



Crown Agriculture Solutions  
Farming made simple

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# Crown Agriculture Solutions

## TEAM

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**MENTOR:         BOB GILL**

- Providing farming personnel with a simple solution to monitor their crops, optimize the water usage and maximize yield.
- Issues addressed:
  - Water is a precious commodity.
  - Commercial farms are large.
  - Nodes are inexpensive

# Business Case and Costs

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CAS is the first to deliver a powerful solution to a serious problem paired with an intuitive interface at an extremely low cost.

Initial target market is commercial vineyards at 1000 hectares in size.

CAS provides a lucrative offer to customer

Human Factors:

- Avoid Stressful Manual irrigation and lost crop
- Loss of revenue
- optimal water usage
- Dead vines from dehydration

# Technical Case

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## Main Functions:

- Nodes acquire data from sensors and will communicate with base station to send data.
- Data is analysed and a decision is made whether it meets or exceeds the threshold which will allow user to decide to activate pumps to irrigate in the required area.

## Costs:

- Rpi: ~\$10 per unit but bulk pricing is less than \$2 USD
- A complete node in bulk should be under \$3 USD
- Will continue to optimize costs in ENSC440

## Major Changes:

- Challenges with Rpi to Pic and Pic to Pic – Will continue to explore similar inexpensive options.
- Rpi to Rpi successful.

# Risk Analysis

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## **Product safety:**

- Sensors and electronics are in a case and secure from hazards.
- Only Antenna is above ground.
- No Chemical leakage expected.

## **Business Risk:**

- CAS delivers a significant cut in costs and maximizing crop yield.
- Revenue projection outweigh the cost.
- Cost Recovery within a single crop season of implementation.

## **Mitigation of Risks:**

- Sealed nodes such that operation is seamless and water damage is mitigated.
- Environmentally-friendly Batteries are packed so that there is no damage to environment.

# Adherence to Standards

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- All devices communicate in the ISM band. ISM – Industry, Scientific and Medical band.
- Uses 802.11n protocol and 2.4 GHz.
- Antenna range is sufficient for a simple 1000 hectare network.
- Antenna Power is in uW range
- ISM band does not require licensing.

The following standards are available in the Requirements Specifications:

- ETSI EN 300 328: Covers wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques.
- IEC60730: Covers equipment, such as controls for household electronics.
- ISO 9241-303: Requirements for electronic visual displays.
- IEC/TR2 61438:1996 - Possible safety and health hazards in the use of alkaline secondary cells and batteries - Guide to equipment manufacturers and users.

# Self Reflection

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I learnt that time management is extremely important due to unforeseen hurdles.

Online research was time consuming but is useful in optimizing product development cycle.

Technical knowledge: antenna, PIC, debugging H/W, python, debugging S/W, datasheets, developed problem solving skills and entrepreneurial skills

After scores of hours of understanding sensors to Device communications and debugging, Rpi worked seamlessly with Rpi.

Pic to Pic communication was determined to be less ideal due to need for more engineering hours throughout the product lifetime.

# Schedule and Brief Plan for ENSC440

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- Will fabricate, remove all wires and breadboards.
- Will explore less expensive options while keeping engineering hours to a minimum.
- Will work with Dr. Rawicz for finalizing the project requirements and packaging



# Conclusions

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- CAS empowers farm owner with knowledge about crop needs thereby cutting costs, enhancing crop yield and thereby maximizing profit.
- I learnt that debugging takes patience and determination in finding solutions before deadlines. Also exhausting all options until a solution is achieved. Spending countless hours in search of a solution enhances debugging skills and aids in meeting deadlines. Issues will arise and time must be allotted for such hurdles as this is good time management practice.

Acknowledgements: Received assistance with learning curve. Assistance from Bob with technical documents. Google. Lol

# Questions

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