Sunny Room

June 9, 2019
Dr. Craig Scratchley
School of Engineering Science - Simon Fraser University
8888 University Drive, Burnaby, British Columbia, V5A 1S6, Canada

RE: ENSC 405W/440 Requirements Specification for HESTIA

Dear Dr. Scratchley,

The following document presents the requirement specifications for Sunny Room Inc's flagship product: HESTIA designed as a part of the ENSC 405W/440 capstone course. The goal of HESTIA is to provide a secure home automation solution using computer vision. In fact, this light switch of the future introduces autonomous occupancy detection and smart home devices interaction while keeping your data local and private. Easily installed to replace any already light switch box, HESTIA is a plug-and-play light switch that can interact with Google Home, Amazon Alexa or other smart home systems.

The requirements specification document below outlines the System Requirements, the Safety and Sustainability Considerations, and the Engineering Standards for the product. The purpose of the Functional Requirements is to list and prioritize features our product shall demonstrate. The development of the product includes Alpha, Beta and Production phases which will act as deliverables for ENSC405W and ENSC440.

Thank you for your time in reviewing this document. Please direct any questions or comments through e-mail hserkouh@sfu.ca.

Sincerely,

Ryan Serkouh
Chief Finance and Communications Officer - Sunny Room Inc.

Sunny Room

Requirements Specifications

HESTIA

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Abstract

This document covers the Requirements Specification for HESTIA and a general overview of the system. The goal is to provide the reader with adequate knowledge on the device and the problems it will solve. It will go over functional requirements that are the basis for the design of the device and then branch off into specific requirements for each core component. The core components of the device includes a camera, a processing unit consisting of an ARM Unit and support FPGA logic, a capacitive sensor, a relay and a power management system. Software specifications are covered and outline all performance goals the algorithm must achieve to be a viable solution for computer vision. A section on sustainability and engineering standards is present that the device must meet in order to comply with Engineering Standards, Safety and Sustainability. Each requirement will act as a plan for deliverables for ENSC 405W/440 in the form of alpha, beta and production stages.

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Glossary

Acronym	Term	Description (if needed)
FOV	Field Of View	The field of view of the camera
FPS	Frames Per Second	-
PL	Programmable Logic	Programmable FPGA
PS	Programmable Software	-

1 Introduction

1.1 Introduction

Sunny Room Inc. aims to bring home automation to a new level through computer vision with our product HESTIA. The goal for the device is to replace existing home electrical switches. An easy installation allows the device to perform current light switch functionality while adding a built-in infrared camera and processing system. For instance, a room or hallway will be monitored by the built-in infrared camera found inside the light switch and the data will be directly sent to the on-chip processing unit housed inside the switch unit. Based off of the visual data, the processing unit then determines if individuals are present in the room, puts a lock on their shape, and tracks their position in the room. For situations where line of sight may become obstructed, previous lock on individual shapes and room layout data will be used to decide if the room was vacated.

The hard sell for the device is going to be data privacy as placing cameras to constantly monitor a room or even an entire home can bring up concerns. We aim to provide peace of mind to end users by locking down the camera data to each individual switch and not having the switches rely on cloud computing or any other main computing unit in the house.

1.2 Background

Computer vision and machine learning have become very prevalent in many fields from quality monitoring to autonomous vehicle control. Applications for home automation are gaining traction as it can also be used to enhance people's homes, power savings, home security, and quality of life. HESTIA aims to bring that technology to everyone's home in a simple, non-invasive and aesthetic package.

Currently, single solution products do not exist on the market with the closest thing to HESTIA being motion detecting sensors. There are no computer vision-based applications to home automation. HESTIA improves upon motion detection by allowing the system to both differentiate between humans and other objects or animals as well as recognizing static individuals. The device will be able to track the relative position of people in the room to not be hindered by line of sight obstructions all of which will be processed internally by the device.

1.3 Scope

This requirement specification document is to be used as an outline of requirements that shall be met and accounted for during the design and testing of the product. The document also lists all Sustainability and Safety considerations and Engineering Standards.

1.4 Intended Audience

This document is to be used by Sunny Room Inc. as a baseline for all functional requirements for future revisions, design updates, testing, presentations to clients and partners, and review by all members of the team, Dr.Craig Scratchley, Dr. Andrew Rawicz and their associated Teaching Assistants.

