



SMART ENERGY GUARD APPLICATION

Group(4): TEAM OF ONE

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Deliverable 1

A. Background

Families are finding it difficult to take care of their high energy bills as well as other growing costs for necessities like food and rent, which are rising faster than the general rate of inflation. In addition to inflation being a contributing factor to the high energy costs, inefficiencies in energy usage are a major reason for the rising cost of energy bills. According to estimates from the U.S. Department of Energy, Americans waste \$100 billion (about \$310 per person in the US) worth of energy annually because of inefficient insulation, heating, and cooling systems in buildings. Because of the above reasons, household budgets are being squeezed by energy expenses, and families are starting to turn to energy monitoring solutions to lower their utility bills regularly.

In response to the above challenges, we team of one group of company wants to build a "Smart Energy Guard " that will monitor the consumption of power by appliances to help reduce the bills of energy consumers. This device connects to the internet of things in an apartment or a building, through its related mobile app, the consumer can monitor and discover devices that consume a lot of power. The mobile app with the usage of energy consumption and the analysis of patterns using machine learning algorithms will figure out an energy-saving plan to help reduce energy bills. The mobile app will also give instant notifications to the consumer on their usage or consumption by any of their appliances is running her than it should.

Additionally, to give our mobile app and device each, a unique value proposition even though they are complementary products, the mobile app will have features that will have an up-to-date list of all the appliances in the world (ranging from TVs, fridges, heaters, fans, computers, industrial machines, lights, etc.) and their respective rates of energy consumption in categories: high consumption, medium consumption, and low consumption, which will make the app a go-to app. It can also serve as an appliance purchasing adviser when buying any electrical gadget.

This feature is user-focused because research has shown that consumers are usually unaware of the energy consumption of appliances when buying them which later causes problems in their quest to reduce their energy bills.

In summary, the goal of Team of one is to build a device that satisfies the growing demand for cutting down monthly energy costs for people from all walks of life.

B. Project Charter: Energy Guard System

1. Project Overview	Creating a complete and individualized Smart Energy Guard to lower energy expenses and promote sustainable living is this project's goal.
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	<p>The system will work with different smart home appliances to connect them, and it will check energy usage patterns and offer energy-saving advice using machine learning algorithms. Additionally, a mobile app will be created that will enable users to keep track of their energy use, set up energy-saving goals, get instant notifications when their usage suddenly increases and also serve as a platform to see the energy consumption rates of almost all electrical appliances in the world.</p>
Project Objectives	<ul style="list-style-type: none"> • To build an energy consumption monitoring system that interacts with all electrical appliances. • To evaluate patterns of energy use and offer tailored suggestions for energy-saving measures using machine learning algorithms. • To provide a mobile app that will enable users to keep track of their energy use, set up energy-saving targets, and get instant notifications. • To build a mobile app that will inform consumers of the amount of energy every electrical appliance on the market consumes before their purchase. • To encourage energy efficiency and sustainable living. • To seize a substantial part of the market for smart home energy management, which is expanding. <p>The project team will focus on achieving these objectives as their main goal. They are unambiguous, succinct, and in line with the organization's overarching objectives.</p>
Project Scope	<p>An energy conservation system will be built as part of the project, along with its connectivity with other smart devices, usage of machine learning algorithms, and development of a mobile application. To guarantee the system's usability and dependability, testing and validation are also included in the scope.</p>

Deliverables	<ul style="list-style-type: none"> i. An effective energy consumption monitoring system for all buildings. ii. A built-in mobile app for tracking energy use and setting up energy-saving goals. iii. The system and its parts are documented. iv. Reports on in-depth testing, verification, and validation
Project Constraints	<p>Time: The project must be completed within the allotted time.</p> <p>Budget: The project must be completed within the allotted spending limit.</p> <p>Technology: To guarantee the system's functioning and dependability, the project must employ cutting-edge technology.</p>
Project Team	A technical writer, testing and validation experts, software developers, and a project manager will make up the project team. The group oversees the designing and building of a smart home energy management system.
Project Timeline	It is expected that the project will take between 6 to 8 months to complete. Planning, designing, development, validation, and release are just a few of the steps that the project will go through.
Project Approval	[Insert names of parties who authorized the project] have studied and approved this project charter. The creation of a Smart Energy Guard system is approved for the project team to move forward with.
Milestone	<p>Milestones are significant moments in the project's timetable that signify appreciable advancement and the accomplishment of project goals.</p> <p>Some of the major achievements of the Smart Energy Guard project may be:</p> <ul style="list-style-type: none"> a. When the system design is completed. b. When the system and smart gadgets are fully integrated.

	<ul style="list-style-type: none"> c. When the building of a useful mobile app is done. d. the validation and testing of the product are completed. e. When the system is made available to the public. <p>The use of milestones helps to monitor development and keep project timelines. A clear picture of what has been achieved and what needs to be done is also given to stakeholders by them.</p>
Budget information	<p>The spending plan for the Smart Energy Guard project will include all expenditures related to the creation and deployment of the system, including labor, supplies, and administrative costs. To guarantee that the project stays within budgetary restrictions, the budget will be periodically reviewed and revised.</p>
Success Criteria	<p>Measurable metrics will be used to assess if the project's goals have been met. Some success criteria for the Smart Energy Guard project may be:</p> <ul style="list-style-type: none"> i. A working smart home energy management system that connects with electronic devices and gives tailored energy-saving recommendations. ii. An easy-to-use mobile app that enables users to keep track of their energy consumption and set up energy-saving goals would result in lower energy bills for system users. iii. Favorable consumer reviews and widespread system use. iv. The returns on investment within the allotted period. <p>The success criteria are crucial for determining the project's efficacy and guaranteeing that it is providing value to stakeholders.</p>
Approach	

