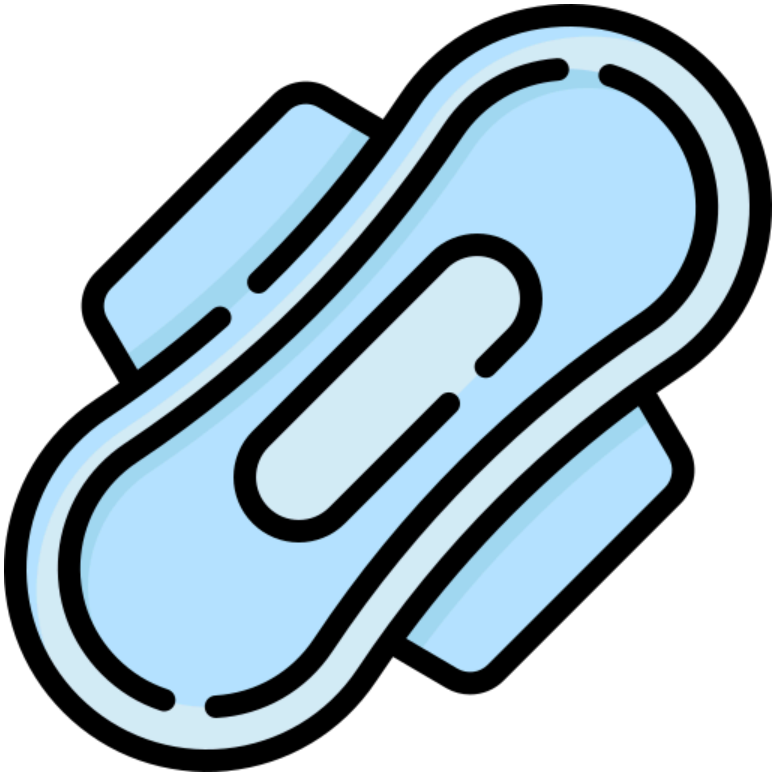

EASE Notifying Feminine Hygiene Pad

University Of Central Florida

College of Engineering and Computer Science
Department of Electrical and Computer Engineering

GROUP 29

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SPONSORED BY GABRIELA MERCADO

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CHAPTER 2 - PROJECT DESCRIPTION
2.1 Project Background and Motivation

As part of the reproductive process, females regularly experience a multitude of physiological side effects associated with the female menstrual cycle, the most notable being physical bleeding. With significant variation in flow, duration, and consistency between individuals, females can have drastically different experiences. Some develop a seemingly regulated cycle length or consistent flow amount, making the use and timing of feminine hygiene products easily predictable while others experience inconsistent cycle lengths from abnormally short, to abnormally long with flow amounts varying from extremely heavy to extremely light. With the latter being highly unpredictable, a female with this type of menstrual cycle may find it difficult to determine when to replace a fully used hygiene product or how often to replace such products which can lead to issues impacting daily life such as embarrassment. inconvenience, or messiness from excess menstruation leakage.

Our Senior Design project aims to resolve this issue by developing a product targeted to the female population that allows users to know exactly when a feminine hygiene product currently being used has reached its maximum capacity and must be replaced. This would provide users with real-time data on blood volume, instantaneously sending alerts to prevent unwanted leaks or discomfort, greatly enhancing user confidence and peace of mind. A project like this would require our group to work cohesively in every step of the engineering design process to ensure a working and effective product is produced. Significant researching, brainstorming, planning, and innovation will be required to design an integrative product, combining software and hardware to effectively meet the desired goal, allowing our team to work together and overcome challenges.

This project was presented to us by Gabriela Mercado, a finance student at the University of Central Florida, an entrepreneur, and the sponsor of this project. She developed the concept of this project after having multiple menstruation leakage experiences at 16 which resulted in embarrassment and stained clothing. These experiences inspired her to develop a product that would notify her of fluid volume within a feminine hygiene product. Developing such a product would positively impact a significant portion of the female population who experience the menstrual cycle for a large portion of their lifetime. Completion of this project could benefit females who experience irregular blood flows and schedules, young females experiencing periods for the first time and navigating how to manage them, or other females who prefer to manage their menstrual cycles stress-free. Thus, our team is motivated to positively impact and directly improve the daily lives of everyday people through the development of this product over other militarized or corporate projects.

