SMART SOLAR BASED CBT EXAMINATION MONITORING

BY

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A PROJECTED SUBMITTED TO THE DEPARTMENT OF COMPUTER SCIENCE

INSTITUTE OF INFORMATION, COMMUNICATION AND TECHNOLOGY KWARA STATE POLYTECHNIC, ILORIN

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CERTIFICATION

This is to certify that this project written and submitted by **NOBLE GANIU AYINLA** with matriculation number **HND/23/COM/FT/0316** to the department of **COMPUTER SCIENCE TECHNOLOGY,** Kwara state Polytechnic, Ilorin.

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DEDICATION

This project is dedicated to Almighty Allah for his immeasurable love and faithfulness upon my life in which his mercies is everlasting. This project is also dedicated to my family for their love and caring.

ACKNOWLEDGEMENT

My sincere thanks go to Almighty Allah in heaven forgiving me life and inspiration to live up to this time and making my program a successful one

I am grateful to my able and capable supervisor, **Dr. AGBOOLA O.M.,** for all the impeccable analysis, corrections and modification towards the attainment of the success of my project, also my profound gratitude goes to **Dr. OYEDEPO (HOD),** and all the lecturers in the department of computer science who have impacted knowledge upon me. My utmost gratitude goes to my parents **MR. & MRS. NOBLE** for their unquantifiable moral and financial support given to me from the point of birth to this time. I pray that they will have live to eat the fruit of their labor.

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CHAPTER ONE

1.1 INTRODUCTION

Traditional examination monitoring method rely on manual supervision which can be prone to human error, bias, and logistical challenges. Additional, the environment impact of traditional examination infrastructure, such as energy consumption and waste generation, cannot be ignored. To address these challenges, this product proposes the development of a smart solar based CBT examination monitor-in system. Leveraging power of the solar energy and advance data analytics. This system offers a creative solution that combines renewable energy and cutting-edge technology to ensure secure and efficient computer-based tests. With the increasing reliance on CBTs in educational assessments, professional certifications, and recruitment processes, this system ensures uninterrupted power supply and effective monitoring. This system has the potential to revolutionize the examination monitoring landscape, ensuring a more reliable transparent and environmentally friendly. Computer based testing has become as essential tools for assessment and evaluation, while we are ensuring the security, integrity and sustainability of CBT examination remains a pressing concern. In such things most use of electrical power needs in monitoring the consumption of power including the performance and durability of the components being used to distribute power. With this comes the ideal of a smart solar based CBT examination monitoring with the design and aim to truck power consumption, power failure, and also to monitor the student during examination processing including the output and remaining contents of batteries.

1.2 STATEMENT OF THE PROBLEMS

While most institution use two forms of writing exams which are the traditional paper-based and computer based test examination, but this institution used an individual with higher authority to supervise them, but this individual are human being with limitation and the supervision is only their line of sight (Traditional paper-based exam) and also in the computer based test (CBT) examinations can which also have a problem of unstable power supply. This cause people to think Traditional paper-based examination is the best.

1.3 AIMS AND OBJECTIVES

The aims of this research work is to design solar power CBT examination monitoring system.

The objective sets of this research include following :

I. Installation of solar panel surveillance camera and inverter for the monitoring of the CBT examination center.

II. Connection of installed cameras with the batteries.

1.4 SIGNIFICANCE OF THE STUDY

The advantages of the research are beneficiary to current examination management Systems (EMS). The advancement in technology of the educations is warranty the idea of this project. The advantages of this research in technology of the educations event cheating, the improvement efficiency of the examination, the sustain area in scuttle electricity which can also be used of the conduction of the examination.

The benefits of this research is also the school authority, student and to the environment. The benefit of this research are: Reduced costs of conducting exam, Increased accuracy of grading and scoring, Real-time monitoring of student in the examination hall, There education of environmental hazards.

1.5 SCOPE OF THE STUDY

This research will be Kwara state polytechnic department of computer science computer-based test centre, Ilorin, Kwara state.