	<p>The Smart Energy Guard project will use the Agile Development process, which means it will be built in chunks.</p> <p>The danger of significant problems or delays is decreased by using a method that allows for regular input and changes as the project develops.</p> <p>The project will go through the following phases: planning, design, development, testing, and release.</p>
Personnel Roles and Responsibilities	<p>Each project team member will be assigned certain roles and duties related to their specialization areas.</p> <p>Some of the most important positions and duties will be:</p> <p>Tina Charles Mbakwe-Obi: [Project manager] She is accountable for the whole management of the project, including its planning, implementation, budgetary and time management.</p> <p>Bukkacherla Bhanuprakash Reddy: [Software, Hardware and Energy Management developers] oversee the development and design of the smart energy guard, conducting energy audits and designing a functional energy sensor and how it will be integrated into homes.</p> <p>Anandas Bharath Thej: [Testing and Validation]: He makes sure the system is reliable and up to standard.</p> <p>Tetteh Edward: [Technical writer] He is in charge of outlining the system and all its parts and also creating user documentation that includes the installation, and guides. FAQs and support material.</p> <p>Thallada Nagaraju :[User Experience Designer] He is responsible for designing mobile app user experience including user interface and overall user experience.</p> <p>Chiluka Trisha: [Deployment and Support] She is responsible for putting the smart home energy management system into place, offering support to customers, and making sure the system works well.</p>

	<p>Jalla Yogesh: [Quality Assurance Engineer] He is responsible for testing smart home energy management systems, ensuring functionality and reliability, and identifying and fixing flaws.</p> <p>It is critical to define roles and responsibilities to ensure that everyone in the project team knows their obligations and can productively play a role in the project's success.</p>
Academic and Industrial Resource	<p>Many academic and industrial resources support the development of smart energy guards.</p> <p>Some relevant literature and resources include:</p> <ul style="list-style-type: none"> • The Internet of Things (IoT): The IoT refers to the interconnected network of physical devices, vehicles, home appliances, and other items that are embedded with electronics, software, and sensors. IoT devices are increasingly being used in homes to control and monitor energy usage. • Energy Management Systems (EMS): An EMS is a system that monitors and manages energy usage in buildings and homes. Smart home energy management systems are similar to traditional EMS in that they monitor energy usage, but they also use machine learning algorithms and other advanced technologies to optimize energy consumption and reduce costs. • Smart Grid: A smart grid is an advanced electricity network that uses digital technologies to manage and optimize energy generation, distribution, and consumption. Smart home energy management systems can be integrated with the smart grid to provide real-time energy consumption data and improve energy efficiency. • Building Energy Management Systems (BEMS): BEMS are systems that monitor and control energy usage in commercial and industrial buildings. Many of the same principles and technologies used in BEMS can also be applied to smart home energy management systems.

	<p>These sites offer insightful knowledge and data about the most recent developments in smart energy Guards and significant topics such as energy management and the Internet of Things.</p> <p>By utilizing these resources, the smart energy Guard project will use current technology and best practices to create a high-quality and efficient solution.</p>
Creating a Prototype	<p>Creating a prototype for a smart energy Guard usually entails several important processes, such as:</p> <ol style="list-style-type: none"> i. Identifying the system's needs, including what it must do and how it must do it, is the first stage. This knowledge will have an impact on the system's design. ii. Choose hardware and software components - Choose the hardware and software that will be used in the system. Software frameworks, communication modules, microcontrollers, sensors, and actuators may be used in this. iii. Design user interfaces - Design user interfaces that are straightforward to use. This might be a mobile app, a web interface, or a combination of the two. iv. Design the system architecture - Specify how the system will be set up overall and how its components will communicate with one another. It is possible to incorporate a model or diagram that shows the relationships between the different components. v. Create the prototype: Create a functioning system prototype using the hardware, software, and system architecture. Soldering, programming, and testing can be required. vi. Test and improve the prototype. Test and improve the prototype as needed. This might entail gathering user input, assessing performance, and making design adjustments.

	<p>vii. Iterate as required: Once the prototype satisfies the standards and is prepared for the market, repeat these procedures as many times as necessary.</p> <p>These methods will be used to create a workable prototype of a smart energy Guard, which can then be used to test the design, show the system's functionality, and draw funding or partners for production.</p>
Market	<p>A smart energy Guard potential customer base is expected to consist of:</p> <ul style="list-style-type: none"> ✓ Residential consumers: This group consists of house owners who want to lower their energy costs. ✓ Commercial and industrial building owners: This category includes companies, universities, and other entities that run large buildings and are aiming to save costs while enhancing energy efficiency. ✓ Energy service companies (ESCOs): These are businesses that offer residential and commercial clients energy services and solutions. As part of their range of energy services, they could consider offering a smart home energy management system. ✓ Smart home technology providers: Companies that produce and market smart home goods and services, such as smart home automation systems, surveillance systems, and lighting control systems, fall under this category.

Advantages of a Smart Home Energy System:

- a. **Increased Energy Efficiency:** Smart Energy Guard can help you monitor and control your energy usage, leading to increased energy efficiency and lower utility bills.
- b. **Remote Monitoring and Control:** With a smart energy Guard, you can monitor and control your energy usage from anywhere using a smartphone app or web portal.

- c. **Increased Convenience:** You can automate various aspects of your home's energy usage, such as lighting, temperature, and appliance usage, making your home more convenient to live in.
- d. **Improved Home Security:** Smart energy Guard often include security features such as remote monitoring and can alert you to any unusual activity in your home.
- e. **Better Energy Management:** You can set energy usage goals and monitor your progress, making it easier to manage your energy usage effectively.

Disadvantages of a Smart Home Energy System:

- 1. **Complexity:** the system may be difficult to set up and may require professional installation.
- 2. **Technical Difficulties:** Smart home energy systems rely on technology, and problems with that technology might cause systems to fail.
- 3. **Privacy Concerns:** Some users might be concerned about the safety of the information that Smart Energy Guard collects. Machine learning algorithms collect data for prediction and recommendations.
- 4. **Limited Interoperability:** Because the smart energy guard mobile app can only be used on iOS and Android smartphones, not all phones are compatible with it.

WORK BREAKDOWN STRUCTURE

	Work Package		WBS Dictionary
1	Ideation		
	1.1 Market Research		
		1.1.1 Research Analysis	This refers to activities related to conducting research and analyzing project-related data, such as market research or competitor analysis.

