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DESIGN OF BASED ELECTRONIC CHECKER FOR STANDARDIZED ENTRANCE EXAMINATION

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ABSTRACT

This thesis presents the hardware and software design of the PC based electronic checker systems for standardized entrance examinations.

The system consists of PC, printer, sensor circuits, multiplexer. The PC including designed software manipulates the operation of the system and the printer. The printer is used as feeder of the answer sheets answer key. The sensor circuit senses the shaded area in answer sheet and keys. The feeding of the answer sheets is the same as feeding paper in a printer. Items are answered by marking specified areas of the examination sheet with the use of carbon pencil.

The answer key sheet is to be scanned first and to be stored in the memory where the rest of the sheets to be scanned are being compared with. The shaded area of the scanned sheets as well as the results of the scanned answer sheets such as name, ID numbers and scores are displayed in the monitor and can be manipulated through the software, programmed in Turbo C++. The software is capable of sorting the names and ID numbers, searching records, ranking the scores, and also provides the database used. The developed system will be beneficial for every faculty or admission personnel at least to ease burden and save time for checking test papers.

Keywords: Design; Electronic Checker; Standardized Entrance Examination.

INTRODUCTION

The necessity for a system to be used in checking examination papers urged the proponent of this study to devise a design that will minimize the time and effort allotted for this task. Our present time dictates that tasks should be done in a modern, efficient and accurate manner through the use of modern devices and equipment. This scenario pushes me to find ways to adapt traditional and conventional ways on doing tasks in our fast-paced society.
Examination paper checking machines already exist in the market today. The Department of Education currently uses a system using such devices for checking National Secondary Aptitude Test/National College Entrance Examination NSAT/NCEE examinations. These existing systems may prove to be effective but not as efficient in terms of cost. This study adheres to help the persons concerned in checking Standardized Entrance Examination Papers and others examination papers such as Summative and Preliminary Exams, Mid-term and Final Exams at the Naval Institute of Technology, for the to be able to give examination results in a quick span of time only – which affect notable reliability in the institution through its standardized Entrance Exam and in checking other long examinations and challenge to construct a design for a cheaper version yet as effective as its predecessors. It will respond to the need to eliminate tons of papers works for the faculty or the admission personnel and promote timesaving, ease of use, and proper organization of materials used.

1.1 Significance of the Study

The significance of the study is to help the faculty or the admission personnel eradicating strenuous hours consumed when checking papers of the Standardized Entrance Examination and other examination papers. The study yearns to simplify the task by predefining formats for the materials used for the system. It also aims to eliminate messy papers

due to erasures. This design project will greatly lessen the time consumed by the faculty, thus, promoting better time management and use.

The study will also benefit the student by using specified formats which will make answering each Item at ease. The system will also entail following directions and instructions properly which is consistent with the program of the system used in checking the Standardized Entrance Examination and other examination papers.

The study also aims to modernize facilities provided by the university/State College through a low cost Personal Computer (PC) based devices and which will eventually uplift the former standards and quality of services offered. It will be an actual demonstration and application of the growing field of low cost PC based devices. Its implementations may also contribute to the development of simpler and better systems which will prove its use in the future.

1.2 Statement of the Problem

Above all, study seeks to answer the question, "*How to develop a system for a low cost* ***(PC) based Electronic Checker for Standardized Entrance Examination****?"*

Specially, the study will solve the following problems:

1. What are the principles behind the proposed design?
2. What will be the software and hardware devices needed to make this study feasible?
3. What are the functions and benefits that the faculty or the admission personnel as well as the students, may attain from the system?
4. What are the advantages of the proposed design over the existing designs?

1.2 Scope and Limitations of the Study

The design will adhere to the specifications and capabilities of the connected components. The device is capable of a constant maximum number of items per sheet. Detection and "reading" of marks will greatly affect the system's accuracy and functions. Proper "feeding" of the medium will also affect the device' performance.

The system will be programmed to read answers from designated coordinates of the paper. The device will be interfaced to a computer, relying mainly on the latter's data processing capabilities. The programming language used is Turbo C++ because of its predefined functions for using the parallel port. Familiarity of the language is also the primary reason why it is chosen. Errors may be encountered if certain instructions are not met like improper shading or misaligned feeding of paper but all these are already considered.

REVIEWS AND FRAMEWORKS OF THE SYSTEM

2.1 Analysis on the Existing Examination Checker System

The Op – Scanner is a machine that automatically checks the examination paper. It exists in the market nowadays and DepEd is one of the current users of this machine for checking the NCEE / NSAT examination.

It provides the best solution for checking examination papers automatically rather than doing it manually. It cannot hide the fact that the automatic paper checker is very useful and important to universities, colleges even companies. Before students can enroll to a certain school, the students are required to take an entrance exam and be back on certain date to get the result. In this kind of setup, the span of time is too long for the part of the admission office staff to check large number of examination paper without crucial errors.

The teacher always uses the other existing system that comes to be first before the Op – scanner was introduced. Teachers manually do the process of checking. Other personnel or staff manually does it with key to correction. Because of large population of examiners or student that takes the exam, checking of paper becomes difficult and the results of the exam cannot be known fast because checking cannot be done immediately. That was the earliest process of checking done in schools and companies.