Completion of this project can also provide other significant benefits beyond regular maintenance of menstruation leakage. With a system that can detect and notify users of leakage volume, this product has the potential to act as a health monitoring

device. By providing precise insights on menstrual flow, the system possesses the capability of tracking and maintaining data that can identify and indicate if an individual is experiencing abnormal menstrual flows or periods relative to their previous cycles that can be indicative of developing health concerns. Additionally, tracking and identifying these abnormal patterns can proactively aid in the identification of hormonal imbalances or gynecological conditions. Early detection of these health issues would provide users with the opportunity to obtain timely medical consultation and intervention, greatly improving overall health and minimizing any risks and health complications associated with the menstrual cycle.

2.2 Goals, Objectives, and Design Requirements

The EASE project centers around a system that alerts its user when their menstrual product is used or at capacity. There are many implementations that can accomplish this goal. With this in mind it doesn't matter whether or not the device is disposable, reusable or embedded in the menstrual product. The main goals of the EASE project stay the same. That is to create a device which can accurately detect when a menstrual product is at capacity or nearing capacity and successfully notify its user. This splits the project into a few pieces of tech which our group is aiming to create, the sensor, the transmitter, the pcb/integration and the alert system.

The Sensor

Overall goals

- Accurately detect when the user's menstrual product is at or nearing capacity.
- Perform the aforementioned detection with an accuracy of 75% or higher.
- Collect sensor data both at the users request as well as passively.
- Comfortable form factor

Advanced goals

- Fully reusable sensor.

Stretch goals

- Additional health sensors such as pH level, blood iron levels, or any other useful data that can be effectively measured through the blood.

The Transmitter

Overall goals

- Reliably sends data between the sensor and alert system.
- Sends data both at the user request as well as passively.

Advanced goals

- Can communicate between both Android and IOS devices.

Stretch goals

- Communicated with our own wearable implementation of the alert system

The PCB/Integration

Overall goals

- Comfortable and discrete form factor.
- Waterproof and reusable
- Integrates the sensor and transmitter.

Advanced goals

- Flexible PCB design
- Washable “sleeve” to house the PCB

Stretch goals

- Replaceable adhesive patch design for more comfort or discrete form.

The Alert System/App

Overall goals

- Alerts the user when the menstrual product is at capacity or near capacity.
- Can be easily paired with the PCB/Transmitter.

Advanced goals

- Provides current sensor readouts and updates at the users request.
- Available on both Android and IOS.

Stretch goals

- Ability to select the brand/type of menstrual product being used for more accurate data.
- Wearable implementation

Goal Summary

In summary the goals we are hoping for are broken down into basic, advanced and stretch goals. The basic goals our project is hoping to achieve are comfortable design, reliable capacity sensing, and a reliable notification/alert system. The user should be able to use and rely on our device to provide them with an accurate notification and prevent leakage without sacrificing comfortability. The advanced goals are ones that further improve the quality of the basic goals, here we are looking to improve battery life, app compatibility, and a reusable design. These advanced goals build upon the basic goals and are designed to improve the quality of the product. The third category of stretch goals are ones that go one more step further but either pose a bigger challenge or greatly alter the design in such a way that would change some previous goals in terms of objectives to reach them. These stretch goals include a wearable alert system option, more advanced tracking/data tracking like blood oxygen levels, and a large range of compatibility with existing menstrual products. While these stretch goals do not conflict with the basic goals they do conflict with the traditional objectives used to accomplish some of these basic goals. In the next sections of chapter 2 I will break down the objectives needed to accomplish the basic, advanced, and stretch goals, how they conflict, and what our thought process is in regards to how we will approach which objective is more suitable for our project.

2.2.1 The Sensor

The EASE project is very dependent on the sensor. A sensor able to accurately and precisely determine the fluid level absorbed by a menstrual product that also does not come with a loss of comfort or reusability is difficult and poses the most challenges. But because of this the objectives are clearly laid out for us. The biggest objectives we are looking for are relating to the comfortability, reusability, and data reliability. To achieve comfortability a great objective is a small or soft form factor. For reusability we need a sensing solution that is cohesive, most likely not embedded in the product, and easily cleanable or sanitizable. And for data reliability we need a sensor that can recognize the volume, weight, or surface coverage of the product. Other important objectives are to find

