

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/EVPAS/IPF

Contact Information:

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Background Information:

MSU is exploring the potential to utilize a WiMax network to communicate on campus. Currently many campus data connections are made by running cable from building to building. We are interested determining if a WiMax network could replace some of these fiber networks and potentially lower costs.

As a way of testing this, we would like to look at connecting equipment and sensors at our campus water wells used to supply water to MSU. Currently there are 17 wells that supply MSU. Each well site would be connected to the system. There will be approximately 5-6 inputs at each site that will be transmitted to a central collection hub and saved. Some of the inputs will be paralleled with existing transducers and some will be new equipment. The saved data will be compiled and manipulated to populate a “dash board” to be used by water operations. The “dash board” will provide detailed information consisting of pump run times, output, efficiency, pressure, horsepower, etc.... The system is for collection of data only at a remote location. No controlling of wells to be integrated into project. The dash board is to have a user friendly appearance which allows for simple and quick review.

Business Case:

Explain why is this an attractive opportunity for your company to pursue now. As mentioned in the background, this project will test a new system to connect sensors and data on campus. WiMAX could be a lower cost system and has the potential to change our current operations on campus. We also have an opportunity to provide supplemental data collection for our water pumps that can be used to create a dashboard for long-term optimization of the system.

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?
 - Is this problem solvable in a 13 week working semester with students?
Yes – but would need to fully scoped with the team
 - Does the design challenge need to be run across two back-to-back semesters? **No**
- Does this problem exist now, or in the future? **Now**
 - How long will the window of opportunity be open to alternative solutions?
 - What will drive the window of opportunity closed in the future?
- Who is the customer?
 - Who makes the buying decision?
IPF (Mike Tracy) and EVPAS
 - Who will the ECE 480 Design Team deliver their project to at the end of the semester?
Mike Tracy (IPF Power & Water), Wolfgang Bauer (Sr Consultant EVPAS), Jessica Stuart (Consultant EVPAS), EVP Satish Udpa
 - Describe the benefit to the end Customer for this project.

Deliverables:

- Describe what is to be delivered at the end of the semester.
 - Proof-of-Concept design? (Bread-boards, wires connecting sub-systems, etc., ugly looking – but functional, development software non-user-friendly interface)
 - Working prototype? (PC boards, cabling between sub-systems, refined software and user friendly interface)
 - Sub-system ready to fit into the overall system?
 - **Final solution ready for end use deployment?**

We would like to get to a final solution that can remain in place to benefit the water system long-term.

Goals:

- Describe what success will look like at the end of the semester.
- Goals should be SMART

The goals of this project are to:

1. **work with IPF water to define what needs to be monitored in their water system**

2. design a series of sensors that will meet these monitoring needs
3. connect these sensors to communicate via a WiMAX network
4. create a user-friendly dashboard to communicate the data
5. leave in-place a system that can be used by IPF water long-term

Scope:

- Clearly define what is IN and OUT of Scope for the Design Team. What are the clearly defined boundaries to prevent the project from 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.
 - 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.

Project Team: (Completed once semester begins)

Name	Responsibility

Faculty Advisor: (Assigned by ECE Dept . based on project requirements)
