Automated Laboratory Item-Inventory System with Barcode

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Abstract— **This design project aimed to develop a laboratory –inventory system for the College of Engineering. This study is a software development project wherein the proponents developed an automated laboratory item-inventory with Barcode reader Results showed that this inventory system is efficient and user friendly to lessen the process in laboratory usage. The outcome of the design has been promising with simplicity but of care to the internal interface of the device. The software used in the system design acted resourcefully and constantly, given that service to the student and faculty. The software commands of the system such as the Inventory system is using a step by step procedure ensuring each of the steps is successfully done..**

Keywords— **Barcode Reader, Engineering Laboratory, Inventory System, , Scanner,.**

I. INTRODUCTION

The companies ensure all tools and safety material used that are borrowed are returned with its corresponding details included in the software, like school libraries, laboratories, etc. Also, it gives a history detail which will provide as the user's reference to locate and determine the borrower's pending borrowed items that are due upon them. For the students, this design project will serve as a guide or reference to those who are planning to use and enhance the same concept of the design. The software Visual Basic 6.0 used in the project will serve as student's beneficial source of programming language that is applicable to their programming research and studies.

A barcode is a printed symbol of machine-readable data that contains information about an item to help facilitate the item's identification and tracking. Barcode symbols or images are made up of printed black lines and patterns, which are read by an electronic input device called a barcode scanner. Most barcode scanners are plug-and-play computer peripherals that are easy and convenient to use. Barcodes can be printed using either an ordinary printer or a barcode printer [1].

A bar code reader is an electronic tool that scans printed bar codes on items for sale or on other labels for identification purposes. The bar code is a unique reference number which a computer uses to look up a descriptive record. Types of bar codes include universal product code, postal, book codes, private delivery service, and more [2].

In addition, bar code readers are available in several different styles. Stationary readers are common in supermarkets and other stores, where the cashier moves the item over the scanner. These use a light-emitting diode, or LED. A lightweight, hand-held bar code reader that utilizes laser technology is useful for scanning large items which are difficult to move over the stationary device. These hand-held tools also are used to create inventory records. They come in styles such as pen-shaped, which a person swipes over the code, and a gun scanner which reads the code at one glance. The laser styles are convenient, but more expensive than the LED types. Bar code readers are often called price scanners, but technically this is incorrect because a bar code reader includes both the price scanner and the decoder which translates the signal from the scanner into specific code representing the data.

The invention and the application for identifying products of all kinds with the help of bar-code technology is one of the most important developments of our century. Those, who have had to wait for long hours at the cash counter of a super market, because the bar-code reading system has broken down, can imagine this. However, the impetus for developing this technique did not come from the desire to offer the customers a special service, but instead to make the supermarket more profitable. The existence of the supermarkets can be traced back to the colonization of North America. Small business concerns during this time specialized in everything that was needed for a new start. It is, therefore, no wonder that the barcode technique was invented and developed in this country [3].

Different kinds of bar codes have been developed during the course of time. They are different, corresponding to the requirements to the different user groups. The UPC code became established in the USA for trade and for the supermarkets. Based on this code, the EAN code was introduced in Europe. Both the types are meant to be used mainly in the supermarkets. The disadvantage of this code for other areas of economy is that first, only numbers are permitted, second, the length of the code is fixed. Hence, a special code was developed for libraries, which can also represent alphanumeric characters. At first, the Codabar was developed for these codes, which initially recognised only the special characters. The quick development of microcomputers also permitted more complex codes.

The code 39 already includes all the capital letters and the code 93, based on code 39, contains even the regular alphabet. However, the barcode labels should not become very long, as otherwise very special laser scanners are required. As a result, one is always searching for code forms, which not only have the highest possible character reserve, but also the highest possible density of information. The developments in this direction are the codes UPC 128 or EAN 128, which use control characters within the code for reducing the length of the bar code. These control characters send instructions to the processor of the bar code for converting the character set [3].

Barcodes are a series of black and white striped lines that contain information. In order for that information to be useful, it needs to be read by a device that is able to translate the data from the barcode. Symbol is a manufacturer of barcode scanners that can read and store data from barcodes, then upload that information to a computer file or database. However, in order for the barcode scanner to accurately understand the data that it is reading, it must first be programmed [4].

According to Rane [5], many different types of bar code scanning machines exist, but they all work on the same fundamental principles. They all use the intensity of light reflected from a series of black and white stripes to tell a computer what code it is seeing. White stripes reflect light very well, while black stripes reflect hardly any light at all. The bar code scanner shines light sequentially across a bar code, simultaneously detecting and recording the pattern of reflected and non-reflected light. The scanner then translates this pattern into an electrical signal that the computer can understand. All scanners must include computer software to interpret the bar code once it's been entered. This simple principle has transformed the way we are able to manipulate data and the way in which many businesses handle recordkeeping.

The Automated Laboratory Item-Inventory System will replace the old paper based system or logbook being used by the College of Engineering Laboratory. The Automated Laboratory Item-Inventory System shall be used by the Laboratory maintenance engineer to trace whether the items borrowed were already returned safely by the students or instructor.