a sensing solution that is low powered or passive, this can further improve comfort and size but may come at the cost of price, precision, or accuracy. Multiple solutions immediately come to mind such as a fluid pressure sensor, a weight sensor, or something similar to an array of contacts that are set to short when in contact with fluids like a level sensor. Each of these options have their drawbacks, the fluid pressure and weight sensors are difficult to ensure comfortability and the weights and pressures can differ depending on the capacity of the menstrual product, blood density, and multiple other factors. The "level sensor" built from contacts sounds novel and can be distributed across the entire surface of the menstrual product giving good volumetric data without needing to worry about the factors that plague the previous sensor options but it too struggles with checking all the boxes. Imagine we embed the contacts in the second layer of the menstrual pad, this option gives good coverage and with small enough contacts could be completely comfortable but the reusability factor goes away almost completely. If instead we decide to create a level sensor band that can be placed around the border of the menstrual pad to detect when it is reaching capacity, this may be a more reusable option but lacks comfort and extra information that we were hoping to gather such as percentage full. In addition to the conflicts listed previously the sensor we eventually land on must be able to remain functional in its environment for a week on average. This means the sensor needs to be relatively robust, it will be in a high moisture, warm, and sometimes high pH environment. To achieve the accuracy goal we are looking for the sensor must be able to operate the entire duration without wear being an issue. The objectives and goals of the sensor collide with each other and make it the most difficult part to satisfy in the EASE project.

2.2.2 The Transmitter

The transmitter has goals which are more direct and clear cut. Reliable data transmission, compatibility with common devices, and both passive and active data transmission. For reliable data transmission and compatibility their objectives align, the most used methods of data transmission follow the trend of the most reliable. I believe the use of bluetooth here is the clearest option. With that in mind implementing bluetooth is a large objective, with that we add size and power consumption. It will be important to find and use a bluetooth implementation that is as small as possible, low power data transmission devices aren't unheard of but may cost more than the average user is willing to pay for consistently in the case that the product may become disposable. For both passive and active data transmission, the transmitter will need to have a processing unit that can interpret signals sent from the user, this again adds size and power consumption. All of the goals we want to achieve come at the cost of an increase in size and power. This means that another big objective will be to find a solution that either reduces the size and power to a manageable extent or passes some of the objectives along to the PCB/integration method. At the integration level issues like form factor and size are large concerns due to the comfortability decreasing as the size increases. If comfort can be found another way on the PCB side, the transmitter can afford to use more power or have a larger footprint. A stretch objective that could solve multiple problems here is to incorporate the wearable alert system, then we could use our own simplified communication protocol and forgo the need for a larger bluetooth IC. An antennae can be etched into the pcb and NFC can be used to communicate with the wearable element.

This reduces size and power but skips the goal that centers around common device compatibility.

2.2.3 The PCB

The PCB/Integration is another contentious part in the EASE project. Just like the sensor there are many ways to accomplish the goals we outlined like comfortability, and reusability but some of the objectives to accomplish these goals can conflict. One goal that may be the most difficult to accomplish will be integrating the sensor and the transmitter/receiver. Collecting data from the sensor in most applications is fairly straightforward and the sensor is either directly mounted to the pcb or the sensor has its own housing and wire/cable is run to the necessary places. To create a pcb that is comfortable to wear the objectives are split, mounting the sensor to the pcb and placing that inside or on the menstrual product will most likely be uncomfortable while running a ribbon cable or other wires from the menstrual pad also sounds uncomfortable and may take away from the discrete form factor goal. This creates two goals, create a pcb that is either flexible, soft, or small enough to attach to the sensor directly, or create a comfortable ribbon/wire harness option that connects to a PCB that is then later attached somewhere more comfortable such as a waistband or garment. If the first of these objectives is chosen then additional goals spawn such as a waterproof PCB design, an effective cleaning and sanitation method, and a method for easy attachment/detachment. If the second objective is chosen it will create objectives such as external garment mounting design and an effective way to use the extra pcb room we acquire. As stated in the last section if the PCB can achieve comfortability without sacrificing size the transmitter can afford to change or flex its goals/objectives. Another objective that must be adhered to is the safety of the PCB/integration. Both methods still require a pcb to be kept close to a person's skin, things such as heat, abrasion, and chemical irritants will need to be eliminated not just for comfort but for safety. Common solder contains lead which should not be kept on the skin for long periods of time, common solder joints are also typically very abrasive and can scratch or break skin very easily. If a low power solution is found then heat may not be an issue.