2.2 Review of PC Based Checker System

For most of the 19th century in the United States and Canada, census
Data were tabulated and compiled by hand, without the aid of machines. Manual processing was very slow, and some figures were obsolete by the time they were published. The invention of mechanical tabulating devices in the late 19th century made processing of the data much faster and improved the accuracy of the results. Today, census questionnaires are processed primarily on computers and electronic equipment. Besides speeding the processing of result, computers have made it possible to perform sophisticated analysis on the data and to draw correlations between various social and economic characteristic of the country. For example, using census data, statisticians can easily determine the number of Houston women between the ages of 25 and 30 who have completed high school and are currently employed. To process the data from hundreds of millions of paper questionnaires, the U.S. Census Bureau employs an advanced system that scans every questionnaire into an electronic image. Then the images are analyzed by computer software that can recognize when a check-box item on the questionnaire has been marked with a pencil or pen. Optical character recognition software analyzed and turned into statistics. Unreadable or ambiguous responses are checked by census clerks and manually keyed into the computer.

2.3 Components of the PC Based Electronic Checker

A phototransistor is a transistor that changes its properties based on sensitivity to light while intensely illuminated by an electromagnetic wave of a specific frequency which is specific to the phototransistor is not illuminated it allows only a small current known as the Dark Current. Another interesting property of phototransistors is that the circuit in which the phototransistor is involved determines their sensitivity, with a high circuit resistance, the phototransistor has an increased sensitivity to light than with a low circuit resistance. This is very useful because you can then adapt one phototransistor to many different applications requiring different sensitivities.

All transistors are light sensitive. Phototransistors are specially designed to take advantage of this important property. Light sensitive FETs are available, but the most common phototransistor is an NPN junction transistor with a large exposed based region. Light entering the base replaces the base-emitter current of ordinary NPN transistors, therefore a phototransistor directly amplifiers variations depending on the amount of light. Two types of NPN phototransistors are available. One Is an NPN transistor. The other includes a seconds NPN transistor to provide more amplification. Phototransistors are commonly used in light-activated circuits and switches.

System Requirements can be summarized below:

Recommended Configuration
700 MHZ or faster Pentium III or equivalent AMD Processor
Win 98 SE
256 MB RAM
700 MB of free hard drive space
32 MB AGP Video Card

2.4 Conceptual Framework of the Study

Figure 2-1: Conceptual Model of the PC Based Examination Checker consist of the context, which contains the grounds why I conducted the study. I thought of a system for checking examination papers that is cost effective, efficient and time conserving. The input gives the source of concepts included in this document. With the help of electronic books, related studies and especially surfing the net help the researcher in findings ways to come up the desired study. The progression describes the development of the hardware, software and how both will be combined to achieved the output of the design project, which is the “PC Based Examination Checker” able to respond to the challenge of eliminating the conventional of checking examination papers.

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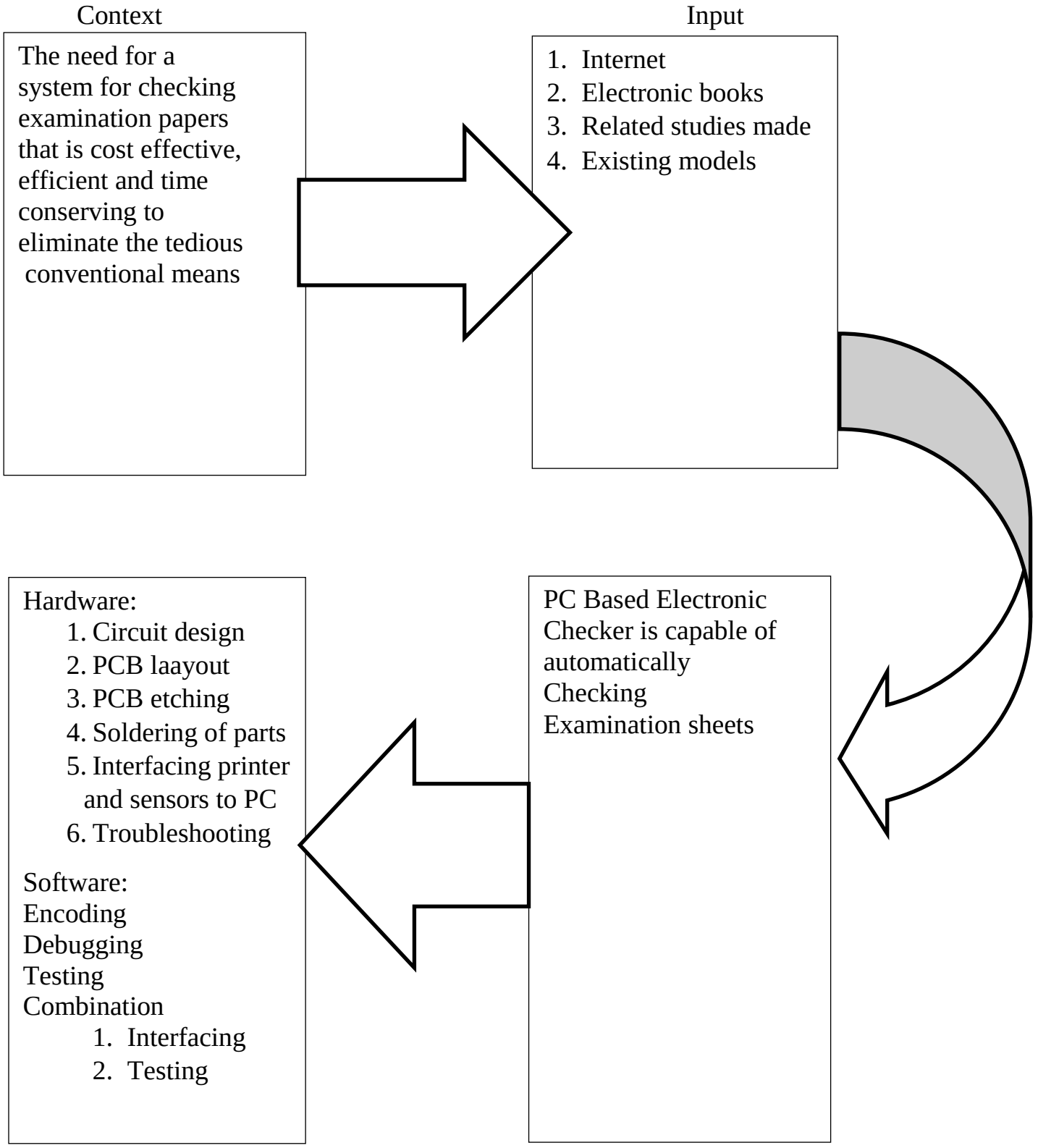