		1.1.2 Customer Interviews	This refers to the process of gathering information from customers or potential customers to better understand their needs and wants.
2 Project Management			
	2.1 Project Plan Development		
		2.1.1 Develop a Project Charter	This involves creating a document that outlines the project's purpose, goals, and scope, as well as the roles and responsibilities of team members.
		2.1.2 Scope Statement	This document defines the project's boundaries and what is included and excluded in the project deliverables.
		2.1.3 Develop a Communication Plan	This refers to developing a plan for how communication will be managed throughout the project, including who will be responsible for communicating with stakeholders and how often.
		2.1.4 Develop Success Metrics	This involves identifying key performance indicators (KPIs) used to measure the project's success.
		2.1.5 Develop Schedule	This refers to creating a detailed timeline for the project, including milestones and deadlines.
		2.1.6 Develop Resource Management	This involves identifying the resources needed for the project, such as people, equipment, and materials, and developing a plan for how these resources will be managed.

		2.1.7 Develop Budget Plan	This involves developing a budget for the project, including an estimate of all costs and how the budget will be managed throughout the project.
		2.1.8 Develop Staffing Plan	This refers to identifying the people needed for the project, including their roles and responsibilities, and developing a plan for how they will be managed.
	2.2 Meetings	2.2.1 Organize Kickoff meeting.	This involves gathering all project stakeholders and team members to officially launch the project and set expectations.
		2.2.2 Status Meeting	These are regular meetings where team members and stakeholders can discuss the status of the project and any outstanding issues.

3	Product Requirements	3.1 Energy Sensor Architecture Requirements (Hardware)		
		3.1.1 Draft Energy Sensor Requirements		This involves creating a detailed list of requirements for the energy sensors that will be developed as part of the project.
		3.1.2 Energy Sensor Requirement Approval		This involves validating the energy sensor requirements from relevant stakeholders before development begins.
		3.2 Mobile App Architecture Requirements (Software)		
		3.2.1 Draft Mobile App Requirements		This involves creating a detailed list of requirements for the mobile application that will be developed as part of the project
		3.2.2 Mobile App Requirements Approval		This involves validating mobile application requirements from relevant stakeholders before development begins.
		3.3 User Documentation		
		3.3.1 Draft User Documentation		This includes creating documentation to help users understand how to use the energy sensor and mobile application.
		3.3.2 Approval of User Documentation		This includes obtaining approval of user documentation from relevant stakeholders before finalizing it.
		3.4 Training Program Materials	3.4.1 Draft Initial Training Requirements	This includes developing a plan to train users on how to use the energy sensor and mobile application.

		3.4.2 Review & Approve Training Requirements	This includes obtaining approval from relevant stakeholders before implementing a training program.
		3.4.3 Run a trial course delivery	This involves testing the training course to make sure it works.
		3.4.4 Update & Finalize training materials	This includes feedback from pilot course delivery and finalizing learning materials.
4 Detail Software Design	4.1 Create UI Designs		
		4.1.1 Low-fidelity wireframe	This refers to basic, low-detail sketches of the energy sensor and mobile app user interface
		4.1.2 Mid-fidelity wireframe	This refers to a more detailed version of the user interface with more specific information and functionality.
		4.1.3 High-fidelity wireframe	This refers to a highly detailed version of the user interface with specific design elements and functionality.
		4.1.4 Review UI Design	This includes reviewing the UI framework and design of the energy sensor and mobile app.
		4.1.5 Approve UI Design	This involves getting approval from relevant stakeholders for the final design of the UI.
System Construction			

	4.2 Development	4.2.1 Configure Software	This work package includes configuring the software that will be used to implement the energy data site for all devices. This includes installing the necessary software components, configuring settings and parameters, and making the software ready for development
		4.2.2 Create Machine Learning Algorithm	This work package involves building a machine learning algorithm that will be used to analyze the energy data collected by the site. This includes researching and selecting suitable algorithms, designing, and developing algorithms, and testing their accuracy and performance.
		4.2.3 Coding	This work package involves writing the code for the website and its components. This includes architectural design, code development, testing and debugging, and providing code maintenance and extensibility.
		4.2.4 Integration of an energy data website for all electrical appliances.	This work package includes the integration of various components of the Energy Data Site such as user interface, database, machine learning algorithms and other functionalities. This includes testing integrations and ensuring the website is working properly This work package involves
		4.2.5 Unit Testing	testing each component of the website individually to ensure that it works as intended. This includes developing test cases, executing tests, and resolving any issues found.