1.5 Requirement Classification

The requirements in this document will follow the following convention:

REQ {Section}.{Subsection}.{Requirement Number} {Stage of Development}

The different stages of development are outlined in the table below:

Code	Development Stage
C	Proof of Concept or Alpha Phase
P	Prototype or Beta Phase
F	Final Product or Production Phase

Table 1.5.1 : Requirement Classification

The Proof of Concept requirements are the most basic requirements and highest priority to be met by the end of 405W. The Prototype requirements are next in the priority line and must be met by the end of ENSC 440. Lastly, the Final Product requirements are any additional requirements that are on a “want” versus a “need” basis and must be completed before product enters the market.

2 System Overview

HESTIA is a direct replacement for standard light switches to enable home automation through computer vision. The device exterior consists of a 180-degree Infrared camera and a switch. The internal system would contain the camera unit, the processing unit, the solid state relay, and the power regulation circuit for powering the internal components. The onboard processing unit will include a chip with programmable software and programmable logic (FPGA) that will perform the data acquisition and processing of the still frames coming from the camera. The exterior of the switch will have a touch sensitive panel for turning on/off/dimming light. Installation is to be done by a certified electrician, and the end-user would be able to use it as a normal light switch. If need be, the user can override the computer vision based control. All processing shall be done by the onboard processing unit to remove visual data interception risk from the camera.

Figure 2.1 - Concept 3D Model

Figure 2.1 shows a concept rendering of HESTIA which will be used as a base for physical design. The rendering shows only the device and not the face plate which would be placed over the device to cover the hole in the drywall.