2.2.4 The Alert System/App

The alert system's goals and objectives follow that of the transmitter's. We want something that is compatible with common devices, gives the user up to date data, the ability to request or monitor the data, and fast response times. In order to achieve these goals just like the transmitter we need a common transmission method like bluetooth, we need a way to integrate and process the data received from the sensor or transmitter. For this its most likely an application will be needed, the user could easily from there view the data as well. Fast response times are congruent with the aforementioned communication methods and should not be the most difficult objective to fulfill. When we take into account the stretch goals such as the wearable implementation and selection of menstrual products some of the other objectives change. The wearable implementation removes the necessity of a communication protocol IC and gives the transmitter and PCB more freedom in their options. The option to choose the menstrual product used can potentially improve the accuracy and precision of some of the sensing applications like

the weight or fluid pressure sensors. An additional objective arises from the ability to select the menstrual product and that is cataloging popular products. We would need a relatively large database of products, their capacities, and other information. Then we would need a method of storing and integrating this data. We could store all the data on the app but if we choose a wearable design it may mean we cannot pursue this objective. The alert system does not struggle with any of its objectives. There are some trade offs but those are due to conflicts that arose from the other parts. The alert system needs to be built to cater to the rest of the system, a place the user can interact with or receive the data the system collects. It is not limited much by cost, size or power constraints and is most likely something that will need to be developed either last or only when key design concepts are decided upon.

2.3 Description of Features / Functionalities

2.3.1 Main Features

The main feature of the EASE. PAD is notifying the user of the fluid volume in the feminine hygiene product, through technological means. According to a survey done by Gabriela, 88.6% of the 210 responses replied that they would consider using a pad or tampon that would notify the user when it is full or close to full. In that same survey, 77.6% of participants have had anxiety of leaking while in public. By knowing the amount of fluid in the hygiene product, the user will know when to change said product to prevent leakage onto their clothing, as leakage can ruin clothes, cause embarrassment, and just in general be messy. This feature provides convenience to the user as they will not have to waste time going to the bathroom to check if their pad is about to leak. It would also reduce their anxieties about leaking in public. The product should remain external (pads or underwear) rather than internal (tampons, disks, menstrual cups), as this adds to the ease of use and peace of mind to the user. As the device is external, it will also be reusable as to reduce the costs for users and to prevent additional waste. As pads come in different sizes and brands, another feature of the project would be to be able to input the brand and size of the pad into the app so that the product is compatible with different sizes of pads. Since we are adding external hardware, we would like our product to be as comfortable as possible, which means the sensors will be separate from the PCB and additional housings. According to the Mayo Clinic, periods typically last 2 to 7 days, which means the battery life of our product should last long enough to accommodate a typical cycle. The information we are collecting is low frequency data, meaning we should be able to make this device low powered to make the battery last this long.

2.3.2 Extra Features

Some extra features that we would like to implement, should time allow it are sending the information about the capacity of the pad to a custom made wearable, and additional health sensors in the pad. Through the custom wearable, users would not have to worry about bringing their phone everywhere they go and would still be able to get valuable information. This wearable could resemble something like a fitness tracker that

has a screen and can buzz the user when the pad is at or near capacity. A lot of health information can be extracted from just blood alone, and if we can add more sensors to the product we can provide users with additional information about their health, rather than just the amount of blood in their pad. To make the product as reusable and user friendly as possible, an adhesive patch, like the ones used on diabetes patches would be used to stick the device on the thigh of the user.

2.4 Existing Products

Currently, the market offers various menstrual hygiene products, each designed to address different needs related to comfort, flow management, and environmental sustainability. While these products serve their intended purposes effectively, they don't fully address the unpredictability of menstrual flow or offer features that could provide real-time alerts to users about threshold capacity levels. Below, we discuss existing products and their capabilities, along with their limitations in terms of addressing the issue of menstrual leakage and predictability.

2.4.1 Menstrual Discs and Cups

Menstrual cups and disks are reusable products inserted into the vaginal canal to collect menstrual blood. Menstrual disks, such as those made by companies like *Flex* or *Softdisc*, sit below the cervix, while menstrual cups, like those from *DivaCup* or *Lunette*, use suction to stay in place and prevent leakage. These products have gained popularity due to their environmental benefits and cost-effectiveness, as they can last several years with proper care. However, users often struggle to determine when the cup or disk is nearing its capacity, as these products typically do not include any sensor or alert mechanisms. This results in a risk of overflow and leakage, particularly for those with irregular flow patterns.

2.4.2 Reusable Pads and Leak-Proof Underwear

Leak-proof underwear, such as *Thinx* or *Modibodi*, and reusable pads offer an environmentally friendly alternative to disposable pads and tampons. These products rely on fabric layers that absorb menstrual flow, and they can be washed and reused. While they do reduce the amount of waste produced during menstruation, they do not provide any feedback to the user about their saturation level, often leaving users unsure of when leakage may occur. This can lead to similar concerns about overflowing and staining as with other products. These limitations highlight the need for a more advanced system, like the EASE Notifying Feminine Hygiene Pad, that monitors and alerts users before leaks happen.