1.6 ORGANIZATION ATION OF STUDY

The research works has five chapters.

In Chapter one, the general Introduction, statement of problems, aim and objectives, significance of study, scope of the study, organization of study and the definitions of terms used. The second chapter consists of the literature review of past related works and review of general text. The third chapter contain the research methodology used.

The fourth chapter contains the result of the research and also the analysis of the research. The fifth chapter which is also the last chapter, will be the conclusion of this research.

1.7 DEFINITIONS OF TERMS USED

The important terms used in the research are:

i. Examination: is a formal assess mentor evaluation of a person's knowledge, skills or abilities in a particular subject or field. It is a way to measure a person's understandings, proficiency or competence in a specific area.

ii. Examination Monitoring System (EMS): is a technology-based solution designed to supervise and monitor candidates during online or computer-based exams. The primary goal of an EMS is to prevent cheating, ensure exam Integrity.

iii. Examination system: is a structured process for assessing a person's knowledge, skills, or abilities through a series of tests, quizzes or evaluations

iv. Computer-Based Test (CBT): is a type of assessment where a computers are used to administer and score a test.

v. Solar: solar refers to energy generated from the sun's rays. The terms "solar comes from the Latin word" sol" meaning sun. It is a set up that uses solar panels to convert sunlight into electrical energy, providing power to various devices, machines, entire buildings.

vi. Solar Panels: also known as Photo voltaic (PV) panels are devices electricity. They are made from semiconducting materials, typically silicon, which release electrons when exposed to sunlight. These electrons flow through an electrical circuit, generating electricity.

vii. Internet of Things (IOT): refers to the network of physical devices, vehicles, home appliances, other items embedded with sensors, software, and connectivity, allowing them to collect and exchanged at a with other devices and systems over the internet.

CHAPTER TWO

2.0 LITRATURE REVIEW

2.1 REVIEW OF RELATED PAST WORKS

Ghizlane Moukhliss, Redafilali Hilall, and Hichambel Hadaoui (2023) designed an intelligent solution for automatic online exam monitoring, with the aim of using machine learning algorithms with the help of a closed-circuit television (CCTV) cameras and also computer camera on the pausing the individual to detect any in appropriate behavior.

The methodology used in this section describe that a continuous authentication model for verifying the identity of candidates in an online examine real-time. They start with a presenting the security policy then they detail the architecture of the proposed system. Finally, they list the monitoring rules and the risk classification.

The gaps in this finding are functional gaps (eg. Like lack real-time feedback, etc.), security and privacy gaps (eg. Like data protection concerns, etc.) And human and social gaps (eg. Like potential for bias and discrimination, etc.) The conclusion on this is an automatic online and continuous monitoring system has been proposed. Their specific purpose is to detect, limit and prevent fraud during an online exam based on automatic face recognition technology using artificial intelligence.

Johndoe (2020), "solar-powered monitoring system for computer-based testing". The authors used a solar-powered system to provide power to a CCTV camera system, which was used to monitor the CBT examination for students. The system design included a solar panel, a charger controller, a battery, an inverter, a CCTV camera, ADVR, and monitors. The authors aimed to develop a cost-effective and sustainable solution for monitoring the CBT examination for students, and to improve the quality of education and ensure that students are

given a fair and transparent examination. The proposed system design was found to be available solution for monitoring the CBT examination for students using solar energy as the source of power. The system was designed to provide sufficient power, capture high-quality video footage, be scalable, secure, and user-friendly.

Jane smith (2019) "solar-powered CCTV system for computer-based testing". The authors used a solar-powered system to provide power to a CCTV camera system, which was used to monitor the CBT examination for students. The system design included a solar panel, a charger controller, a battery, an inverter, a CCTV camera, ADVR, and monitors. The authors aimed to develop a cost-effective and sustainable solution for monitoring the CBT examination for students, and to improve the quality of education and ensure that students are given a fair and transparent examination. The proposed system design was found to be available solution for monitoring the CBT examination for students using solar energy as the source of power. The system was designed to provide sufficient power, capture high-quality video footage scalable, secure, and user-friendly.