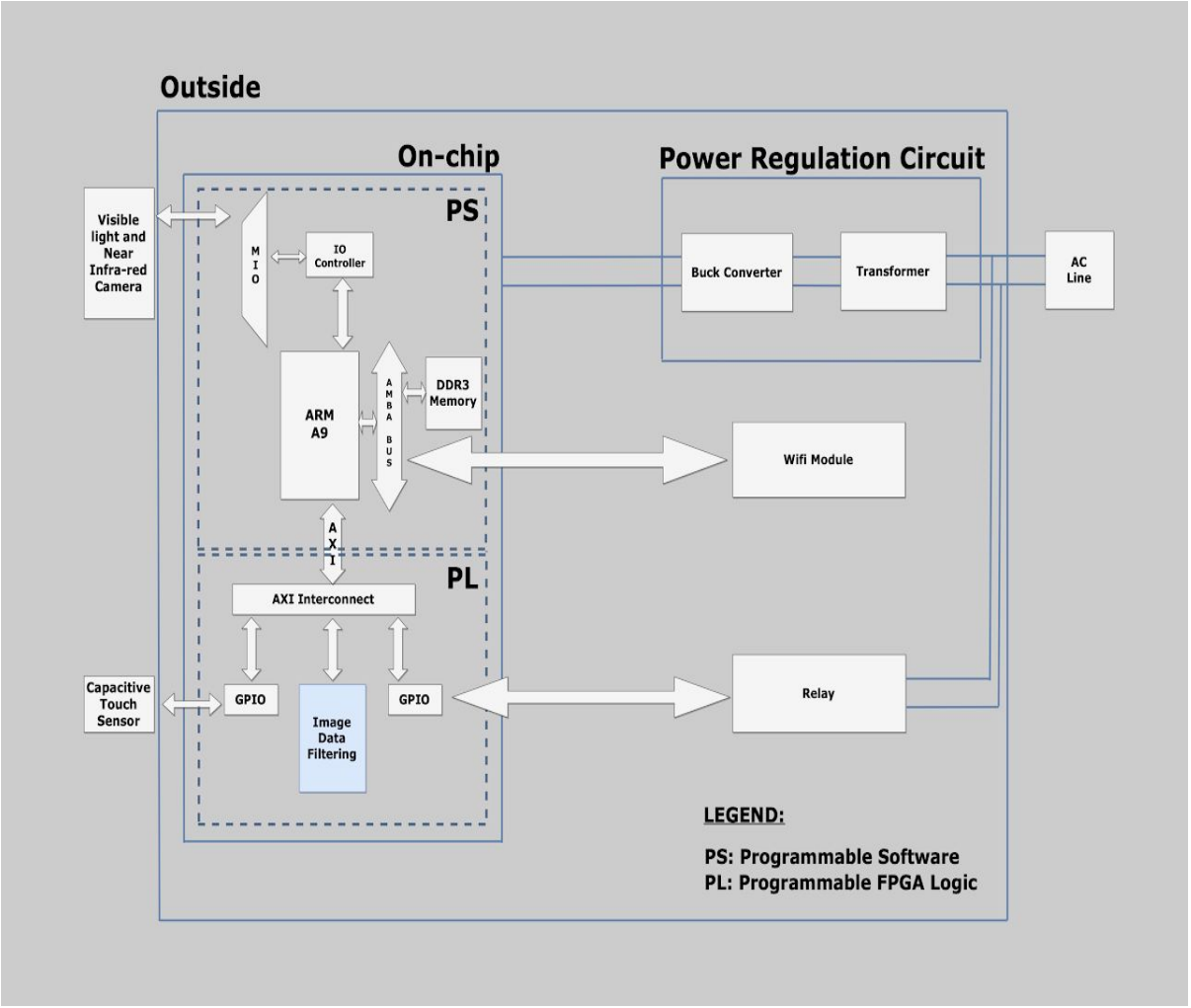

Figure 2.2 - System Block Diagram

Figure 2.2 shows a system overview diagram which will be used for electronic and software design inside the device.

3 General Requirements

3.1 System Requirements

Requirement	Description	Development Stage
REQ-3.1.1	The product shall extract power from the home's mains wires found inside of a standard light switch socket	C
REQ-3.1.2	The product shall recognize objects (specifically the shape of a person) within the camera's field of view (FOV)	C
REQ-3.1.3	The product shall control the state of the lights, based on the activity seen in the FOV of the camera	P
REQ-3.1.4	The product shall be compatible with Google Home and Alexa voice commands through the use of existing libraries	P
REQ-3.1.5	The system shall include a camera, a microcontroller, an FPGA, a wifi module, a relay, and a physically interactable switch	F

Table 3.1.1: System Requirements

The system requirements for our product are rather basic at this point in time. The proof-of-concept model covers only the most basic requirements, which are REQ-3.1.2 and REQ-3.1.1. These two requirements are extremely important, as REQ-3.1.2 can be seen as one of the more basic functionalities and REQ-3.1.1 is the power supply to the product. The other requirements were put into place after considering many factors, with the most crucial one being importance to the functionality of our product.

The two prototype requirements, REQ-3.1.3 and REQ-3.1.4 were put into place after considering potential features of our product. During the conceptualization of the product, these two requirements were always at the center. The recognition of the activity

of human shapes (REQ-3.1.3) was always of highest priority, as it was one of the ways of informing the system of room occupancy. The other prototype stage requirement, REQ-3.1.4, was also considered important in terms of targeting our market. We believe that the majority of our market would have also invested more into the smart home trend, and thus compatibility with related products would make HESTIA more appealing.

The last requirement, REQ-3.1.5, was one of the most basic. Although this is split up into several requirements in further sections, the modular parts of the entire system can be described in this requirement alone. We as a company, have concluded that having these parts acting as an entire system is necessary and sufficient for HESTIA's intended purpose.

3.2 Functional Requirements

Requirement	Description	Development Stage
REQ-3.2.1	The product shall turn on the light if a person is detected in the FOV of the camera (inside the room) and the ambient light in the room is too low	C
REQ-3.2.2	The device shall turn off the lights if no person is detected in the room	C
REQ-3.2.3	The camera circuitry shall enter a lower power state when there is little activity in the camera's FOV after 30 seconds	P
REQ-3.2.4	The device shall have memory to decide and place a target on a moving person present in the room	P
REQ-3.2.5	The light switch shall have manual control using capacitive touch sensor, which would override the camera detection feature	P
REQ-3.2.6	The device shall support connection to Google Home or Alexa for voice control of associated light switches	P

Table 3.2.1: Functional Requirements

The functional requirements for our product are relatively basic. For the proof-of-concept model, our functionality is rather simple, as seen in REQ-3.2.1 and REQ-3.2.2. Essentially, it is the ability to detect the presence of people in the room, and turning on/off the lights

accordingly. While these requirements are rather basic, it more or less encompasses the entire purpose of our product. The other requirements are more additional, and were thus placed into the next stage of development, the Prototype phase. These other requirements were put in place after considering factors such as: power consumption, edge cases in terms of room layout, and the potential market.