2.4.3 Smart Hygiene Products

Some recent advancements in the menstrual product space include the development of "smart" tampons and pads. These products, still largely in the prototype

phase, are designed to detect moisture and send signals to a connected device, notifying users when a product is full. One example is *LOONCUP*, a smart menstrual cup with built-in sensors to monitor fluid levels and detect health indicators. However, most of these products face significant challenges in terms of reliability, comfort, and battery life. Many smart tampons and pads are not yet widely available, and their real-world usability is limited due to high costs, concerns about device durability, comfort, and issues with integration between hardware and software.

Image source: https://www.kickstarter.com/looncup

2.4.4 Traditional Tampons and Pads

Traditional tampons and pads, such as those offered by brands like *Always* and *Tampax*, have long been the standard solution for managing menstrual flow. While they are widely accessible and available in various absorbency levels, they come with inherent limitations. Once their capacity is reached, they can no longer prevent leakage. Without any mechanism to notify users when the product is full, it is easy for leaks to occur unexpectedly, especially for individuals with heavy or irregular flows. This underscores the need for a product like the EASE Notifying Feminine Hygiene Pad, which aims to fill this gap by providing users with timely notifications before they reach leakage risk.

2.5 Engineering Specifications

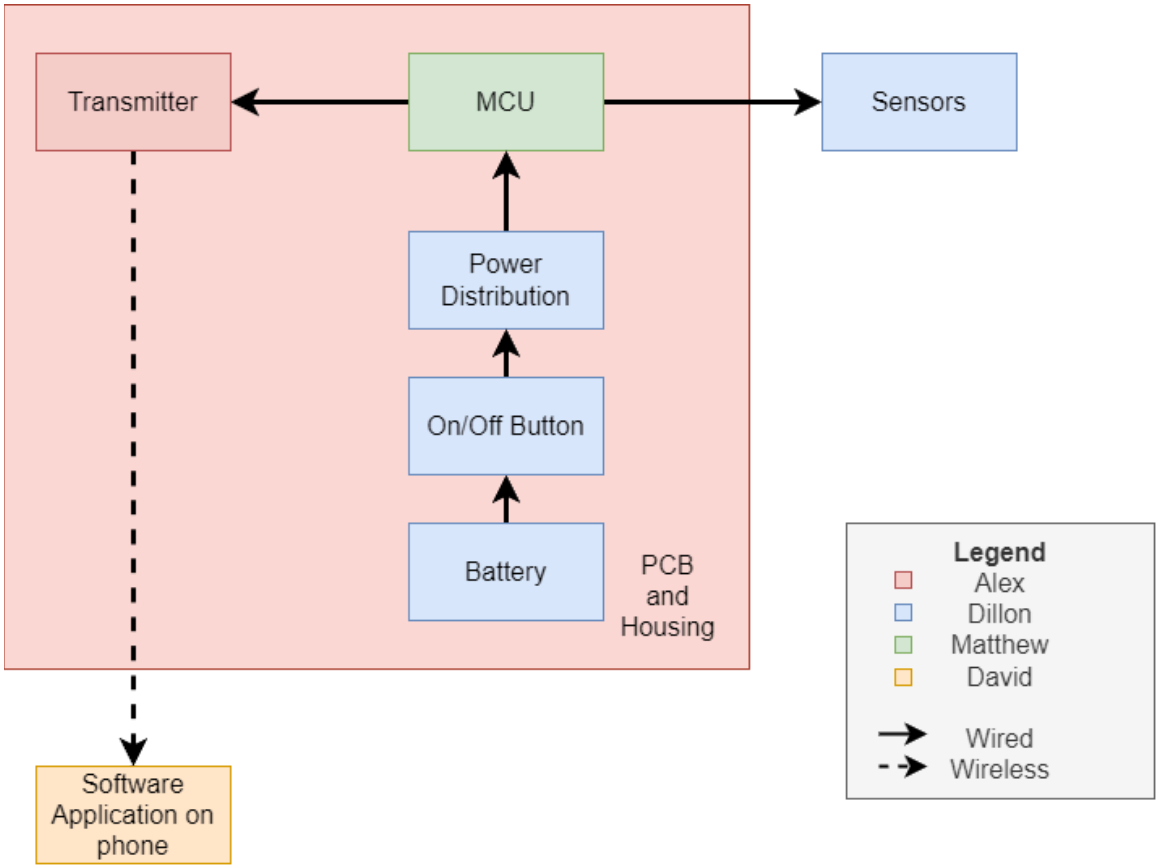
The preceding sections depict the objectives, goals, and vision of what the final project should achieve. In order to convert this idea to a demonstrable product that successfully fulfills the project goal, a set of engineering requirement specifications must be clearly defined. These specifications serve as both a contract between our team and our sponsor, Gabriela Mercado, and a grading metric between our team and the committee that clearly states what the project will be capable of upon completion. Such engineering specifications are defined below in Table 1 which identifies both the quantitative and qualitative metrics of what the completed prototype should meet.