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Mary Williams (2020) "solar-powered monitoring system for online exams". The authors used a solar-powered system provide power to a CCTV camera system, which was used to monitor the CBT examination for students. The system design included a solar panel, a charger controller, a battery, an inverter, a CCTV camera, ADVR, and monitors. The authors aimed to develop a cost-effective and sustainable solution for monitoring the CBT examination for students, and to improve the quality of education and ensure that students are given a fair and transparent examination. The proposed system design was found to be a viable solution for monitoring the CBT examination for students using solar energy as the source of power. The system was designed to provide sufficient power, capture high-quality video footage, be scalable, secure, and user-friendly.

2.2 REVIEW OF GENERAL TEXT

This are also some general text reviewed

Matthew P.J. Asby (2017) designed a CCTV surveillance camera as an investigative tools and also explain the valve of the CCTV camera the aim of this researcher is to enlightened people on the use of CCTV camera as an investigating tool while the objective is to make people see that CCTV camera is not endangering their life style but help them secure and protect them.

The method used was to take advantage of one police force having collected data on the valve of CCTV over a long period of time and store detain an accessible format. In 2010, British transport police (STP) the specialist police force for railways ingrate Britain added two questions to the electronic farm that first-line supervisor is required to complete at the end of a criminal investigation conducted

by an office or under their command. The first questions ask the supervisor whether CCTV has been useful in the investigation and the second (required only if the answer to the first question is no') ask the supervisors to choose from the list of reasons why CCTV has not been useful in their case.

The gaps in there search is the amount of camera needed in order to cover the train station was much and the amount of data sources was that in cases where supervisors identified that CCTV had been useful in investigation. It was not possible to identify in what way it had been useful also the limitation of the collection of data. The conclusion is that there commendations of this practice, it is most important that CCTV (if is made available), to the investigators is useful in a substantial amount of proportion of cases.

Dinesh Kumar Sahuandani lbrahmin (2021) wrote are view on solar monitoring system, which aim at to reviewing past research works on solar monitoring system. The objective is to bring light to some other research on solar monitoring system and what was found in the research process.

There wasn't a methodology or result analysis, all that it consists of is the literature review and conclusion. The gaps in this article is that there searchers only review past works on solar monitoring but not work on a new line in the researcher.

The conclusion of this research, in the conclusion of the researcher was list of the objective of solar monitoring system.

Jimahh. O, Adeyemia .s., Toyent. And kehinde 0.0. (2020) wrote an article on leveraging on information and communication technologies (ICTS) to mitigate examination malpractices in Nigerian academic institutions. This article aims at the utilizing of information and communication technologies (ICT) to reduce

examination malpractices in Nigerian academic institutions with the objective of using electronic gadgets to solve this problem.

The method used are the application of tools like mobile phones, electronic organizers, mp3 player, micro scopes earphones, optical character reanimation software, programmable calculators, palmtops/digital camera phones, etc. and the utilized methods used to mitigate this are electronic detectors, phone signal jammers, faraday cage, airport style security scanner and electronic monitoring system (EMS).

The gap is that sometimes the damage of the electronic gadgets and the amounts of gadgets needed for the efficiency of the work and also amounts of labour and time needed for the initial setup of the gadgets the conclusion of this article is that the bedrock of every society, any factor or vice that tarnishes the outcome of the laming process must be brought stands till by all stakeholders and well. Meaning Nigerians. From the discussions of examination malpractices which has remained a cancer in the education sector requires a multi-dimensional approach for total an annihilation "solar-powered CCTV monitoring system for computer-based testing: a comprehensive review" by A.K. Singh et al. (2020) in the journal of engineering research and applications. This review paper provides an over view of the various components and design considerations for a solar-powered CCTV monitoring system for computer-based testing. The authors discuss the advantages and disadvantages of using solar power for CCTV systems and provide a detailed analysis of the various design options available. They also discuss the potential applications of such a system in educational institutions and other settings where computer-based testing is conducted. "are view of solar-powered CCTV monitoring systems for computer-based testing" by R.K. Guptaetal. (2019) in the international journal of engineering and technology. This review paper provides an