Power consumption was greatly considered during the early stages of HESTIA. To be able to market this as a power saving product, REQ-3.2.3 was put into place. As our current estimates put our operating power consumption (about 5W) on the same level as some LED light bulbs available on the market (about 6W), it was essentially the same as keeping the light on at all times. In fact during the periods where the system was turned on along with the room's lights (assumed to be LEDs), one would be consuming almost twice the amount of power. As such, we proposed the existence of a low-power state and directly addressed this issue.

In terms of having a room with unusual layouts, or those with large pieces of furniture, REQ-3.2.4 was proposed. With this requirement, the device would no longer require direct line of sight to people in the room to count it as being occupied. There are several ways to go about this, such as looking for entrances/exits to the same room and keeping a counter of some sort, or even tracking a person as they pass by the device and connecting with other devices to see if they are still in the room. However, as of this point, we have not sufficiently investigated many possible solutions, but we are leaning towards those involving person tracking.

After considering our potential market, we put the last two requirements, REQ-3.2.5 and REQ-3.2.6 into place. These two requirements can be seen as targeting the two opposite ends of our potential market: those who prefer the more traditional light switch, and those who just want light functionality. The presence of a manual physical override to the system (REQ-3.2.5), caters to users that prefer the physical presence of a light switch itself. On the other hand, voice control through other smart home products (REQ-3.2.6) caters to users that want light functionality in the easiest way possible. While some sort of application is also a potential solution, it has been put into place as a production phase requirement.

4 Software Requirements

The core software will be designed to implement a main controller to manage the image acquisition and processing software module, the communications software module, and computer vision software module. Hardware Description Language will be used to offload computationally heavy functions to FPGA as well as handling the input from the capacitive touch control sensor.

4.1 General Requirements

Requirement	Description	Development Stage
REQ-4.1.1	The device shall have firmware to control a light switch	C
REQ-4.1.3	The device firmware shall be able to perform image acquisition and processing	C
REQ-4.1.4	The device firmware shall be able to send and receive data for the state of light switch via wifi (no video data)	P
REQ-4.1.2	The device firmware shall handle communication between camera, FPGA, wifi, and a relay to control the switch	F
REQ-4.1.5	There shall be a mobile app developed to control and display the light switch state/setting	F
REQ-4.1.6	The firmware shall handle requests from video processing, manual touch, and via the wifi module	F

Table 4.1.1: General Requirements (Software)

4.2 Image Processing Requirements

Requirement	Description	Development Stage
REQ-4.2.1	The firmware shall acquire acquire video data of at least 30 FPS and store it in memory for use by the microcontroller and FPGA	C
REQ-4.2.2	The microcontroller and FPGA shall perform image processing and make a decision on the control of a switch	C
REQ-4.2.3	The video data shall be compressed/analyzed using existing libraries in python	C
REQ-4.2.4	A deep learning model shall be applied in order to differentiate shapes and identify people	C
REQ-4.2.5	The video data shall be processed in FPGA logic to identify regions of interest (ROI) where the shape of a person is located	P
REQ-4.2.6	The FPGA logic shall be used to offload computationally heavy processing in the deep learning models	F

Table 4.2.1: Image Processing Requirements

4.3 Performance Requirements

Requirement	Description	Development Stage
REQ 4.3.1	Video data shall be processed in real-time	C
REQ 4.3.2	The time required for the device to detect a person and turn on the lights shall be less than 3 seconds	P
REQ 4.3.3	The software shall reset if there is a critical failure and the device cannot recover	F

Table 4.3.1: Performance Requirements

5 Hardware Requirements

5.1 General Requirements

Requirement	Description	Development Stage
REQ-5.1.1	Product shall include a camera	C
REQ-5.1.2	Product shall interact with connected circuitry to modify the power output to connected lights(dimming light)	C
REQ-5.1.3	Product must fit inside of a standard light switch back box	P
REQ-5.1.4	Product must be compatible with current light switch wiring standards	P
REQ-5.1.5	Product camera lens must be unidentifiable at distances greater than 1 metre	F

