through Internet, including Applets, HTTP, custom byte streams, XML-RPC, SOAP. Building network-based applications that interface hardware.

General Information:

Instructor	Dr. Robert Heinrichs, robert.heinrichs@asu.edu
Office / office hours	Polytechnic Campus, Peralta 230R, Tue & Thu, 2-3 PM or via appointment (request via Slack or email)
Schedule line number	22667 (SER 494), 22668 (SER 540)
Class website	Canvas: asu.instructure.com
Communication / discussion	Slack (Link on Canvas)
Final exam date	Thursday, May 8, 2:30 - 4:20 PM

Topics:
Modern vehicles are huge driving and mobile embedded systems with a vast number of sensors and actuators, like RADARs, laser scanners, electric motors, electric valves. Most of them are used for Advanced Driver Assistance Systems (ADAS), which increase the safety and comfort of the driver and passengers. Electric Control Units (ECU) are used to implement the ADAS functionality.
In past years, the connectivity of vehicles to the internet has steadily increased, making them internet-enabled "embedded devices". This course will go into detail on how the embedded systems in a vehicle are built, how they work and what they do. Current and potential new applications of embedded systems using internet connectivity regarding ADAS are discussed and analyzed. During this course, students will get the opportunity to implement their own ADAS (in Java) based on real sensor data, which was recorded with a test vehicle.

Prerequisites:
- Helpful (but optional) embedded/hardware related courses: SER 232, SER 450, SER 456, SER 486 or equivalent.
- Extensive knowledge and experience in object-oriented programming and languages are required for this course (Java is used in this course). For assessments students must implement a significant amount of code.

Course Outcomes:

	Course Outcome
CO-1	Students will have knowledge of the physical structure of embedded systems (including internet-enabled embedded systems) in vehicles and their function.
CO-2	Students will understand how the vehicle's embedded systems enable the implementation of Advanced Driver Assistance Systems (ADAS) and how ADAS work.
CO-3	Students will understand which potential adding internet-connectivity to embedded systems in vehicles have regarding Advanced Driver Assistance Systems (ADAS).

Other:

- Late submissions of assignments or quizzes will lead to a 10% deduction. Submissions of assignments or quizzes that are submitted 24 hours after the due date will not be accepted. For any other type of assessment (e.g., exams) late submissions are not possible.
- All assignments, unless otherwise announced, must be submitted to the designated area of Canvas. Do not submit an assignment via email.
- ASU email is an official means of communication among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned email regularly.
- Cell phones and pagers must be turned off or set to airplane mode during class to avoid causing distractions.
- The use of recording devices is not permitted during class.
- The instructor reserves the right to conduct unannounced graded quizzes / activities during class at any point in time.

Grading:

Graded Item	Value
Assignments / Quizzes / Activities	20%
Project	30%
Midterm	20%
Final Exam	30%

Grading Scale:

Grade	Percentage range
A+	97% to 100%
A	93% and less than 97%
A-	90% and less than 93%
B+	87% and less than 90%
B	83% and less than 87%
B-	80% and less than 83%
C+	77% and less than 80%
C	70% and less than 77%
D	60% and less than 70%
E	0% and less than 60%

Grade Appeals:
Students may appeal a scored assessment within one week of the grade's posting online. Appeals are in written form only (email only!) and must point to specific evidence of why the grade should be revised. Per assessment, only one grade appeal can be made. Arbitrary "please regrade because I want a higher score" queries will be discarded without a response. The instructor reserves the right to assign a lower score on appeal.

Absence & Make-Up Policies:
Published assignment due dates (Arizona Mountain Standard time) are firm. Excused absences for classes will be given without penalty to the grade in the case of (1) a university-sanctioned event [ACD 304-02]; (2) religious holidays [ACD 304-04]; a list can be found here https://eoss.asu.edu/cora/holidays]; (3) work performed in the line-of-duty according [SSM 201-18]; Excused absences do not relieve students from responsibility for any part of the course work required during the period of absence.
In case a university-sanctioned event conflicts with coursework, inform the instructor as soon as possible and before the event.

Classroom Behavior:
Students in this class are expected to acknowledge and embrace the FSE student professionalism expectation located at: https://engineering.asu.edu/professionalism/

Any violent or threatening conduct by an ASU student in this class will be reported to the ASU Police Department and the Office of the Dean of Students.

Students are expected to participate in the educational process and not be a disruptive element with regard to the learning of others. Safety, self-discipline and respect for others are necessary elements in the educational processes employed in this course. All students should be familiar with the Student Code of Conduct, which can be found at http://www.asu.edu/studentlife/judicial/.

Academic Integrity:
All students in this class are subject to ASU's Academic Integrity Policy (available at http://provost.asu.edu/academicintegrity) and should acquaint themselves with its content and requirements, including a strict prohibition against plagiarism. All violations will be reported to the Dean's office, who maintain records of all offenses. Students are expected to abide by the FSE Honor Code (http://engineering.asu.edu/integrity/).