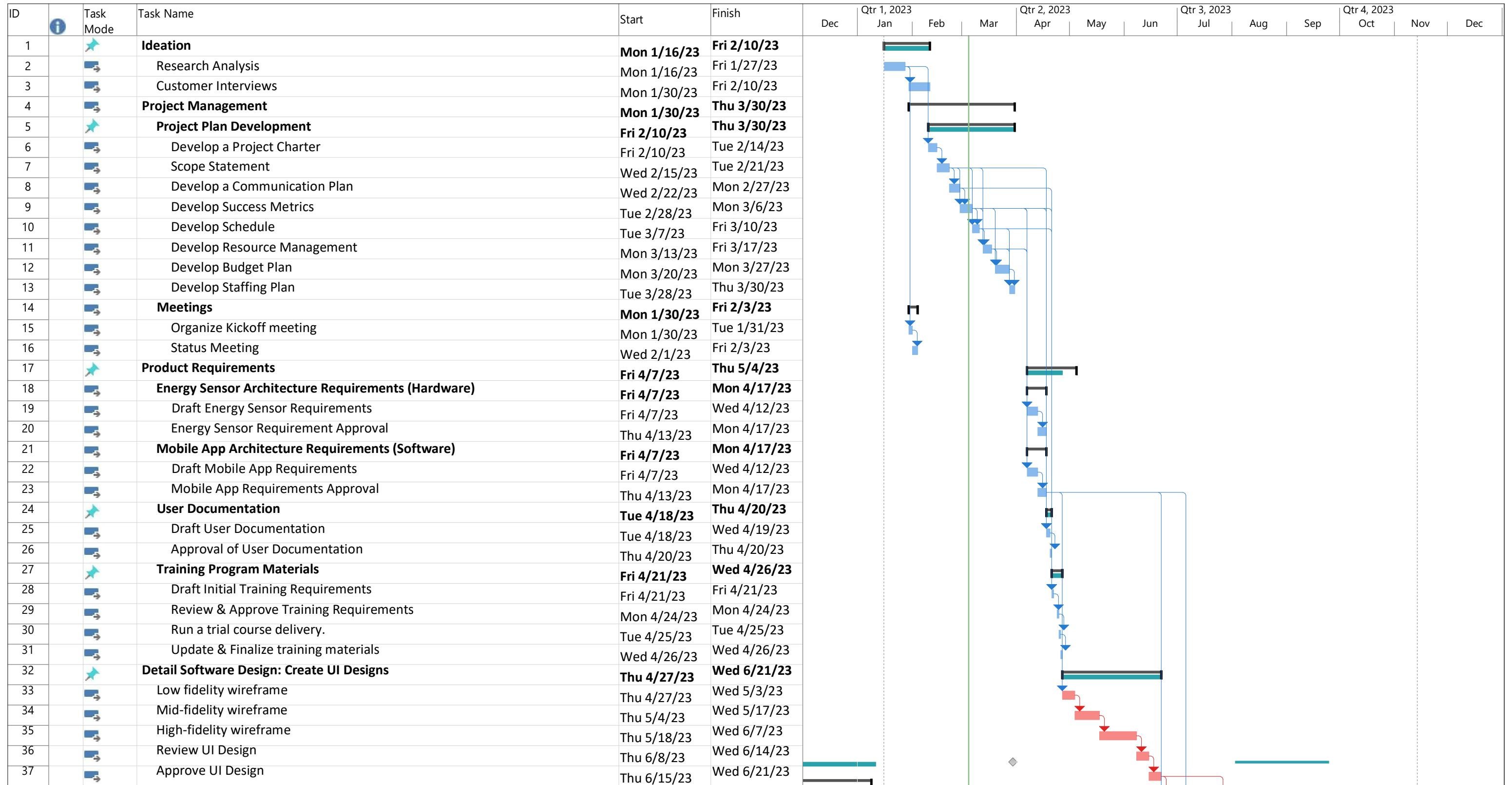
		4.2.6 Build a Prototype	This work package involves creating a functional prototype of the website that users can test and evaluate
5 Integration & Test			
	5.1 System Test Plan	5.1.1 Internal Testing	This work package involves testing the site within the development team to ensure it is working properly and meets requirements. This includes conducting various types of tests such as system tests, regression tests, and usability test
		5.1.2 Integration Testing	This work package includes testing the integration of the site with other systems and components it interacts with. This includes testing the site for compatibility, performance and reliability when integrating with external systems.
		5.1.3 Acceptance Testing	This work package involves testing the website with actual end users to ensure it meets their needs and expectations. This includes developing test scenarios, executing tests and making any necessary improvements based on user feedback.
	5.2 System Results		
	5.3 Implementation and Future Support		

Work Breakdown for the Implementation of Smart Energy Guards



DELIVERABLE 2

A.