The program of the system was written in Visual Basic 6.0 programming language. The system used database to store and retrieve valuable data and information of the borrowers and the laboratory items. These data will be recorded and stored using Barcode and I.D. System. The borrower must present his school ID with barcode which will be scanned by a barcode reader to determine the borrower's name, year/section, and instructor. The data recorded will be saved in the automated item-Inventory.

II. OBJECTIVES OF THE DESIGN PROJECT

It is intended to create an inventory system for the Engineering Laboratory to improve the manual system of borrowing and returning items from and to the Laboratory through the use of bar code and to design a program that will be capable of accepting scanned items with bar code and the borrower's ID that will be stored in the Automated Item-Inventory Program using Visual Basic 6.0 to easily monitor the items and prepare inventory reports.

III. MATERIALS AND METHOD

This study is a software development project wherein the proponents developed an automated laboratory item-inventory with Barcode reader, in order to introduce a new way of determining a borrowed equipment and returned equipment system in the university laboratory which are also compatible in different establishment such as companies, school libraries, school laboratories, etc.

Through complete analysis of the electrical and electronic laboratory equipment and published articles, some option was brought out and the distinguished most ideal was then chosen. Applying some learned principles about electronic components and computer programming which could be adopted to the design, The layout was programmed and interfaced resulting to the final framework of the project. The hardware design is composed of Zebex Z-3110 CCD (Barcode Scanner).

The Z-3110 is a simple-to-use contact CCD scanner that offers fast, reliable and sensitive scanning performance, the ideal entry-level product for first-time users as well as the proprietary ultra scan decoding technology, Light and rugged design, Multi-interface communication.

Zebex Z-3110 CCD Barcode Scanner was also used in the project with light and rugged design, advanced scanning performance, read status LED indicator and programmable beeper, built-in decoder, multi-interface communication, 20 mm scanning distance, 80 mm scanning width and 200 scans/sec. scanning rate.

IV. RESULTS AND DISCUSSION

Hardware Development

The prototype was an enhancement and development of the automated bar coding system concept to attain the economical environment for their marketing securities, maintenance & productivity basis. The prototype has a barcode scanner which scans the barcode of an item. The barcode scanner accepts the *'coda39'* barcode that serves as the input of the program. The input will automatically check in the database if a certain item was in the list.

Once it has successfully obtain the item, the program has a different categories which allows the user to borrow, return, view history of the borrowed and returned item and product/item maintenance. But in these categories, there are cases that only users can borrow and return while the admin or faculty can borrow and return, they have the access to the maintenance account.

The maintenance form of the program allows the faculty to add, search and delete an item or product In this case, they also have the access and determine who were the borrowers and who returned it on time. The history will serve as the basis or reference for checking the records of the borrower and returner's specific date and time information in order for the administrator to determine the identity of the borrower.

The output is to satisfy the user's needs and to monitor the products and items. The design project was made in a purpose to change the university laboratory system. Technology innovates the students' process as well as for the faculty in borrowing, returning and monitoring our items and products.

Software Development

The software of the design was constructed and developed to introduce the student and faculty in a new system that allows borrowing for the users and admin. It also allows the admin to monitor and maintain his/her items or product. Adding and updating items are also one of the features of our software. The software was made in a Visual Basic 6.0 programming languages. The visual basic is the third-generation event-driven programming language and integrated development environment (IDE) from Microsoft for its COM programming model. VB is also considered a relatively easy to learn and use programming language, because of its graphical development features and BASIC heritage.

Visual Basic was derived from BASIC and enables the rapid application development (RAD) of graphical user interface (GUI) applications, access to database using data access objects, remote data objects, or activeX data objects, and creation of activex controls and objects. Through this programming languages we are able to make the Automated Laboratory Item Inventory-System. In this software we are interfacing barcode scanner to pc, barcode to barcode reader and user to barcode reader and user to personal computer. Barcode scanner requires a barcode as a representation of input for our software. The input barcode will be compared to the database list if it has a record on it. The software provides a button to clicked.

The borrow button and the return button once the barcode is read and satisfies its requirements. The users are allowed to borrow or return. Another user interfacing is called admin, Admin has the power to monitor each of the items or products to be added and deleted. If the software compromises with its requirements then the admin are allowed to work on the database where the list of items and products are safely installed. The concept of this system is not far to the concept of our library ID scanning system.

The proponents developed the automated laboratory item-inventory with Barcode reader, in order to introduce a new way of determining a borrowed equipment and returned equipment system in the university laboratory which are also compatible in different establishment such as companies, school libraries, school laboratories, etc.

V. CONCLUSION AND RECOMMENDATION

The Inventory software communicates with the user using a language understandable and giving confirmations if the borrowing and returning process has been successful or not. The Barcode reader, which is the hardware of the system, is very easy to handle, for it automatically gives details for the scanned device or unit. Automated Laboratory Item-Inventory System w/ Barcode retrieves and stores data of the user and the item being borrowed. After the successful process of entering the username and password, and getting confirmation from the user, the software will then send data to the data storage so that it will show history, for it to checks a device or unit being borrowed.

The proponents of the design project entitled "Automated Laboratory Inventory System with Barcode" recommended the following: the use of a touch screen instead of using Laptops or PC, thus it is easy to use and more organized; adding more specific command buttons to make the system more user-friendly; adding memory for storage of transaction; installing a UPS and adding more features in the retrieving process.

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