

# ENSC405 - Proof of Concept Demo

## Sunny Room Inc. presents



# Outline

- **Meet the team**
- **Mission Statement**
- **Motivation**
- **Background**
- **Business cases/cost and research users**
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- **Adherence to standards**
- **Self Reflection**
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- **Conclusion**

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# The team

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**Ryan Serkouh - CCFO**

**Philip Leblanc - CTO**

**Rony Sheik - CCO**

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# Mission Statement

**Enable Home Automation  
through  
Computer Vision**

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# Motivation

- **Limitations of current devices:**
  - Based on motion sensors
  - Limited compatibility with smart home devices
  - Rely on passive infrared and can be fooled
- **HESTIA:**
  - Turn on/off lights based on room occupancy using computer vision
  - Data local to the device
  - Control via Mobile app and Google Home
  - Ergonomic design with capacitive touch and dimming capability

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# Background

**Current PIR Vs Upcoming Computer Vision**

**Motion vs Static**

**Other Improvement:  
Capacitive Touch Module**

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# Business Cases/Cost and Research Users

**Major competition in the form of the Ecobee Switch+**

**Shortcomings [2]:**

- No integration with external devices (Alexa, Google ect.)
- No dimming capabilities
- Limited to motion sensing

All of which Hestia aims to solve



[1]

**The maximum cost for Hestia is aimed to be 250\$, 150\$ greater than the Ecobee Switch+**

**Persona of ideal user:**

John is a homeowner in his early thirties and really into upcoming technologies, he is looking for a ways to automate the daily activities in his life. John decides to go and shop around for a light switch that would turn on the lights automatically when he enters a room, and that he can control using his phone or his google home device. HESITA combines all of those functionalities into one handy product!

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# Technical Cases

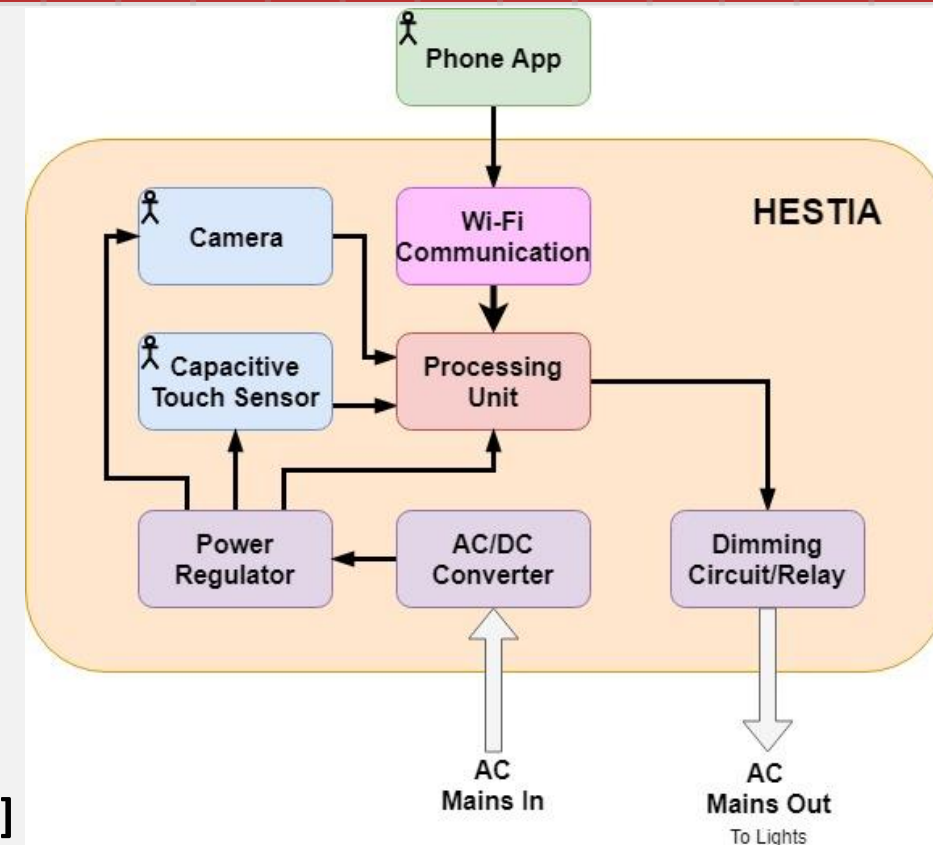
## Key Subsystems:

- Camera
- Processor
- App
- Touch sensor
- Power circuitry

## Change in scope:

Minor change in scope consists of no longer utilizing an FPGA for speeding up processing

[3]



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# Technical Cases

## Materials:

- NoIR camera
- Raspberry pi 3B+ (for prototype)
- BT139 TRIAC based dimmer
- AT42QT2120 touch IC (for prototype)

Prototype Subsystem	Cost(CAD)
Capacitive Touch module	55
Dimming circuit	35
Camera and image processing	130
<b>Total</b>	<b>\$220</b>

## Considerations of cradle-to-cradle

## Financing:

Self funded as of now, but expecting financing through ESSS endowment fund and IEEE special grant

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# DEMO

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Intro

Market

Progress

Risk

Summary

10/18

# Risk Analysis/Risk Management

## Risk Analysis:

- 1) Safety: Electrical Safety
- 2) Performance: Responsiveness of the system to human interaction

## Risk Management:

- 1) Safety: Thorough Testing
- 2) Performance: Timed responsiveness of the capacitive touch and human shape in field of view - Looking into training the model in a house setting

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# Risk Analysis/Risk Management