Project: Gantt Chart Project1

03/04/2023

Date: Sun 3/5/23

Task

Summary

Inactive Task

Split

Project Summary

Inactive Milestone

Milestone

Inactive Summary

Smart Energy Guard Project

P&CM Innovation Project

Manual Task
Duration-only

Manual
Summary Rollup

Manual
Summary

Start-only

Finish-only

External Tasks

External Milestone

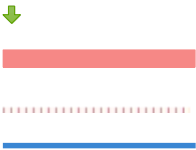
Manual Progress

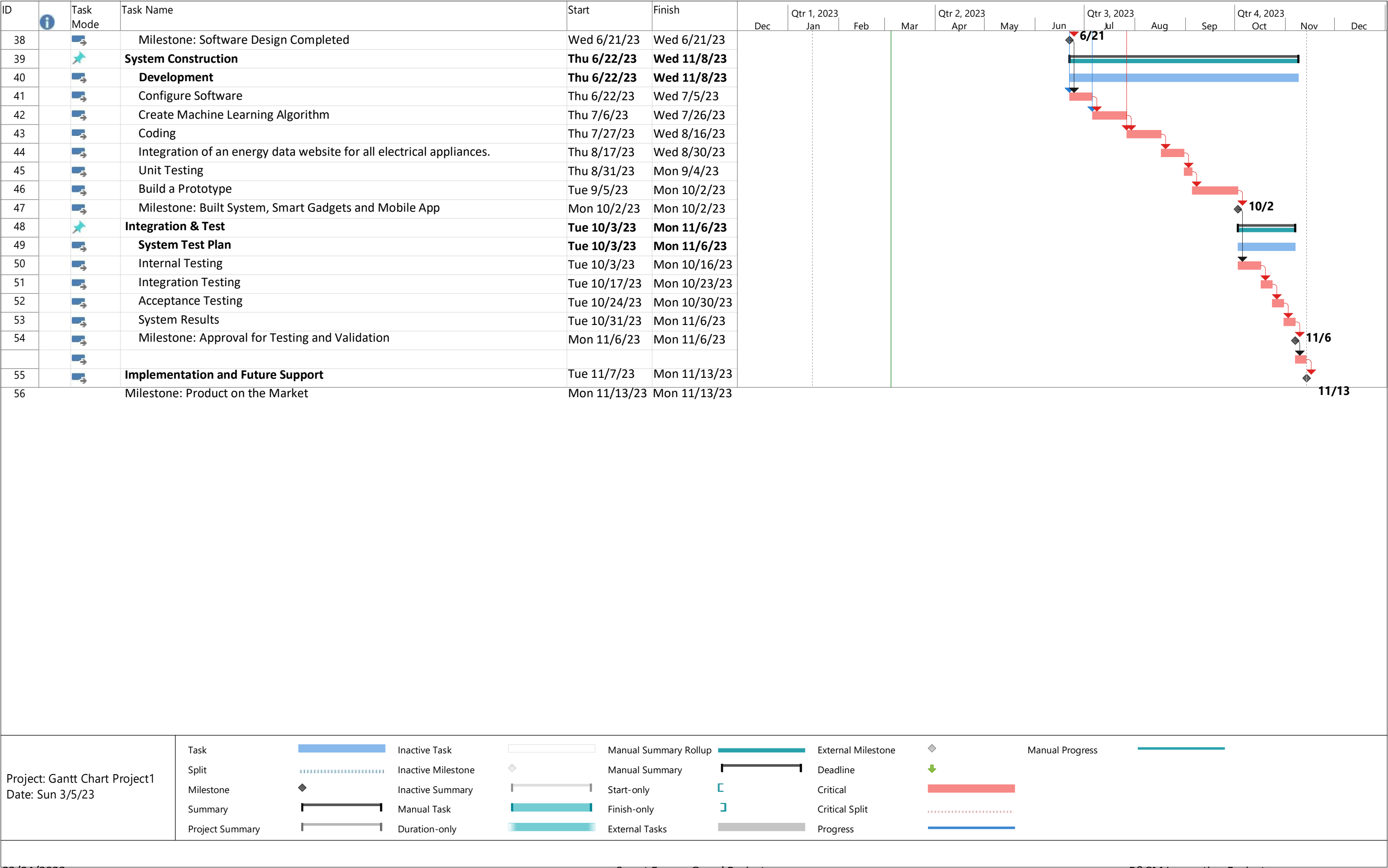
Deadline

Critical

Critical Split

Progress





03/04/2023

Smart Energy Guard Project

P&CM Innovation Project

The organization of a Gantt chart involves the sequence and logic of the activities, as well as the links between them. Each activity in a Gantt chart is represented by a horizontal bar, with its length representing the duration of the activity. The activities are listed on the left-hand side of the chart, while the time scale is shown along the top or bottom of the chart. The sequence of the activities is usually shown in a vertical order, with each activity starting only after the previous one is completed. This represents the dependencies between the activities and ensures that the project is completed in a logical order.

The links or arrows between the activities in a Gantt chart represent the relationships or dependencies between them. There are four types of dependencies:

1. Finish-to-Start (FS): Activity A must be finished before activity B can start.
2. Start-to-Start (SS): Activity A must start before activity B can start.
3. Finish-to-Finish (FF): Activity A must finish before activity B can finish.
4. Start-to-Finish (SF): Activity A must start before activity B can finish.

The links between the activities are represented by arrows, with the tail of the arrow indicating the predecessor activity and the head of the arrow indicating the successor activity. The links help to identify the critical path of the project, which is the sequence of activities that must be completed on time to ensure the project is completed on schedule.

In summary, the organization of a Gantt chart involves the sequence of the activities, the logical links between them, and the use of arrows to represent these links. This helps to ensure that the project is completed in a logical order and on schedule.

With regards to the Gantt Chart for the Energy Smart Guard project, the ID number on the far right of the chart is replaced with activity numbers for the purposes of describing the sequence and logic among the arrows and links among all activities in the chart:

Activity 2 "Research Analysis" is the starting point of the project and has no predecessor. It has two successor activities, i.e., Activity 3 "Customer Interviews" and Activity 6 "Develop a Project Charter," both of which have FS dependencies with Activity 2.

Activity 6 "Develop a Project Charter" must be finished before Activity 7 "Scope Statement" can start. Activity 7 has two predecessor activities, i.e., Activity 6 with an FS dependency and Activity 15 "Organize Kickoff" with an SS dependency.

Activity 8 "Develop a Communication Plan" and Activity 25 "Draft User Documentation" both have FS dependencies with Activity 7 "Scope Statement." Activity 9 "Develop Success Metrics" has an FS dependency with Activity 8 and Activity 10 "Develop Schedule" has an FS dependency with Activity 9. Similarly, Activity 11 "Develop Resource Management" has an FS dependency with Activity 7, 9, and 10.

Activity 12 "Develop Budget Plan" has an FS dependency with Activity 9 and 11. Activity 13 "Develop Staffing Plan" has an FS dependency with Activity 10, 11, and 12.

Activity 15 "Organize Kickoff" has an SS dependency with Activity 16 "Status Meeting."

Activity 19 "Draft Energy Sensor Requirements" has FS dependencies with Activity 11 and 9. Activity 20 "Energy Sensor Requirements Approval" has an FS dependency with Activity 19. Similarly, Activity 22 "Draft Mobile App Requirements" has FS dependencies with Activity 11 and 9.

Activity 26 "Approval of User Documentation" has an FS dependency with Activity 25.

Activity 28 "Draft Initial Training Requirements" has FS dependencies with Activity 8, 9, and 10. Activity 29 "Review & Approve Training Requirements" has an FS dependency with Activity 28, and Activity 30 "Run a trial course delivery" has an FS dependency with Activity 29.

Activity 31 "Update & Finalize training materials" has an FS dependency with Activity 30.

Activity 33 "Low-fidelity wireframe" has an SS dependency with Activity 23. Activity 34 "Mid-fidelity wireframe" has an FS dependency with Activity 33. Activity 35 "High-fidelity wireframe" has an FS dependency with Activity 34, and Activity 36 "Review UI Design" has an FS dependency with Activity 35.

Activity 37 "Approve UI Design" has an FS dependency with Activity 36. Activity 38 "Milestone: Software Design Completed" has an FS dependency with Activity 37.

Activity 41 "Configure Software" has FS dependencies with Activity 23 and 38. Activity 42 "Create Machine Learning Algorithm" has FS dependencies with Activity 23 and 41.

Activity 43 "Coding" has FS dependencies with Activity 37 and 42. Activity 44 "Integration of an energy data website for all electrical appliances" has an FS dependency with Activity 43.

Activity 43 (Coding) is dependent on Activity 37 (Approve UI Design) and Activity 42 (Create Machine Learning Algorithm).

Activity 44 (Integration of an energy data website for all electrical appliances) is dependent on Activity 43 (Coding).

Activity 45 (Unit Testing) is dependent on Activity 44 (Integration of an energy data website for all electrical appliances).

Activity 46 (Build a Prototype) is dependent on Activity 45 (Unit Testing).

Activity 47 (Milestone: Built System, Smart Gadgets and Mobile App) is dependent on Activity 46 (Build a Prototype).

Activity 50 (Internal Testing) is dependent on Activity 47 (Milestone: Built System, Smart Gadgets and Mobile App).

Activity 51 (Integration Testing) is dependent on Activity 50 (Internal Testing).

Activity 52 (Acceptance Testing) is dependent on Activity 51 (Integration Testing).

Activity 53 (System Results) is dependent on Activity 52 (Acceptance Testing).