EASE Notifying Feminine Hygiene Pad
Quantitative Metrics

Maximum Length	125 cm^3
Maximum Weight	10 g
Temperature Limitations	Up to 46℃ [1]
Environmental Rating	IP 35 [2]
Volume Accuracy	±2 mL
Response Time	Transmits within ~1 s of product reaching ~95% capacity
Battery Life	7 Days
Qualitative Metrics	
User Interface	Data should be displayable via an app on a mobile device
Communication	Transmitter should be capable of communicating real-time data to the user's mobile device, including current blood volume within the hygiene pad when prompted.
App Specifications	Sends a notification when pad is nearing maximum capacity
	Provides a real-time display of current volume within the pad
Physical Specifications	Compatible with the most common types of external feminine hygiene products
	Product is reusable
	Comfortable and lightweight such that it is virtually unnoticeable when in use
	Pliable and able to conform to reasonable shapes as necessary for the user
	Able to withstand contact from bodily fluids including but not limited to blood, water, sweat, and discharge

Table 1 EASE Engineering Specifications and Requirements

2.6 Hardware Block Diagram



2.7 Software

2.7.1 Basic Goals

The primary software goal of the EASE Notifying Feminine Hygiene Pad project is to deliver a reliable and timely notification to the user's mobile device, informing them when their hygiene product has reached a critical threshold and needs a replacement. This core functionality requires continuous interaction between hardware and software components, where the sensor detects the fluid levels, and the transmitter sends this data to the mobile device via Bluetooth.

The system's basic software goals include:

1. *Seamless communication*: The mobile app must be able to receive data from the transmitter reliably and without a delay lasting more than a few seconds. This ensures the user receives a notification when their pad is at or near capacity.
2. *Accurate monitoring*: The software should process sensor data and evaluate it to assess if the feminine hygiene product has reached the predefined capacity limit. This evaluation must be performed continuously or at set intervals.

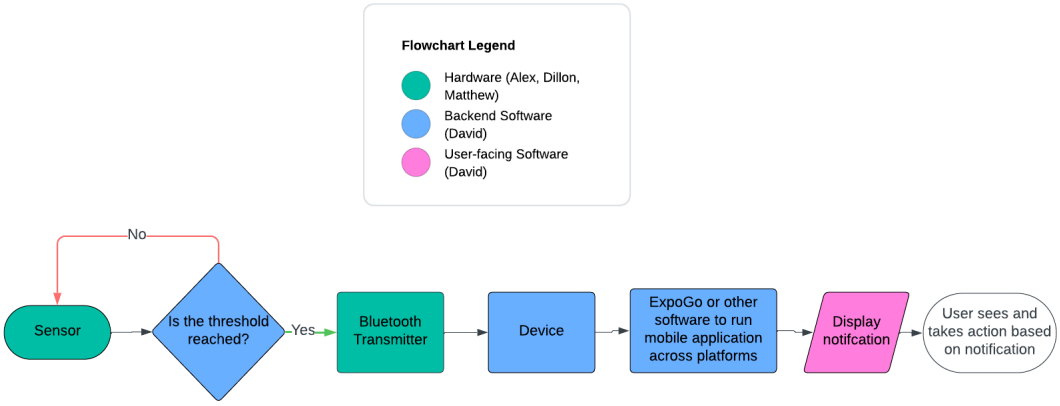
3. *User-friendly notification system*: The mobile app must notify the user when the hygiene pad is near full capacity or when it has reached the capacity threshold. The notification should be clear, easy to understand, and actionable.
4. *Compatibility*: The software must be capable of functioning across both Android and iOS devices to ensure accessibility for a wide range of uses.
5. *Low power consumption*: Both the transmitter and the mobile app should be optimized for low power consumption to prolong battery life, particularly during the passive monitoring.