Table 5.1.1 : General Requirements (Hardware)

The General Hardware Requirements for our product is enough to get a very basic overview of its intended functionality. A few crucial requirements are detailed as follows. A large part of our target market are those with existing homes looking to retrofit their homes with smart light capability, and to this end, two requirements (REQ-5.1..3 and REQ-5.1.4) address this issue directly. Failing to meet REQ-5.1.3 would mean that not only may our customers have to cut up more of their walls, but also the installation of a new outlet box. Failing to meet REQ-5.1.4 necessarily means that new wiring would need to be set up for compatibility with our system, which is unreasonable to expect from customers.

Another requirement that we would like to point out is REQ-5.1.5 The presence of a camera lens (especially in a home) would be considered unsettling for the general population. To address this issue, the camera lens is meant to be undetectable of distances greater than at least 1 metre. This can be done through several ways, but the simplest would be to look for materials with high transmission in the infrared and near-infrared wavelengths and low transmission in the visible spectrum. Some possible options include Germanium and Silicon although further research needs to be done before making a decision.

5.2 Relay Requirements

Requirement	Description	Development Stage
REQ-5.2.1	The relay must be powered by a 12V DC Source	C
REQ-5.2.2	The relay must be a keep (latch) relay to reduce power consumption	C
REQ-5.2.3	The load circuit of the relay must be the circuit of the lights themselves	C
REQ-5.2.4	The relay must allow power to go through each associated light individually	P
REQ-5.2.5	The relay's control circuit must be controlled by the component known as the primary control box	P
REQ-5.2.6	The relay must allow dimming control of each associated light	F

Table 5.2.1 : Relay Requirements

The Relay is an essential part of the system, and must allow power to flow through each light individually, as outlined in REQ-5.2.4. One specific option that we would like to include in the final product is outlined in REQ-5.2.6, which would allow the dimming option of each light. This can be easily done through commands originating from the Capacitive Touch Module, and changing the time periods at which energy is let through the bulb. To this end, we can use a triac and a diac.

5.3 Capacitive Touch Module Requirements

Requirement	Description	Development Stage
REQ-5.3.1	The capacitive touch module must act as a manual override to the HESTIA system	P
REQ-5.3.2	The capacitive touch module must be able to act as a substitute to the standard light switch	P
REQ-5.3.3	The capacitive touch module must be able to differentiate at least 4 values throughout its vertical length	F

Table 5.3.1 : Capacitive Touch Module Requirements

Although the Capacitive Touch Module is not completely necessary for our product, it does increase the design and the quality of life features for our customers. The most important requirement for this hardware module is REQ-5.3.1, which allows it to be an override to the HESTIA System, allowing for manual control of the associated lights. One of the main reasons for this is to cater to customers that have members of the family that prefer the existing, non-smart light switches.

5.4 Camera Unit Requirements

Requirement	Description	Development Stage
REQ-5.4.1	Product camera must be powered by a 5V DC Source	C
REQ-5.4.2	Product camera must be able to detect spectral ranges to allow distinction of objects in low-light conditions	C
REQ-5.4.3	Product camera must capture images at a rate no lower than thirty frames per second	C
REQ-5.4.4	Product camera must have a resolution of at least 640x480 pixels	C
REQ-5.4.5	Product camera must have a 180 degree Field of View	F

Table 5.4.1 : Camera Unit Requirements

The camera unit is a crucial part of our system, as it is the main way that Hestia is informed whether or not someone is in the room. Key requirements to note are REQ-5.4.2 and REQ-5.4.5. REQ-5.4.2 allows the control of the system to persist even in low light conditions. The most obvious use case for this is when being the first one to arrive home at night. REQ-5.4.5 allows more accurate detection of persons in the room, essentially being the greatest field of view for a camera in the wall. Lastly, we would like to point out that many of the other requirements point to the camera not needing to be of superb quality. This is important, as for our purposes (the location/detection of persons in a room), having a high frame rate and resolution quality would provide negligible benefits significantly outweighed by the costs involved.

