“Developing a Comprehensive Web-Based System with Android Application for CCTV Maintenance and Warranty Management”

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Chapter 1

**INTRODUCTION**

Recent decades have seen the emergence of close-circuit television (CCTV) surveillance as a mainstream crime prevention measure used around the world. It became essential to maintaining safety and security system. The project ‘Developing a Comprehensive Web-Based System with Android Application for CCTV Maintenance and Warranty Management’ mark a significant advancement in tackling the difficulties related to the maintenance and warranty administration of CCTV system. This all-encompassing solution promises to transform how organizations and people manage their CCTV cameras by improving productivity, decreasing downtime, and ultimately maintaining the durability and efficacy of these vital security equipment. CCTV systems have become a crucial component of security infrastructure in a variety of settings, including apartment buildings, businesses, and public areas. But the absence of a centralized management system that is effective and efficient for managing these surveillance cameras frequently results in operational inefficiencies and increased vulnerability. To streamline CCTV maintenance and warranty administration, our project offers the creation of a comprehensive web-based system that is accompanied by an Android application.

By providing a warranty, manufacturers or providers stand as a testament to the quality and durability of their products. They contribute to building trust between customers and providers and can lead to significant cost saving by covering repairs and replacement during the warranty period.

The Android application will extend the accessibility and functionality of the system, allowing users to receive real-time notifications, report issues on-the-go, and access essential information at their fingertips. And establishing a dedicated CCTV website with e-commerce capabilities can be a highly effective strategy for businesses in the surveillance industry. It not only broadens market reach but also offers convenience, information, customization, cost savings, data insights, and improved customer support, all of which contribute to higher sales and customer satisfaction.

Project Context

The context of this project revolves around the need for efficient management of Closed-Circuit Television (CCTV) systems in various settings, such as businesses, institutions, residential areas, and public spaces. CCTV systems play a crucial role in security and surveillance, and it is essential to ensure their proper maintenance and warranty management to ensure their optimal performance. This project aims to address the challenges associated with managing CCTV systems and their warranties effectively.

According to a study conducted in 2018, CCTV technology leverages to improve the immediate handling of criminal incidents. The significance of this study lies in its ability to develop a real-time crime response strategy that can pinpoint the precise locations of incidents and the likely escape routes taken by suspects. By actively using CCTV monitoring in urgent situations, traditionally reserved for post-event analysis, it has the potential to increase the effectiveness of crime resolution. Moreover, this technology has the added benefit of optimizing the operational efficiency of control centers by introducing automation to certain aspects of their central control systems, reducing the reliance on human monitoring. (Choi & Na, 2018)

CCTV systems provide a range of benefits, including acting as a visible deterrent to potential criminals, aiding in crime prevention and detection by offering valuable evidence for investigations, enhancing public safety in various settings, improving employee safety and productivity in workplaces, and aiding in traffic management and retail loss prevention. CCTV is linked to a noticeable but moderate reduction in criminal activities. Notably, the most substantial and consistent effects of CCTV were observed in car parks. However, the analysis also revealed significant reductions in crime in other settings, with residential areas being particularly notable. It's worth noting that CCTV systems with active monitoring, where human operators are actively watching the footage, tended to produce more significant effects compared to passive systems that rely on recorded footage. Additionally, when CCTV was implemented alongside multiple other interventions, the impact on crime reduction was more pronounced compared to schemes with single or no additional interventions. In summary, the findings suggest that CCTV can have a positive impact on crime reduction, with the extent of its effectiveness influenced by factors such as the setting and the level of monitoring and other complementary interventions in place. (Thomas & Amada L.,2019)

Objectives

1. To simplify and streamline the after-sales service process for CCTV devices, ensuring they operate at optimal performance.
2. To provide a platform for users to report issues and for technicians to efficiently resolve them, minimizing downtime.
3. To effectively track and manage warranties to maximize cost savings and ensure devices are serviced under warranty whenever possible.
4. Provide insights through analytics and reports to make informed decisions about maintenance schedules and device performance.

Scope and Limitations

This project focuses on the development of a comprehensive web-based system accompanied by an android application that is designed to streamline the management of CCTV after sales service and warranty management. It offers a range of essential features and functionalities to empower users including, business owners, local residence, security managers, and even technicians, in maintaining and monitoring their CCTV devices effectively. The key points of this scope includes the CCTV maintenance management, warranty management, web-based dashboard, android application, and user support.

While this project holds significant promise, it is important to acknowledge its inherent limitations. This includes the hardware compatibility of the system, not all devices may have the same capability, for example the users' device runs an old version of system processor, the user cannot expect to have the same performance as the latest version devices. Users and admins also need to have a stable internet connection for real-time updates and system access. Poor connectivity may restrict the system's functionality. Inadequate following of app tutorials may limit the system's adoption and utility. Understanding these limitations is critical for managing expectations and addressing potential challenges throughout the project's development and deployment phases.