These basic goals lay the foundation for a reliable, functional product. We want to ensure users are notified in a timely and accurate way to avoid leakage and improve overall convenience.

2.7.2 Software Diagram / Flowchart

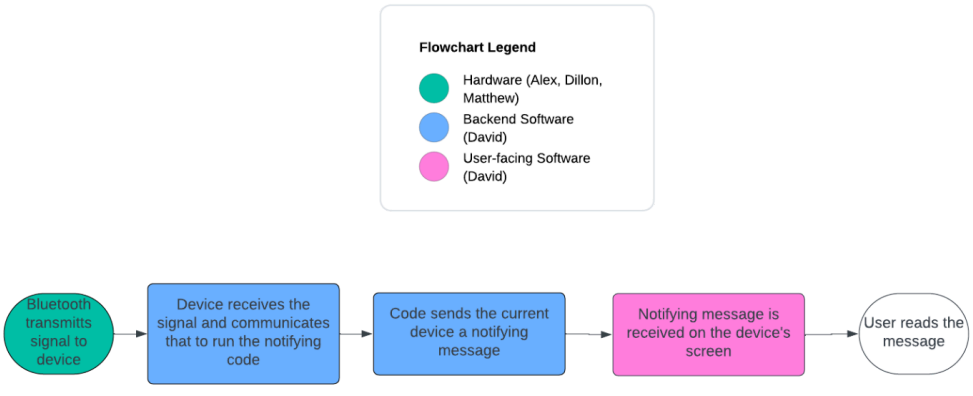
2.7.2.1 Overview flowchart (Includes hardware scope)

The chart below is a basic overview of how the overall encompassing software interacts with the related hardware:

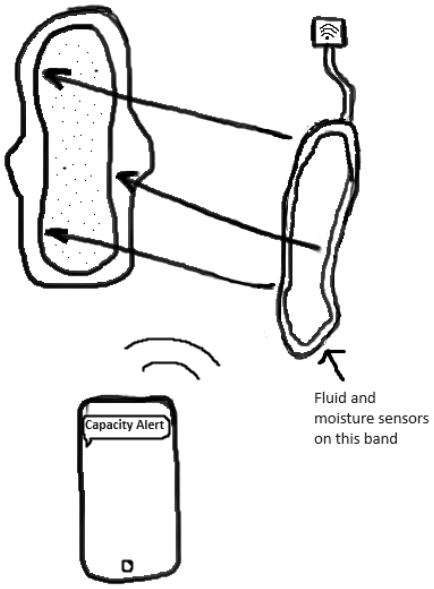


2.7.2.2 Software flowchart

The chart below is an overview of how the software will specifically interact once the bluetooth detects the sensor has reached its threshold capacity:


Flowchart Legend
Hardware (Alex, Dillon, Matthew)
Backend Software (David)
User-facing Software (David)
Bluetooth transmitts signal to device
Device receives the signal and communicates that to run the notifying code
Code sends the current device a notifying message
Notifying message is received on the device's screen
User reads the message

2.8 Prototype Illustration



2.9 House of Quality

		Maximum Length	Sensor Accuracy	Battery Life	Compatibility	Product Weight	Environmental Rating	Response Time
		-	+	+	+	-	+	-
Cost	-	↓	↓↓	↓		↓	↓	↓
Reuseability	+	↓	↓	↑	↑	↓	↑	↑
Comfortability	+	↑↑	↓↓	↓	↓	↑↑	↓	↓
Ease of Use	+	↓	↑	↑	↑	↑		↑
Targets for Engineering Requirements		*125 cm^3*	*±2 mL*	*7 Days*	*Compatible with IOS and Android*	*10 g*	*IP 35 [2]*	*Within ~1 s of reaching ~95% capacity*

CHAPTER 10 - ADMINISTRATIVE CONTENT
10.1 Budget and Financing

As our project is a potential product down the line, we would like to try to keep the cost of materials as low as possible, so that the product could be sold for a reasonable price in order to attract customers. To achieve this, establishing a budget that effectively allocates resources can allow our team to develop a product that meets the project's specifications and requirements while simultaneously minimizing cost. The table below represents a tentative budget that meets these expectations. Additionally, a tentative Bill of Materials that meets the budget expectations is presented.