Activity 54 (Milestone: Approval for Testing and Validation) is dependent on Activity 53 (System Results).

Activity 55 (Implementation and Future Support) is dependent on Activity 54 (Milestone: Approval for Testing and Validation).

Activity 56 (Milestone: Product on the Market) is dependent on Activity 55 (Implementation and Future Support).

The following are activities on the critical path and the significances of the critical path:

Activities on the Critical Path:

- 1. Low-fidelity wireframe
- 2. Mid-fidelity wireframe
- 3. High-fidelity wireframe
- 4. Review UI Design
- 5. Approve UI Design
- 6. Configure Software
- 7. Create Machine Learning Algorithm
- 8. Coding
- 9. Integration of an energy data website for all electrical appliances.
- 10. Unit Testing
- 11. Build a prototype
- 12. Internal Testing

- 13.Acceptance Testing
- 14.System Results
- 15.Implementation and Future Support

The significances of the critical path for managing the energy smart guard project are as follows:

1. Identifying the most important activities: The critical path helps you identify the most important activities in the project, and these activities must be completed on time for the project to be successful. By focusing your attention and resources on the critical path, you can ensure that the project stays on track and meets its deadlines.
2. Predicting project completion: The critical path provides an estimate of the minimum time required to complete the project. This helps you plan and allocate resources more effectively, and also enables you to communicate a more accurate timeline to stakeholders.
3. Managing risk: Because the critical path is the sequence of activities that is most likely to cause delays, it's important to identify potential risks and develop contingency plans to mitigate those risks. By proactively managing risk, you can minimize the chances of delays and keep the project on track.
4. Prioritizing resources: The critical path helps you prioritize resources, such as people, time, and budget, to ensure that the most important activities are given the necessary attention and resources. This can help you allocate resources more effectively and ensure that the project is completed on time and within budget.

Overall, understanding the critical path is essential for managing the energy smart guard project effectively. By identifying the most important activities, predicting project completion, managing risk, and prioritizing resources, you can ensure that the project stays on track and meets its goals.

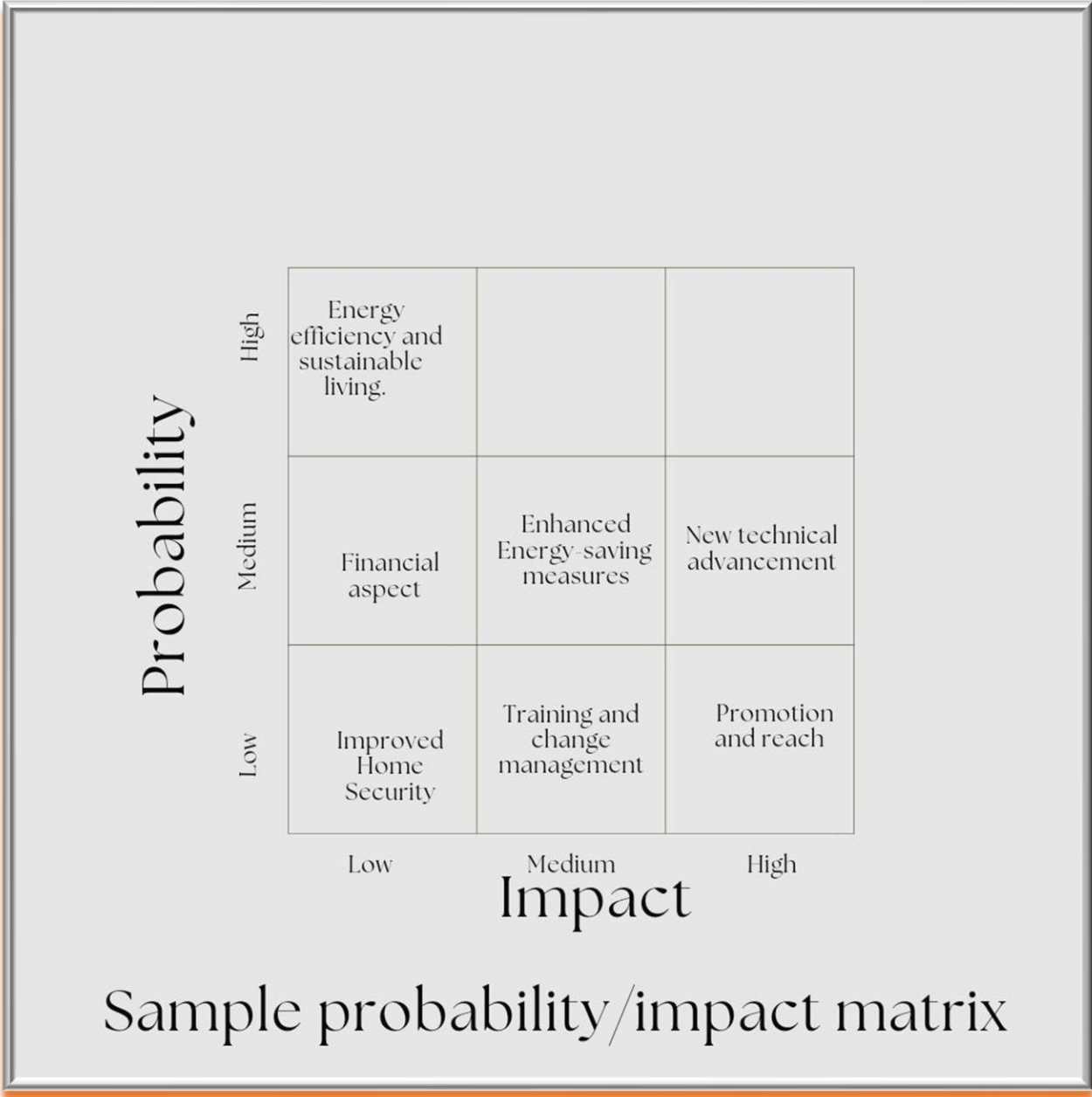
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(1)