Definition of Terms

1. **Closed-circuited Television (CCTV)** - a system that sends television signals to a limited number of screens and is often used in stores and public places to prevent crime.
2. **After-Sales** **Services** - refers to the ongoing support and assistance that a business provides to customers after they have purchased a product or service. It includes resolving customer complaints, offering technical support, providing maintenance services, and addressing product issues or defects.
3. **Warranty** - a written guarantee, issued to the purchaser of an article by its manufacturer, promising to repair or replace it if necessary, within a specified period of time.
4. **Analytics** - a process in which a computer examines information using mathematical methods in order to find useful patterns.
5. **Web-based** **system** - A web-based system is an application that is accessed via HTTP. The term web-based is usually used to describe applications that run in a web browser. It can, though, also be used to describe applications that have a very small component of the solution loaded on the client's PC.
6. **Maintenance** - the process of maintaining or preserving someone or something, or the state of being maintained.
7. **Security** - protection of a person, building, organization, or country against threats such as crime or attacks by foreign countries.
8. **Comprehensive** - complete and including everything that is necessary.
9. **Inadequate** - an adjective that describes something as insufficient, lacking in quality or quantity, or not meeting the required standards or expectations.
10. **System** **processor** - In the context of computer systems and technology, a "system processor" typically refers to the central processing unit (CPU) of a computer or other electronic device.
11. **Compatibility** - refers to the ability of two or more things to work together or exist together without conflict, problems, or issues. It can be applied in various contexts, and the concept of compatibility is often used to describe how well different elements or components can interact or function harmoniously.

CHAPTER 2

**REQUIREMENT SPECIFICATION**

The Requirement Specification for this project serves as a comprehensive guide to define the features, functionalities, and performance expectations of a modern web-based platform and its companion Android application. This system is designed to transform the management and monitoring of Closed-Circuit Television (CCTV) devices, ensuring their optimal functionality while simplifying the tracking of warranty information.

Hardware and Software Specifications

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| --- | --- |
| **Hardware Specification** | **Description** |
| **Android Phone** | * Its purpose is to provide a convenient mobile interface for users to access the system and interact with the admin including the technician. * Should have sufficient processing power (quad-core or higher) for smooth operation. * Sufficient internal storage space to install the application and store local data. * Screen size and resolution suitable for the user’s needs. |
| **Personal Computer** | * We use computers to write and test the code, design user interfaces, and ensure that the software functions as intended. * Must have sufficient RAM for running the web application efficiently. * Operating system not lower than Windows 7. * Fast and reliable storage drive. |

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| --- | --- |
| **Software Specification** | **Description** |
| **Visual Studio Code** | Developers can use it to write, debug, and test the code for the web-based system, the Android application, and any related scripts. |
| **Web Browser** | primary means through which users and administrators access the system's web-based interface. |
| **Laragon** | Developers can easily create, manage, and manipulate databases, which is crucial for a system like the CCTV maintenance and warranty management, where data storage and retrieval play a significant role. |
| **GSM Modem** | An android application that can be used for automatic sending o SMS alert notifications. |

Functional Requirements

1. Admin can add, view, edit, and delete CCTV devices, including details like model, serial number, installation date, and warranty information.
2. E-commerce features where new customers can buy online and manage schedule of installation.
3. Warranty Tracking where the system will automatically track warranty information for each CCTV device and send notifications when warranties are about to expire.
4. Clients can report problems or issues with their CCTV devices, providing detailed descriptions and attaching images if necessary.
5. A ticketing system to manage reported issues, assign them to technicians, and track their resolution status.
6. Real-time notifications and alerts for device maintenance, warranty expiration, and issue resolution updates.
7. Manage a database of technicians, their availability, and expertise.
8. Generate reports and analytics on maintenance history, issue resolution times, and warranty status for better decision-making.
9. Customer feedback and rating feature.

Non-Functional Requirements

1. **Operational Requirements**
2. Users should be able to access the system securely through web browsers and the Android application.
3. The system should support different user roles, including administrators, maintenance personnel, and end users.
4. The system should be designed to scale as the number of CCTV devices and users grows.
5. **Performance Requirements**
6. Ensure that the web-based system is compatible with a wide range of web browsers, providing a consistent and responsive experience to users.
7. **Security Requirements**
8. Implement robust user authentication mechanisms to verify the identity of users accessing the system.
9. Implement detailed logging and auditing mechanisms to record user activities, system events, and potential security incidents.
10. **Cultural and Political Requirements**

a. Provide user training materials and support resources in languages and formats that are accessible to users from various cultural backgrounds.