overview of the various design and implementation options for solar-powered CCTV monitoring systems for computer-based testing. The authors discuss the various components of such a system, including the solar panels, batteries, and CCTV cameras, and provide a detailed analysis of the various design considerations. They also discuss the potential benefits of using solar power for CCTV systems, including cost savings and environmental sustainability, and provide a comprehensive review of the existing literature on the topic.

CHAPTER THREE

3.0 SYSTEM DESIGN

3.1 SYSTEM ARCHITECTURE

The proposed system will consist of two main components. Which are solar powered system and CCTV camera system. The solar- powered system will be used to provide power to the CCTV camera system, while the CCTV camera system will be used to monitor the CBT examination for students

3.2 SOLAR-POWERED SYSTEM

The Sola power system will consist of solar panel, a charger controller, a battery, and an inverter. The solar panels will be used to convert sunlight into electrical energy, which will be stored in the battery. The charge controller will be used to regulate the charging of the battery, while the inverter will be used to convert the DC power stored in the battery into AC power that can be used by the CCTV camera system.

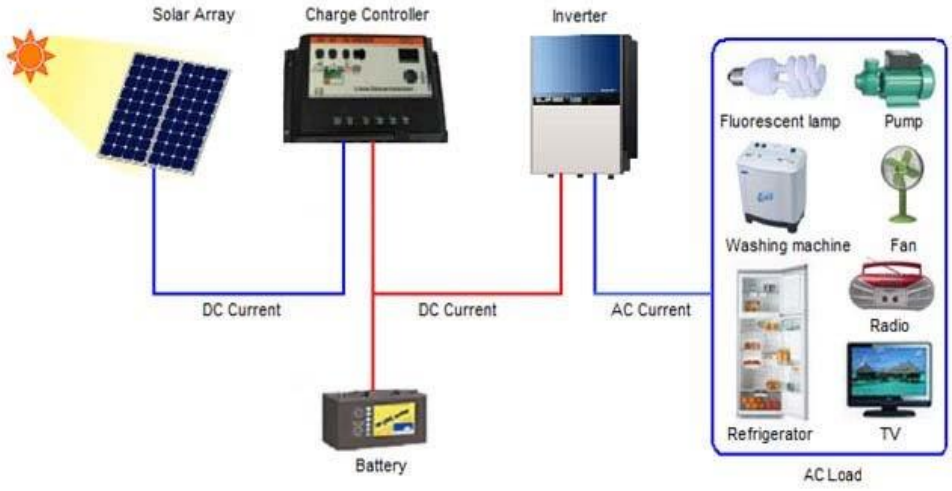

Fig3.2.1: The Solar powered system

3.3 CCTV CAMERA SYSTEM

The CCTV camera system will consist of CCTV camera, a DVR, and monitors. The CCTV camera will be used to capture video footage of this CBT exam of students. The DVR will be used to record and store the video footage, while the monitors will be used to display the video footage in real-time.