No	Rank	Risk	Description	Category	Root Cause	Triggers	Potential responses	Risk owner	Probability	Impact
1	R1	Enhanced Energy-saving measures	This energy saving measures increases because individuals likes to change with technical advancements for energy saving and this helps to reduce the electricity bill .	Process risk	Its new to the market, mostly to the people of higher age groups	Consumers needs training since not everyone is proficient user of mobile applications.	Training the individuals and checking with users for any difficulties to be addressed	Training and product manager	The scenario of occurrence is moderate because it depends on individual and their background.	Impact is medium as few people like to use and promote new technologies.
2	R2	Energy efficiency and sustainable living.	To promote sustainable living with using energy saving techniques of automation which helps for effective life.	Market risk	Since people like to have sustainable living with reduced investment	All the consumers might not like to change or to adopt to change where individuals may give up	Taking regular feedback and asking to confirm if they need any support by quick customer success team.	Business partners	The probability to occur this risk is Low since we can promote for better living through various ways.	Its impact on project is high since this is the main core area of our department.
3	R3	Improved Home Security	When we g out to receive notification and giving caution	Technology risk	Before few years we don't have this feature and	This might not function because of network	One should make sure that they are up to date with latest	Security officer and Consumer	The scenario of this type of risk is low since, every device has their own	Impact might be less to moderate because this event occurs in worst case

			on higher temperature or risk activities about appliances this helps as a higher protective layer to all appliances.		many hazardous situations happens and cannot suspect what's wrong easily, which can be done through this.	fluctuations or sometimes due to mobile or system issues of unexpected situations.	advancements in technology and also being cautious when living the premises of network zone, since this is completely out of business reach		security and mostly people are connected to network throughout the day.	scenarios because of individuals device or system
4	R4	New technical advancement	Since need of consumers changes continuously and competitors also come up with better features business should update to meet individuals needs	People risk	As the competitors offers better features organization need to be strong technically	Demand and need increase continuously and this makes organizations to work on development continuously.	Being able to take strategic responses for development and to be technically strong.	Business, technical, and strategic officer.	The probability of occurrence is very high since competitors always look for opportunity	It creates very medium impact since business is in growth phase and we have technical team for continuous development if needed.
5	R5	Financial aspect	Allocating budget to various departments and planning buffer amount to mitigate or to cope up with loss in investments if project don't work as planned	Financial risk	This occurs if there is any developments or losses in any particular project	This kind of situation occurs when the investment doesn't give expected returns, or if budget is not planned as needed.	Planning well to perform and allocate funds well along with taking calculative risks than a trial-and-error method	Financial officer or manager.	The probability of occurrence is low as budget is allocated strategically	Financial department plays a vital role, so it has medium to higher impact.
6	R6	Training and change management	As the development in strategies and technology increases, its need for the employees to change where training plays a major role	Structure or process risk	Major reason for this continuous development in smart home niche and employees are not willing to change or to adopt to new processes	Employee adoption to new changes and consumers need for better features since they look for better opportunities.	To overcome this risk, we hired a training manager who mainly works on making employees to understand in better way for change and its importance. Where business can help to satisfy end customer	Training consultant and change manager	We can expect this to happen frequently, so its probability of occurrence is moderate	Since this is not a huge continuous change and it happens gradually and step by step, so its impact is low.
7	R7	Promotion and reach	Our products USP is while buying electronic gadgets it gives suggestions on energy consumption and how to choose a	Market risk	Main reason for this event is its new to market and gaining trust is difficult since this approach is new to market,	Gaining consumers trust and their satisfaction with product plays a major role.	We have a well dedicated team to get proper reach and pilot study and trial run has showed less errors and we	Marketing officer	The probability of happening is high since its new to market	Impact creation is certainly less as our product is having high benefits and advertisements is going to help us for returns.

			better product, for this we need good marketing and mainly promotion team		and we should create impact so being strong in all departments is crucial.		modified the found errors.			
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Risk event	Response strategy	Contingency plan	Explanation and justification (that is, why “Contingency plan” you identified on the left can reach your claimed “response strategy”)
<i>Update? crash of application.</i>	<i>Avoidance</i>	<i>To give notifications regarding the plan</i>	<i>The update or crash of system can be handled by making the customers aware of update and notifying them regarding the update or issue if needed and in this way we can avoid risk to the fullest.</i>
<i>Compatible equipment's with system/ Supportive operating system</i>	<i>Escalation</i>	<i>Giving options and compatible device check for future transparency</i>	<i>Technology and product development's evaluations is a continuous process where organization need to accept and develop as per need and growth so here we provide system check in beforehand to perform and to make sure our platform is going to give support, or escalating by informing that its not compatible and will comeback with new response soon after a talk with higher hierarchy.</i>
<i>Team collaboration on change</i>	<i>Acceptance</i>	<i>Pre training methods</i>	<i>Resources should accept the change and should share opinions up to what extent they can agree and what kind of improvements they are looking for and this training helps them to be prepared in advance.</i>
<i>Security</i>	<i>Mitigation</i>	<i>Having quality resource and using recent technologies</i>	<i>Security threats occurs continuously as the organization grows and this is an opportunity for continuous development, however having a quality resource helps to increase security so that we can mitigate threat and increase security and support for smooth operations.</i>
<i>Consumer/ customer satisfaction</i>	<i>Transference</i>	<i>Having outsourcing team</i>	<i>Every organizations major pillar is consumer base and along with our support we will collaborate with outsourcing agency to know about product performance and it's a risk to sell and relax, so this third party transformation helps to be safe for retention of previous customers</i>
<i>Finance, marketing and development</i>	<i>Mitigation</i>	<i>Having proper resources</i>	<i>Finance and marketing department plays a major role from start to end of product development and for end customer use so having proper resources helps to mitigate risk and ao9ng with this testing and validation at regular intervals helps for the growth of organization.</i>

Lessons gained by each person on the team in this project.