Item	Budget
MCU	$10.00
Battery	$1.00
Sensor	$5.00
Transmitter	$10.00
PCB	$500.00
Circuit Components	$10.00
Miscellaneous Components	$20.00

EASE CBOM				
Part #	Part Description	Manufacturer	Qty	Price
CR2032	BATTERY LITHIUM 3V COIN 20MM	Panasonic - BSG	1	$0.41
DA14531-00000OG2	IC RF TXRX+MCU BLE 17WLCSP	Renesas Electronics	1	$1.82

R5F21258SNFP#V2	16-bit Microcontrollers - MCU R8C/24 MCU 64+2/2.5 52LQFP -20/+85C	Renesas Electronics	1	$8.03
DPS368XTSA1	SENSOR 17.4PSIG 24BIT 8VLGA	Infineon Technologies	1	$3.18

10.2 Table of Work Distributions

To effectively achieve and accomplish the objectives of this project, it is essential to establish a clear understanding of how tasks and responsibilities are distributed among team members. The following table represents a detailed breakdown of work distribution, indicating each member's assigned roles, responsibilities, and tasks. This provides a structure that facilitates better planning and coordination while simultaneously ensuring that each aspect of the project is managed efficiently to streamline workflow and enhance productivity.

Component	**Primary Responsibility**	**Secondary Responsibility**
Sensor	Dillon Sardarsingh	David Garzon
Transmitter	Alexander Nguyen	Matthew Poole
Software Application	David Garzon	Matthew Poole
MCU	Matthew Poole	David Garzon
Power Supply	Dillon Sardarsingh	Alexander Nguyen
Housing Unit / PCB	Alexander Nguyen	Dillon Sardarsingh

Research Responsibilities

Component	**Primary Responsibility**	**Secondary Responsibility**
Battery/Power Supply	Dillon Sardarsingh	Alexander Nguyen
Transmitter	Dillon Sardarsingh	David Garzon
Software Application	David Garzon	Matthew Poole

MCU	Matthew Poole	David Garzon
Sensor	Matthew Poole	Alexander Nguyen
Housing Unit / PCB	Alexander Nguyen	Dillon Sardarsingh
Testing Procedure/Equipment	Alexander Nguyen	David Garzon
Build Equipment	Collaborative	

10.3 Project Milestones

In order to deliver a demonstrable product by the end of Senior Design and meet the time constraints of the project, milestones for project progress must be clearly defined and established. These milestones act as a tentative marker throughout the engineering process, indicating the current status of where the project is within its development phase. The following table represents these milestones with clear dates and deadlines throughout the duration of SD1 and SD2.

Senior Design 1	
Deadline	**Milestone**
August 26, 2024	Project Idea Brainstorming
September 3, 2024	Project Selection
September 5, 2024	Committee Formation
September 6, 2024	Divide & Conquer Document
September 20, 2024	Component Research, Investigation and Selection
October 11, 2024	Standards and Design Constraints
October 24, 2024	Comparisons
October 25, 2024	60 Page Document Submission
November 1, 2024	Hardware Design and Software Design
November 15, 2024	System Fabrication

November 26, 2024	System Testing
Senior Design 2	
Date	Milestone
January 6, 2025	Order Initial PCB
January 13, 2025	PCB Assembly
January 13, 2025	Integrate Software
As Necessary	Redesign PCB and Debug Code
As Necessary	PCB Reorder
TBD	Final Testing
TBD	Live Demonstration

APPENDICES

Appendix A - Reference

[1]J. R. Suchard, "Recovery from Severe Hyperthermia (45 degrees C) and Rhabdomyolysis Induced by Methamphetamine Body-Stuffing," *The western journal of emergency medicine*, vol. 8, no. 3, pp. 93–5, 2007, Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2672216/#:~:text=The%20highest%20reported%20core%20body

[2]IEC, "IP ratings | IEC," *www.iec.ch*, 2024. https://www.iec.ch/ip-ratings

[3] "Sanitary napkin Special Lineal color icon | Freepik," *Freepik*, Jun. 15, 2021. https://www.freepik.com/icon/sanitary-napkin_4917910

[4] "Menstrual cycle: What's normal, what's not," *Mayo Clinic*, Apr. 22, 2023. https://www.mayoclinic.org/healthy-lifestyle/womens-health/in-depth/menstrual-cycle/art-20047186#:~:text=The%20cycle%20isn't%20the,more%20regular%20as%20people%20age.

Appendix B - Copyright Permission

Appendix C - Data Sheet

Appendix D - Software Code

Appendix E - ChatGPT Prompts and Outcomes

Appendix F - etc.