

Smart Wireless Ag Sensors for Measurement of Soil Water Contents

PROJECT PLAN

Team 38

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NOTE: This template is a work in progress. When in doubt, please consult the project plan assignment document and associated grading rubric.

1 Introduction

1.1 PROJECT STATEMENT

Explain what the project is about. What are you trying to do?

Our team is working to improve the plant and soil sensors for the Agricultural Engineering and Electrical Engineering research group at Iowa State University. We will design and develop new sensors to be used out in the fields, while creating an updated user interface to access and store data in.

1.2 PURPOSE

Explain what is driving this project. Why is this work of benefit to the society?

The research department is working towards improving the crop yields within the agriculture field. With improving these sensors, it will allow for enhanced data collection and interpretation. The team can then find out what would be the best type of crops to plant in certain areas or how much fertilizer will be needed throughout the season. Ultimately this research can be used to help farmers grow better crops increasing their yields allowing for more food and less waste.

1.3 GOALS

Explain what you hope to accomplish through this particular senior design project. What would you like to achieve? Enlist as many goals as you can envision.

Our team would like to achieve many goals this year throughout this project. We will be focusing on both project oriented goals along with personal goals, looking at both short-term and long-term accomplishments. Some of our goals focus more into the requirements that the client has set with the improvements that they want for the sensors. Improving the size, power consumption, and user interface. Other goals go into the personal and professional focus with things like teamwork, communication, better understanding of the technology used with sensors. Overall, we would like to gain knowledge and connections through this project expanding our strengths by working on our weaknesses as a team.

2 Deliverables

Our team's deliverables can be separated by each semester.

Semester One:

- Reduce the size of the control box to $\frac{1}{4}$ of the size it is currently
- Find a new battery that properly supports the modified size of the control box

- Add a waterproofing mechanism so that the hardware is protected against the elements
- Create a total of ten sensor boxes once they are smaller
- Design a sensor network so that all sensors are communicating with each other
- Create an app so that viewing data is easy and effective

Semester Two:

- Modify and improve actual sensors and test them for accuracy

More information and deliverables will become available when we get closer to the 2nd semester.

3 Design

In the first semester of the class we will be redesigning the data acquisition device to make it smaller, more energy efficient, and improve connectivity of the sensor network. During the second semester we will work to improve the designs of the soil sensors.

3.1 PREVIOUS WORK/LITERATURE

The sensors used to capture data by the plants are the first of their kind and cannot be publicly disclosed in this document.

3.2 PROPOSED SYSTEM BLOCK DIAGRAM

We are still waiting for documents from are client in order to understand how the whole system will interface with the current sensors.

3.3 ASSESSMENT OF PROPOSED METHODS

At this point we have not solidified any purposed methods.

3.4 VALIDATION

Our designs will be extensively tested and benchmarked to ensure they meet our requirements listed in section four of this document.

4 Project Requirements/Specifications

4.1 FUNCTIONAL

- Smaller sensor box
- Less energy usage
- Waterproof
- Portable

4.2 NON-FUNCTIONAL

- User-friendly software interface
- Cheap-to-build circuit
- Efficient networking

4.3 STANDARDS

- IEEE Communication Standards

5 Challenges

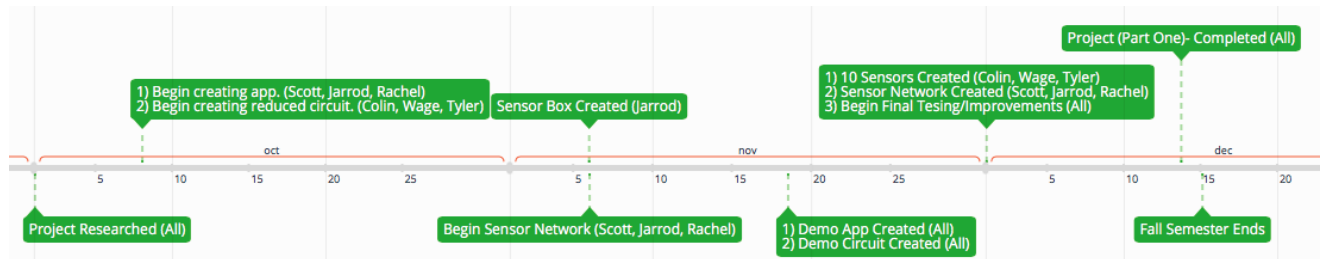
As our group gathers further details about our project we have come across a couple issues. We have no specific details on the design of the circuit or how any of the components are assembled within our sensor box. We know the specifications in which we want to reach but not the details of the components themselves yet. Once we get this information we can start designing the different components to fit expectations for the new sensor box. We have all the resources at our disposal, but in order to move forward we just need to obtain the current design of our sensor.

We have also been tasked with finding different microcontroller to use. We currently use an Arduino Uno which is relatively cheap. Our goal is to find a microcontroller which has all the capabilities of the Arduino Uno but that is a quarter of the size. We have found a couple options but are much more expensive than the Arduino Uno. We will need continue to research the different microcontrollers to make sure we stay within our budget for our project.

6 Timeline

You may want to include a Gantt chart/something similar to help visualize your timeline to complete the project.

6.1 FIRST SEMESTER



6.2 SECOND SEMESTER

Detail what needs to be done in the second semester. You may want to include division of work amongst the team.

As the project progresses throughout the first semester we will gain a better understanding of what we need as a time line for the second semester.

7 Conclusions

Sum up your project plan. Briefly re-iterate your goals for the project and the plan your team has put in place to achieve these goals.

In conclusion our team is focused on improving and implementing these sensors into the research field to better the outcome of data readings and crop yields. We wish to accomplish many goals along the way growing stronger as a team to ensure our clients success. We will accomplish this through research and collaboration throughout the project. Making sure to make positive improvements and accurate testing in the field.

8 References

List all the sources you used in understanding your project statement, defining your goals and your system design. This report will help you collect all the useful sources together so you can go back and use them when you need them.

Meeting Notes in team CyBox and initial project description also in CyBox.

9 Appendices

If you have any large graphs, tables, or similar that does not directly pertain to the problem but helps support it, include that here. You may also include your Gantt chart over here.