

**Michigan State University**  
**College of Engineering; Dept. of Electrical and Computer Eng.**  
**ECE 480 Capstone Design Course Project Charter**

**Sponsoring Company/ Organization: Michigan State University**

**Contact Information:**

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**Background Information:**

Parking on MSU's campus is limited. Drivers often circle from lot to lot looking for spaces. Some faculty and staff are reluctant to leave campus during peak hours during lunch time, or go to meetings, for fear of losing their parking space. Campus is interested in developing a smart parking solution that would provide real-time information on the number of spots available in each campus lot. This would allow drivers to target lots with open spaces and make other more informed choices about their transport on campus. There is a potential path currently for Smart Parking on campus in gated lots, however it will involve a costly replacement of gate arms across campus. We are interested in a lower cost solution that might accelerate the pace of deployment on campus and are interested in the students' views and ideas for this problem.

**Business Case:**

- Explain why is this an attractive opportunity for your company to pursue now. Recent changes on campus have started to create a more connected transport system on campus. CATA has just released real-time bus data, and riders can now check for bus arrivals on their smartphones. MSU is close to implementing a connected, central traffic control system that will allow for quick signal changes and emergency response. The look at a Smart parking makes sense now to connect into this other work and overall improve mobility on campus.
- Describe the discontinuity creating the competitive opening in the marketplace that makes this project timely. (Competitive action, Legislation, Regulation, etc.)
- Explain how this product / service will be positioned as a commodity (low cost to serve) or a differentiated (value priced) offering. Why?
- Outline the competitive barriers to marketplace entry the Design Team needs to take into consideration. TBD
- What is the hypothesized basis of for a sustainable competitive advantage?
  - Patents, Trade Secret, Low cost, privileged relationships? TBD

**Project Intellectual Property Considerations:**

- Will the student Design Team be required to sign a Non-Disclosure Agreement?  
No
- Will the Design Team be able to post their work on the course web site? Yes
- Will the student Design Team be working with technology contained in pending patents not yet granted? No
- Can the electronic design be shown, but the embedded software protected?

### **Opportunity Statement:**

- What **clearly defined Customer Problem** you hope to solve with this project?  
There is a potential path currently for Smart Parking on campus, however it will involve a costly replacement of gate arms across campus. We are interested in a lower cost solution that might accelerate the pace of deployment on campus. What would be needed would be a way to count cars and provide real-time data of available spots.
  - o Is this problem solvable in a 13 week working semester with students?  
We believe so, but would need to further scope with the students.
  - o Does the design challenge need to be run across two back-to-back semesters? TBD
- Does this problem exist now, or in the future? This problem exists now and has been ongoing. We have a potential path and commercial solution to address this but there is a large cost involved which slows down deployment.
  - o How long will the window of opportunity be open to alternative solutions?
  - o What will drive the window of opportunity closed in the future?
- Who is the customer? The customer will be the MSU Police campus parking and traffic group – John Prush, Deputy Director Management Services Bureau and Stephanie O'Donnell, Traffic Engineer. Also Jessica Stuart, Consultant to the EVP for Administrative Services.
  - o Who makes the buying decision?
  - o Who will the ECE 480 Design Team deliver their project to at the end of the semester? John, Stephanie and Jessica.
  - o Describe the benefit to the end Customer for this project. The benefit to the Customer will be a review of potential parking solutions and hopefully a lower cost option.

### **Deliverables:**

- Describe what is to be delivered at the end of the semester. We are flexible in this and would need to scope out with the students.
  - o Proof-of-Concept design? (Bread-boards, wires connecting sub-systems, etc., ugly looking – but functional, development software non-user-friendly interface)
  - o Working prototype? (PC boards, cabling between sub-systems, refined software and user friendly interface)
  - o Sub-system ready to fit into the overall system?

- o Final solution ready for end use deployment?

**Goals:**

- Describe what success will look like at the end of the semester.
- Goals should be SMART
  - o **Specific** – Exactly what is to be delivered?
  - o **Measurable** – Describe the measurement system that will determine the degree of success.
  - o **Attainable** – Can a student team, with little to no industrial experience complete this project in 13 weeks to your satisfaction?
  - o **Relevant** – Limited to this design challenge.
  - o **Time Bound** – 13 week working semester (Students loose a week getting organized and a week preparing for Design Week presentations.)

**Scope:**

- Clearly define what is IN and OUT of Scope for the Design Team. What are the clearly defined boundaries to prevent the project form getting too large and complicated? TBD
- Clearly list chipsets, software, equipment, test set-ups, working systems, etc. that will be supplied to the Design Team to facilitate their efforts and keep project cost reasonable. TBD

**Constraints:**

- List all constraints on the project team. **TBD**
  - o Examples include: Equipment the team must interface with, past Capstone Designs the team must build upon previous results, chip sets / software team must use in the design, etc.

**Cost for Sponsorship: \$4000**

**Project Team:** (Completed once semester begins)

| Name | Responsibility |
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**Faculty Advisor:** (Assigned by ECE Dept . based on project requirements)

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