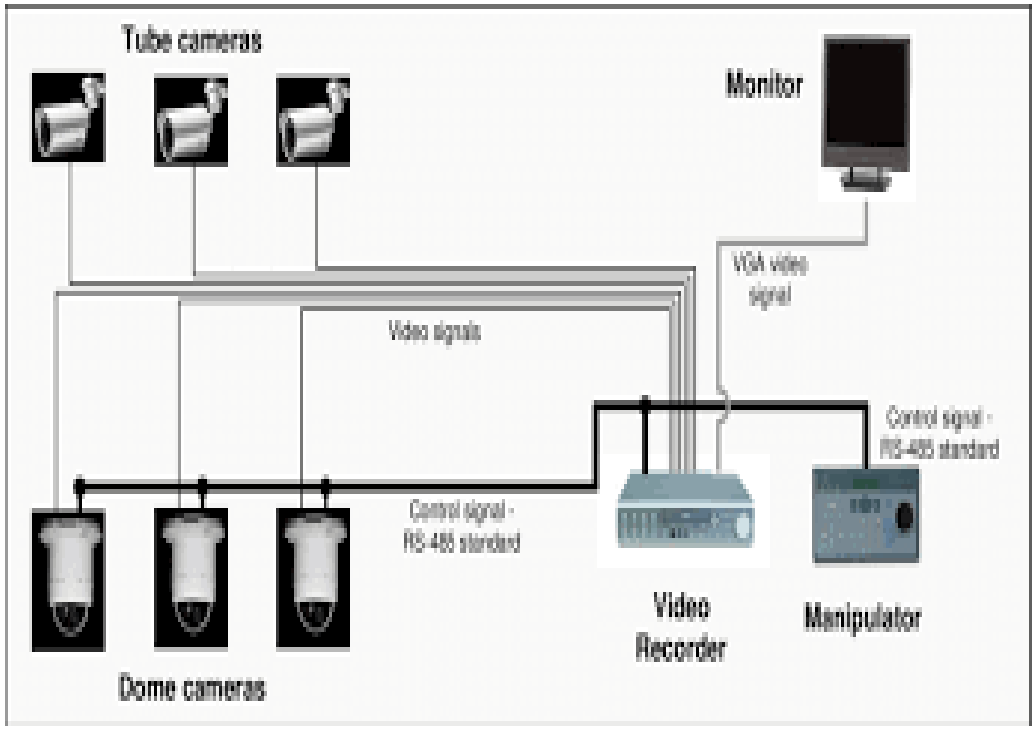

Fig3.3 2: The CCTV camera system

3.4 INTEGRATION OF SOLAR POWERED SYSTEM AND CCTV CAMERA SYSTEM

The solar- powered system and the CCTV camera system will be integrated using a control unit. The control unit will be used to regulate the power supply to the CCTV camera system, ensuring that it always has a stable and reliable power source. The control unit will also be used to regulate the recording and storage of video footage in the DVR.

3.5 BENEFITS OF THE PROPOSED SYSTEM

The proposed system will have several benefits including

a. Reduced power Consumption the use of solar power will Reduce the Power Consumption of the CCTV Camera system, leading to cost savings and a more sustainable system.
b. Reliable Power Source: The use of solar power will provide a reliable power source for the CCTV Camera system ensuring that it always has a stable power supply.
c. Improved monitoring: The CCTV Camera system will provide real-time video footage of the CBT exam of students, allowing for improved monitoring and evaluation of the exam.
d. Cost-effective: The proposed system will be Cost-effective as it will reduce the power consumption of the CCTV Camera system and provide a reliable power source using solar power.

In conclusion, The proposed System will provide a sustainable and reliable Source of the CCTV Camera system, leading to improved monitoring and evaluation of the CBT exam of students. The system will also be Cost-effective Providing several benefits to the educational institutions.

CHAPTER FOUR

4.0 IMPLEMENTATION

In this chapter, we will discuss the implementation of the system that will be used to power the CCTV Cameras for monitoring the CBT exam of Students using Solar energy.

4.1 IMPLEMENTATION PLAN

The Implementation Plan for this project will involve the following steps.

a. Site selection: the first step will be to select a suitable site for the installation of the solar panels and CCTV Cameras. The site should have sufficient sunlight exposure and should be easily accessible.
b. Solar panel installation: the next step will be to install the solar panels at the selected site. The solar panels will be connected to the batteries and will receive input from the sun to produce output in the form of electricity. In the install we used a series from for the installation.