The Student Academic Integrity Policy of Arizona State University requires each student to act with honesty and integrity and to respect the rights of others in carrying out all academic assignments. There are a number of actions that constitute a violation of the policy. These actions in this course include, but are not limited to:

1. practicing any form of academic deceit;
2. referring to materials or sources or employing devices (e.g., audio recorders, crib sheets, calculators, solution manuals, or commercial research services) not specifically authorized by the instructor for use during tests, quizzes, homework, and class activities;
3. acting as a substitute for another person in any academic evaluation or using a substitute in any academic evaluation;
4. possessing, buying, selling, or otherwise obtaining or using, without appropriate authorization, a copy of any materials intended to be used for academic evaluation in advance of its administration;

5. on the aid of others to the extent that the work is not representative of the student's abilities, knowing or having good reason to believe that this aid is not authorized by the instructor;
6. providing inappropriate aid to another person, knowing or having good reason to believe the aid is not authorized by the instructor;
7. submitting the ideas or work of another person or persons without customary and proper acknowledgment of sources (i.e., engaging in plagiarism);
8. permitting one's own ideas or work to be submitted by another person without the instructor's authorization; or attempting to influence or change any academic evaluation or record for reasons having no relevance to class achievement.
9. turning in work/code done by someone else or another pair/group
10. copying work/code done by someone else or another pair/group
11. writing code together with someone else or with another pair/group (unless expressly allowed by the instructor)

A common question in programming courses is the use of code that is "googled" or found on popular sites such as StackOverflow. Items 5 and 7 pertain to this situation. Most programmers use reference examples, found in print or online. This is fine as a practice but is not acceptable in situations where you are using code to proxy your understanding of the coding concepts applied in that assessment (i.e. lab or in-class activity). First, if you are uncertain if it is allowable or not, verify directly with the instructor before submitting the assignment. Second, if it is allowable, you are still required to a) adhere to all originating author's constraints on the use and licensing of the code, and b) provide proper attribution (full URL to the code snippet or bibliographic reference to a print item). Failure to do so constitutes a violation of this Academic Integrity Policy.

Students may be allowed to work in small teams on assessments and in-class assessments. You are to work with your partners and only your partners as directed by the instructor; receiving assistance from anyone else other than your partners, the graders, teaching assistants, approved tutors or the instructor is considered a violation of this Academic Integrity Policy. Further, on any paired/group assessments you remain individually responsible for the entire solution – you must understand it fully, and there will grades awarded between the individuals in the pair/group. From an ethics standpoint, you have a professional responsibility to your partner to give your best effort on each programming assignment. Failure to do so will be considered an ethics violation.

All work submitted for the course cannot have been submitted for any other course or any previous section of this same course. Student academic integrity violations are reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). Withdrawing from this course will not absolve you of responsibility for an academic integrity violation and any sanctions that are applied. The AIO maintains a record of all violations and has access to academic integrity violations committed in all other ASU college/schools.

Unless explicitly allowed by your instructor, the use of generative AI tools on any course assignment or exam will be considered academic dishonesty and a violation of the ASU Academic Integrity Policy. Students confirmed to be engaging in non-allowable use of generative AI will be sanctioned according to the academic integrity policy and FSE sanctioning guidelines.

The penalty for an Academic Integrity Violation (cheating) on any assessment will be a zero for the assessment and a reduction of a course letter grade for the first offense, and failure of the course for a second offense. The penalty for an Academic Integrity Violation (cheating) on an exam is immediate failure of the course. The penalty for an ethics violation will be a zero for the assessment. All violations will be referred to the Dean's Office of the Ira A. Fulton Schools of Engineering.

Disability Accommodations:
Suitable accommodations are made for students having disabilities. Students needing accommodations must register with the ASU Student Accessibility and Inclusive Learning Services (SAILS) office and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in enough time for it to be properly arranged. See ACD 304-08 (https://www.asu.edu/aad/manuals/acd/acd304-08.html) Classroom and Testing Accommodations for Students with Disabilities.

Harassment and Sexual Discrimination:
Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, https://goto.asuonline.asu.edu/success/online-resources.html.

Copyright:
You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the student first complies with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.
The contents of this course, including lectures and other instructional materials, are copyrighted materials. Students may not share outside the class, including uploading, selling or distributing course content or notes taken during the conduct of the course. Any recording of class sessions by students is prohibited, except as part of an accommodation approved by the Disability Resource Center. (See ACD 304–06, “Commercial Note Taking Services” and ABOR Policy 5-308 F.14 for more information.)

Photo Requirement:
Arizona State University requires (https://cfo.asu.edu/photo-consent) each enrolled student and university employee to have on file with ASU a current photo that meets ASU's requirements (your "Photo"). ASU uses your Photo to identify you, as necessary, to provide you educational and related services as an enrolled student at ASU. If you do not have an acceptable Photo on file with ASU, or if you do not consent to the use of your Photo, your access to ASU resources, including access to classes (online or in person) may be negatively affected or denied.

Change Notice:
Any information in this syllabus (other than grading and absence policies) may be subject to change with reasonable advance notice.