5.5 Power Requirements

Requirement	Description	Development Stage
REQ-5.5.1	The product must include a transformer connected to the AC Mains line	C
REQ-5.5.2	The transformer must mimic guidelines set by the Canadian Electrical Code (CEC), including but not limited to sections 26-240, and 26-248	C
REQ-5.5.2.1	The transformer must have all live parts enclosed and inaccessible to unauthorized users	C
REQ-5.5.2.2	The transformer must be protected from mechanical damage	C
REQ-5.5.2.3	The transformer must not be installed in a way where water/other liquids can fall onto windings	C
REQ-5.5.2.4	The transformer must be installed a sufficient distance away from combustible materials	C
REQ-5.5.3	The voltage from the transformer must be stepped down to provide power for other parts in the system (Touch Pad, ARM Unit, etc.)	C
REQ-5.5.4	The entire system must consume a maximum of 5W of power	F

Table 5.5.1 : Power Requirements

The most important of the requirements is the very last one, REQ-5.5.5, which states that the system overall must use less than 5W of power. As one of our product's goals is to save power consumption throughout the house, we have chosen this benchmark, as many available LEDs have a power consumption of around 6W. Lastly, we would also like to point out a key requirement in terms of safety and usage, REQ-5.5.2. Although our product may not have to comply to these codes directly, we have taken them as a baseline in terms of making sure that our power supply is safe for constant usage and prevent any unauthorized access.

6 Safety and Sustainability

6.1 Safety Considerations

The proof of concept prototype as well as the production version of HESTIA are to be implemented with the highest safety standards in mind as detailed in the standards section below. Those include but are not limited to preventing electrocution, static shocks, and burns. Other design considerations include an on-device processing of the camera data to eliminate data privacy concerns, circuit protection against large current/voltage amplitude fluctuation as well protection against shorts, and finally boxed-in components to eliminate risks of electrocution.

6.2 Sustainability Considerations

Core values of each of Sunny Room Inc team members include ecology and reducing the human footprint on Earth. The requirements and design take that into consideration to reflect those values.

6.2.1 Cradle-to-cradle Approach

The cradle-to-cradle of HESTIA follows the guidelines provided by the Canadian Standards Association for dealing with the end of life of devices as HESTIA will follow recycling standards from production, shelves, and disposition. Those include but are not limited to use of recyclable forms of plastic for the production of the box as well as the packaging for shelf selling[1].

7 Engineering Standards

Fundamental parts of HESTIA include a power regulation circuit, a camera, a processor, a capacitive touch sensor, and a wifi module. Each of these parts require consideration with regards to safety standards and regulations. Also, since HESTIA is to be used at home and in offices, environmental as well as ergonomic standards are to be considered.

7.1 Electrical Standards

Standards	Description
CAN/CSA-C22.2 NO. 61508-1:17	Functional safety of electrical/electronic/programmable electronic safety related systems - part I: General requirements [2]
CAN/CSA-C22.1NO. 0-10	General requirements - Canadian Electrical code, part II

Table 7.1.1 : Electrical Standards

7.2 Environmental Standards

Standards	Descriptions
CAN/CSA-ISO/TR 14062-03 (R2013)	Environmental Management - Integrating Environmental Aspects into Product Design and Development (Adopted ISO/TR 14062:2002, first edition, 2002-11-01) [3]
CAN/CSA-ISO 14040-06 (R2016)	Environmental Management - Life Cycle Assessment - Principles and Framework (Adopted ISO 14040:2006, second edition, 2006-07-01) [4]

Table 7.2 : Environmental Standards

7.3 Mechanical Standards

Standards	Description
ISO 12100:2010	Safety of machinery — general principles for design — risk assessment and risk reduction [5]

Table 7.3.1 : Mechanical Standards

7.4 Wireless Standards

Standards	Description
ISO/IEC 8802-2:1998	Information technology - Telecommunications and information exchange between systems -- Local and metropolitan area networks - Specific requirements - Part 2: Logical link control [6]
IEEE Std 802.15.4	IEEE Standard for Low-Rate Wireless Networks[7]

Table 7.4.1 : Wireless Standards

7.5 Ergonomic Standards

Standards	Description
ISO 6385:2016	Ergonomics principles in the design of work systems[8]
ISO 7250-1:2017	Basic human body measurements for technological design -- Part 1: Body measurement definitions and landmarks[9]
ISO 7250-3:2015	Basic human body measurements for technological design -- Part 3: Worldwide and regional design ranges for use in product standards[10]