## 1) Risk Related to Profitability

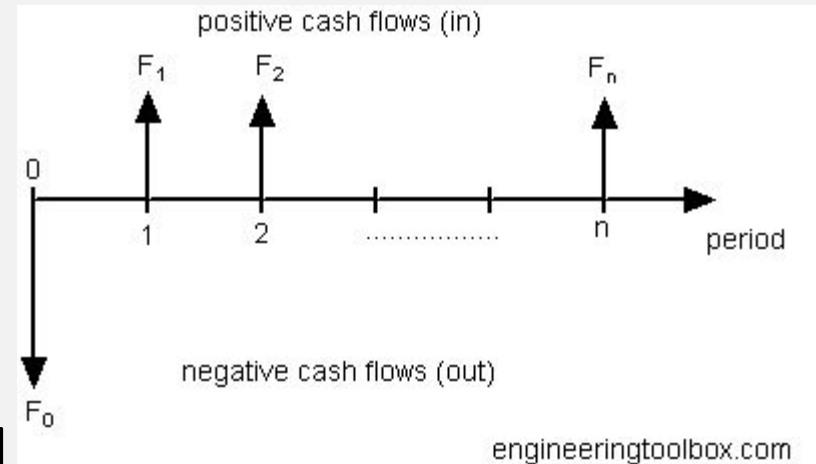
- a. Economic Risk
- b. Operational Risk
- c. Legal Risk
- d. Compliance Risk
- e. Strategy Risk
- f. Reputational Risk

## 2) Competitive Risk/Market Availability

Ecobee: \$100 (motion activated)

## 3) Net Present Worth for the Project Viability<sup>[4]</sup>

Cash Flow Diagram



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# Adherence to Standards

## Engineering Standards:

- Electrical Standards
- Environmental Standards
- Wireless Standards
- Ergonomic Standards

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# Self-Reflection

## Learned so far:

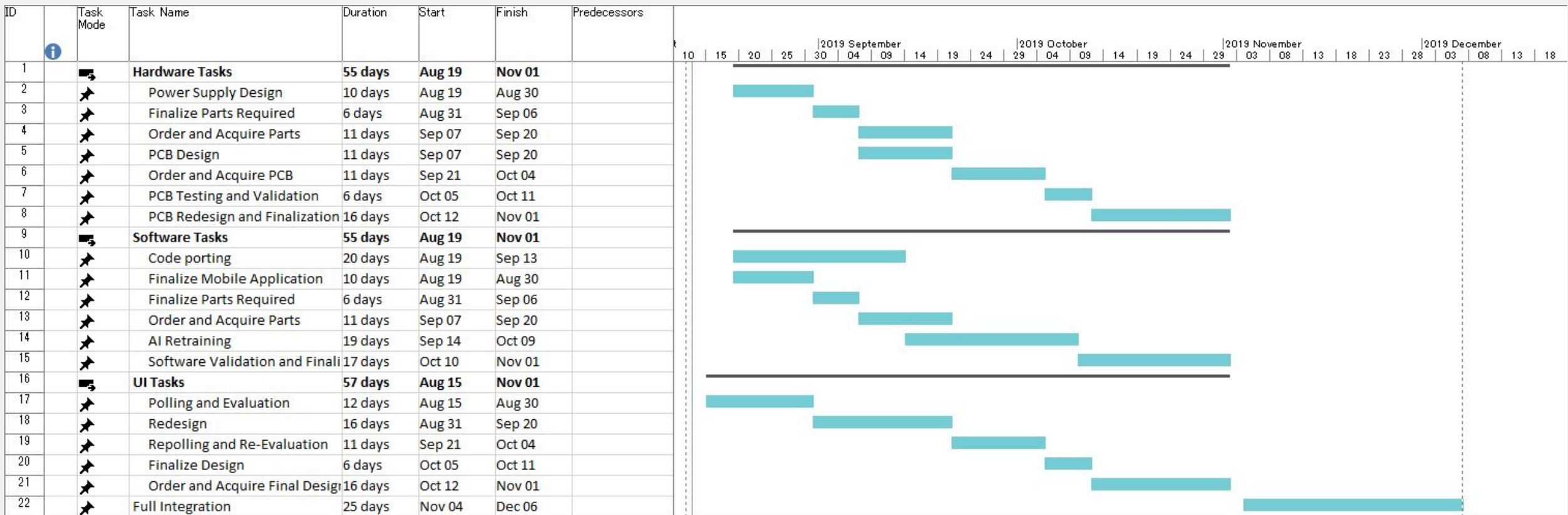
- Time Management as a Team
- Technical Research
- Improved on Documentation and Communication Skills

## Development process changes

- Updates during Weekly Meetings

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# Schedule & Plan for 440



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# Conclusion / References Acknowledgements

**Designed and implemented a proof of concept prototype for a computer vision enabled light switch.**

## Acknowledgments:

**Our team would like to thank Professors Craig W. Scratchley and Andrew Rawicz as well as our Teaching Assistant Mohammad Akbari for their inputs during our lectures, guidance during progress review meetings, and support during office hours.**

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## References

- [1] “Ecobee Switch+,” *shop.ecobee.com*, [Online]. Available: <https://shop.ecobee.com/products/switch-plus>. [Accessed Aug. 12, 2019].
- [2] Dan Seifert, “Ecobees’s new Switch+ puts Alexa in your light switch”, *The Verge*, Mar. 13, 2018. [Online]. Available: <https://www.theverge.com/2018/3/13/17109782/ecobee-switch-plus-alexa-review>. [Accessed Aug. 12, 2019].
- [3] A. Nevmerjitski, R. Serkouh, J. Decena, P. LeBlanc and R. Sheik , "Project Proposal," Vancouver, 2019
- [4] “cash flow diagram investment,”*engineeringtoolbox.com*, [Online]. Available:<https://www.engineeringtoolbox.com/docs/documents/1231/cash-flow-diagram-investment.png>. [Accessed Aug. 12, 2019].