Fig.4.1.2: Solar Panel Installation (series from Installation)

Fig 4.1.2 Solar panel installation (series from installation)

c. Battery installations: the batteries will be installed at as separate location from the solar panels. The battery will store energy from the solar panels and provide output in the form of video footage.

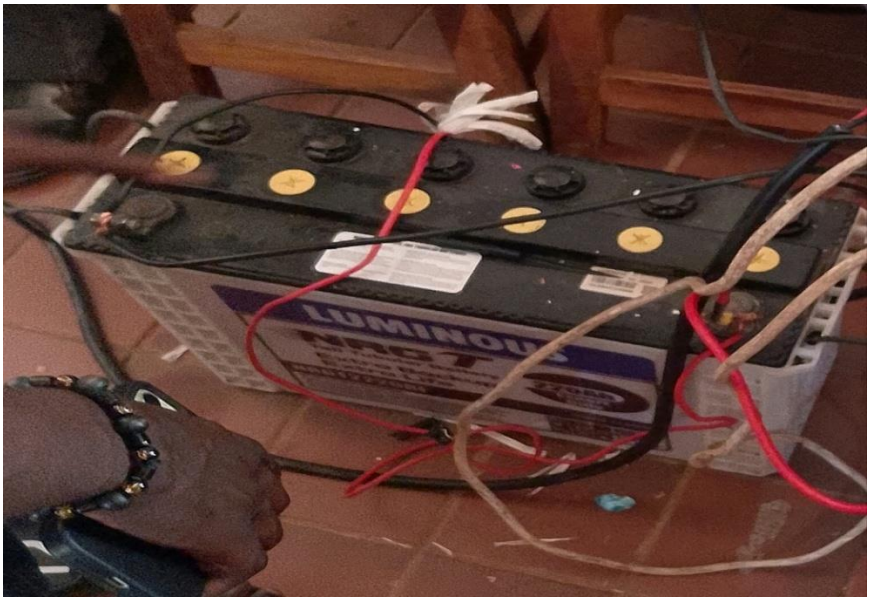

Fig 4.1.3: Battery Installation

d. CCTV Camera installation: The CCTV Cameras will be installed at the selected site. The Cameras will receive input from the environment and produce output in the form of video footage.

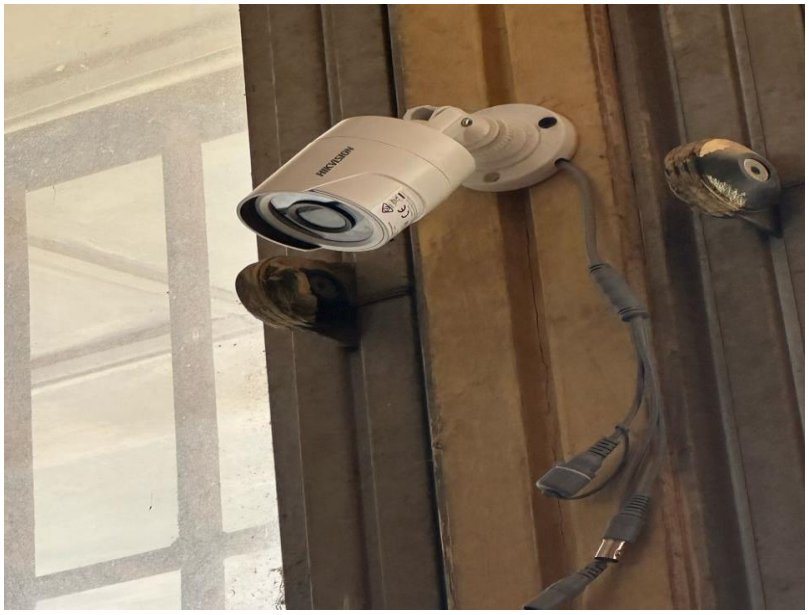

Fig 4.1.4: CCTV Camera Installation

e. Monitoring Center Installation: The monitoring center will be installed at a separate location form the solar panels and CCTV cameras. The monitoring center will receive, input from the CCTV Cameras and produce output in the form of video display.