Name of Team Member	Lessons Learnt
Tina Charles Mbakwe-Obi	<p>Through this course, I have a comprehensive understanding of project management. Not only did it give me insight into idea generation and processing, but it also highlighted the rigorous project management process, from project charter to approval, testing and execution. However, working in a team of seven presented challenges as only three members were active enough to complete the project. As the leader of the fourth group, I considered reporting the absence of my group members.</p> <p>The Big 5 personality test gave me insight into how to work with different people, but it proved difficult to work with people who didn't communicate or were not committed to the project. These people often make excuses during submission, causing delays and a lack of progress.</p> <p>The most important thing I learned from this course is to never fully delegate the completion of a project to a team member.</p> <p>As a project manager, projects must be continuously monitored and evaluated to reduce the impact of human irresponsibility on tasks and prevent the risk of project failure. I</p>
Edward Tetteh	<p>learned about the following topics and how important they are for project management in this current dispensation:</p> <p>Agile Methodology:</p> <p>I learned that Agile methodology is a flexible and iterative approach to project management that emphasizes collaboration, customer satisfaction, and continuous improvement. Furthermore, agile teams work in short sprints, or iterations, delivering small, working pieces of the product at a time, which enables rapid feedback and adaptation. Finally, Agile encourages frequent communication and collaboration among team members, as well as with the customer, to ensure that the project stays on track and meets the customer's needs.</p> <p>Software Development:</p> <p>I also learned that software development is the process of designing, coding, testing, and maintaining software. In addition, effective software development requires a well-defined software development life cycle (SDLC) that includes planning, requirements gathering, design, implementation, testing, deployment, and maintenance. Software development projects require careful management of resources, including people, time, and budget. Finally, to ensure quality software development, it's essential to incorporate testing and quality assurance processes throughout the SDLC.</p> <p>Working with a Difficult and Culturally Diverse Team:</p> <p>I learned that working with a diverse team can bring a wealth of benefits, including varied perspectives, experiences, and ideas. However, working with a culturally diverse team also requires sensitivity and awareness of cultural differences and potential communication barriers. I also learned that when working with a difficult team member, it's important to identify the root cause of the problem and address it proactively. Effective communication and collaboration are also critical when working with a difficult or diverse team, as misunderstandings can arise due to language or cultural differences; hence, it is imperative that a project manager be adept at managing conflict, building consensus, and fostering a positive team environment.</p>
Thallada Nagaraju	<p>Learnings from the project:</p> <p>How to work effectively with small and large groups</p> <p>I've got an idea of how to present it to investors and how to think based on current-day situations.</p> <p>Coming to project details, I learned about how the project works from end to start and how to apply theoretical knowledge to practical work.</p> <p>The importance of WBS, charts, and how to know risk events, ways to overcome them, and how to plan to reduce the impact and probability.</p>

	Overall, it's a great learning experience that I can take into my future career; however, this also helps me to do well with coming changes to optimize the productivity of any business or organization.
Chiluka Trisha	<p>The project taught me about resources, costs, communication, risk, procurement, and stakeholders—all of which are critical in any business.</p> <p>Learn about how groups function and the benefits of working in groups for better productivity and processing.</p> <p>How to manage and act based on change.</p> <p>Topics covered help me in my future job; this is a practical experience on how to handle a team and how to contribute when in need.</p>
Anandas Bharath Thej	<p>This project made me believe that with the use of technology, everything can be better.</p> <p>Got to know about smart home energy safeguard applications. An energy conservation system will be built as part of the project, along with its connectivity with other smart devices, the usage of machine learning algorithms, and the development of a mobile application. To guarantee the system's usability and dependability.</p>
Jalla Yogesh	<p>Through this project, I learned that technology could make better use of everything.</p> <p>I learned about the smart home energy protection program. As part of the project, an energy-saving system will be created along with its connectivity to other smart devices, the use of machine learning algorithms, and the creation of a smartphone application. to ensure how much energy will be used by each appliance in the home and how to reduce overconsumption of energy by the home appliances.</p>
Bukkacherla Bhanuprakash Reddy	<p>I learned how to create a Gantt chart and understand how crucial it is to the success of a project.</p> <p>I also learned how to work with people from all walks of life on a project to achieve stated objectives.</p> <p>I have learned more about how software is developed, from the ideation stage to the development stage.</p>

References

- Work Breakdown Structure Examples (Software, Construction). (2021, June 11). In IT Project Managers. <https://pmbasics101.com/work-breakdown-structure-guide/>
- US Now Leads in Energy Waste. (2018, July 7). In Energy Central. <https://energycentral.com/c/ec/us-now-leads-energy-waste>
- How to Make a Gantt Chart in Microsoft Project. (2022, February 14). Gantt Chart GanttPRO Blog. <https://blog.ganttpro.com/en/how-to-make-a-gantt-chart-in-ms-project/>
- How to make Gantt Chart using MS Project 2016. (2016, December 26). YouTube. <https://www.youtube.com/watch?v=zgWePRrWN-Q>
- Home of the future: Climate-friendly, electrified and closer than ever. (2023, February 6). In Canary Media. <https://www.canarymedia.com/articles/electrification/home-of-the-future-climate-friendly-electrified-and-closer-than-ever>
- Kim, J. (2022, February 26). Your Guide to the Smart Grid Interoperability Panel (SGIP). In Green Building Elements. <https://greenbuildingelements.com/smart-grid-interoperability-panel/>
- UNIT TESTING VS INTEGRATION TESTING - EXPLAINED IN UNDER 5 MINUTES. (2022, August 18). In YouTube. <https://www.youtube.com/watch?v=pf6Zhm-PDfQ>
- National Institute of Standards and Technology. (2023, February 8). In NIST. <https://www.nist.gov/>
- Internet of things - Wikipedia. (2003, March 2). In Internet of things - Wikipedia. https://en.wikipedia.org/wiki/Internet_of_things
- Energy management system - Wikipedia. (2021, October 27). In Energy management system - Wikipedia. https://en.wikipedia.org/wiki/Energy_management_system
- Smart - Wikipedia. (n.d.). In Smart - Wikipedia. <https://en.wikipedia.org/wiki/Smart>
- Neu, A. (2022, July 9). What Is WBS In Project Management? | UMBC Training Centers. In UMBC Training Centers. <https://www.umbctraining.com/what-is-wbs-work-breakdown-structure/>
- iOS and Android Application Architecture. (2020, March 19). In YouTube. <https://www.youtube.com/watch?v=H3Ekg-fkmf0>
- What is User Documentation? (2021, September 28). In YouTube. <https://www.youtube.com/watch?v=bYxbwsGG3Zo>
- How to Write a Project Plan [PROJECT PLANNING STEPS THAT WORK]. (2020, July 1). In YouTube. https://www.youtube.com/watch?v=Lt9_4vzPdlo