Table 7.5.1 : Ergonomic Standards

8 Conclusion

This document outlined the requirements that followed for the design and implementation of Sunny Room Inc's flagship product HESTIA. The desired capabilities and boundaries envisioned were fully analysed, captured, deconstructed, and categorized in their corresponding sections of requirements. General requirements consist of system requirements, and functional requirements. Software Requirements consist of image processing requirement, and performance requirements. Hardware requirements consist of relay requirements, capacitive touch requirements, camera unit requirements, and power requirements. Overall, the requirements defined in this document fully capture the needed components and modules needed for the design of HESTIA.

9 Appendix

9.1 Proof of Concept Deliverables

- Prototype of image processing algorithm displaying input image and output image with lock on moving person on a monitor
- Prototype of a power regulation circuit to power chip, wifi module, capacitive touch sensor
- Prototype of a Phone Application that interacts with Google Home and Amazon Alexa to change the state of a button on the screen (button up/down)

9.2 Acceptance Test Plan

The following is the Acceptance Test Sheets to be filled out for each module or component during testing.

9.2.1 Electrical

1. Power Management Circuit :	Comments:
Output: 5V **☐Yes ☐No**	
Output: 3.3V **☐Yes ☐No**	
2. Capacitive Touch Sensor:	Comments:
Capacitance on touch : Changes **☐Yes ☐No**	
Capacitance on slide: Changes **☐Yes ☐No**	

9.2.2 Physical

1. Camera:	Comments:
Horizontal FOV: 180 ☐**Yes** ☐**No**	
Low light performance: Can differentiate objects ☐**Yes** ☐**No**	
2.Enclosure:	Comments:
Size: Fits inside standard back box ☐**Yes** ☐**No**	

9.2.3 Software

1. Phone App:	Comments:
Integrated with Google Home API ☐**Yes** ☐**No**	
2. Image Processing:	Comments:
Detection of human shape ☐**Yes** ☐**No**	

10 References

[1] CSA Group, “Product Recycling and End of Life Management”, CSA, 2017, https://store.csagroup.org/ccrz__ProductDetails?viewState=DetailView&cartID=&portalUser=&store=&cclcl=en_US&sku=iso_055872

[2] CSA Group, “CAN/CSA-C22.2 No. 61508-1:17”, CSA, 2017, [Online], https://www.scc.ca/en/standardsdb/standards/28870

[3] CSA Group, "CAN/CSA-ISO/TR 14062-03 (R2013) - Environmental Management - Integrating Environmental Aspects into Product Design and Development (Adopted ISO/TR 14062:2002, first edition, 2002-11-01)," CSA, Mississauga, 2013. https://store.csagroup.org/ccrz__ProductDetails?sku=2701813

[4] CSA Group, "CAN/CSA-ISO 14040-06 (R2016) - Environmental Management - Life Cycle Assessment - Principles and Framework (Adopted ISO 14040:2006, second edition, 2006-07-01)," CSA, Mississauga, 2016. https://www.orderline.com/can-csa-iso-14040-06-r2016-environmental-management-life-cycle-assessment-principles-and-framework-adopted-iso-14040-2006-second-edition-2006-07-01

[5] ISO12100:2010 “Safety of machinery -- General principles for design -- Risk assessment and risk reduction” https://www.iso.org/standard/51528.html

[6] International Organization for Standardization, “ISO/IEC 8802-2:1998(en)”, ISO, 1998 [Online], https://www.iso.org/obp/ui/#iso:std:iso-iec:8802:-2:ed-3:v1:en

[7] IEEE Std 802.15.4-2015 (Revision of IEEE Std 802.15.4-2011) - IEEE Standard for Low-Rate Wireless Networks https://standards.ieee.org/findstds/standard/802.15.4-2015.html

[8] Ergonomics principles in the design of work systems https://www.iso.org/standard/63785.html

[9] Basic human body measurements for technological design -- Part 1: Body measurement definitions and landmarks https://www.iso.org/standard/65246.html

[10] Basic human body measurements for technological design -- Part 3: Worldwide and regional design ranges for use in product standards
https://www.iso.org/standard/64237.html