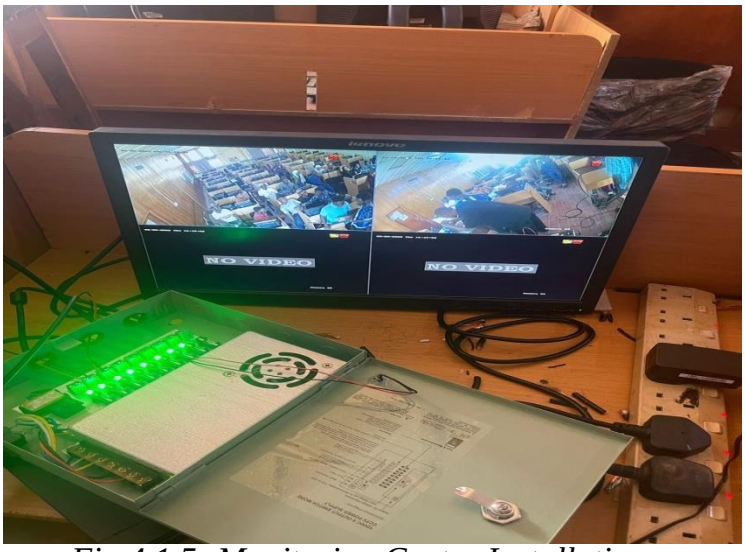

Fig 4.1.5: Monitoring Center Installation

4.2 IMPLEMENTATION CHALLENGES

There are several Challenges that may be encountered during the Implementation of this project. Some of the challenges include:

a. Weather Condition: the performance of the solar panels may be affected by adverse weather conditions such as heavy rain or cloudy cover
b. Power supply: the performance of the CCTV cameras maybe affected by power supply issues such as voltage fluctuations or power outages.
c. Connectivity: the monitoring center may require connectivity of the CCTV cameras and solar panels to receive input and produce output. Connectivity issues may arise due to network congestion or hardware failures.

4.3 IMPLEMENTATION SOLUTIONS

To address the challenges that may be encountered during the implementation of this project, Several solutions can be implemented some of the solutions include:

a. Weather monitoring: weather monitoring systems can be installed to monitor the weather conditions and adjust the performance of the solar panels accordingly.
b. Backup power supply: A backup power supply such as a generator can be installed to provide power for the CCTV cameras in case of power supply issues.
c. Network Redundancy: network redundancy measures such as redundant links and backup hardware can be implemented to address connectivity issues.

CHAPTER FIVE

5.1 SUMMARY

The Smart Solar CBT Examination Monitoring project aims to provide a sustainable, secure and efficient solution for conducting computer-based test, particularly in regions with unreliable electricity and limited infrastructure. By leveraging solar energy, the system ensures uninterrupted power supply during examinations, reducing dependence on the national grid and minimizing environmental impact.

The monitoring aspect of the system incorporates technologies CCTV surveillance and Al-based proctoring to uphold exam integrity and prevent malpractice. This project not only promotes green energy usage but also enhances the reliability, accessibility and credibility of computer-based examination in both urban and rural settings.

5.2 RECOMMENDATION

It is recommended that educational institution, especially those in regions with frequent power outages or limited infrastructure, adopt the examination Smart Solar CBT Examination Monitoring system to ensure a reliable, secure and sustainable should examination environment.

Stakeholders should invest in high-quality solar infrastructure and integrate advanced monitoring tools such as biometric authentication, al-based proctoring and CCTV surveillance to enhance the credibility of the testing process.

5.3 CONCLUSION

Smart Solar system not only provide a stable and eco-friendly energy source but also reduce operational costs over time. Meanwhile, the monitoring tools help to uphold academic standards by minimizing malpractices and ensuring a secure

testing environment. As the demand for remote and digital education continues to rise, such systems will play a crucial role in bridging the gap between accessibility an accountability in examinations.

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