Figure 2-1. Conceptual Framework of the Design

2.5 Definitions of Terms

Interface – an electronic circuit that governs the connection between two hardware devices, between two applications, or between a user and an application that facilitates the exchange of data.

Parallel Interface – the transfer of data in the form of one or more bytes in parallel to or from the device.

Port – an interface that governs and synchronizes the flow of data between the central processing unit (CPU) and external devices such as printers and modems. Also, the reprogramming an application so that it runs on another type of computer.

Sensor – a device that senses a change in a physical or chemical quantity and provides an electrical output.

Phototransistor – a device that operates by converting incoming photons to electrons in the base of a bipolar transistor.

Diode – any electronics device that has only two electrodes.

Electrodes – a device that emits, collect, or deflects electric charge carrier. It is usually in the form of a solid plate, a wire, or a grid.

Resistor – an electronic device that possesses resistance and is selected for use because of that property.

Transistor- a multi-electrode semiconductor device in which the current to one or more specified electrode.

Multiplexer – selects binary information from many input lines and directs it into a single output line. The selection of a particular input line is controlled by a set of select input.

Nibble – half byte or four bits.

2.6 Application Criteria

The PC Based Electronics Checker for Standardized Entrance Examination requires 220 volts supply. Before turning on, inspect whether the connector is properly attached to the parallel port. A password is needed to ensure that only the authorized user is operating the system, that is for security reasons on the part of the system and the concerned individuals assigned to take care and carry out the efficiency of the working condition of the system. The feeding of the answer sheets is the same as feeding paper in a printer. Items are answered by marking specified areas of the examination sheet with the use of carbon pencil. The answer key sheet is to be scanned first and to be stored in the memory where the rest of the sheets to be scanned are being compared with. The shaded area of the scanned sheets as well as the results of the scanned answer sheets such ID numbers and scores are displayed in the monitor and can be manipulated through the software, programmed in Turbo C++. The software is capable of sorting the names and ID numbers, searching records, ranking the scores, and also provides the database used.

The faculty or admission personnel is task to do a lot of work such as computing the students grade, preparing the test questions, checking test papers and recording the test results. The PC Based Electronic Checker for Standardized Entrance Examination will be beneficial for every faculty or admission personnel at least to ease burden and save time for work. It will satisfy the need of the faculty or admission personnel for checking test papers.

The PC Based Electronic Checker for the Standardized Entrance Examination is simple and portable because of its few components.

The PC Based Electronic Checker for the Standardized Entrance Examination provides quick result, which fastens the computations of the student's grade. It minimizes the errors in checking and counting the correct answers. Its operation is similar in printing documents; using it will surely not a problem at all.

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Compared to the existing machine in the market, the cost of this device is very economical and it will be beneficial to the consumer because of its efficiency and more likely will save so much time and effort in checking the examination papers, moreover will bring forth prestige and excellence on the part of the institution implementing such program in delivering honest and well-checked examination results.

DESIGN OF THE ELECTRONIC CHECKER SYSTEM

3.1 Design Specification

Developing a new system requires tremendous amount of information through observation, research and interviews. This traditional method of gathering data has proven to be the most effective and efficient source of information that is required by the system. Such information supports and helps in the development of the newly designed system.

The materials for this study were gathered by surfing the Internet and visiting different university and college libraries to select the appropriate reading materials needed for this study such as books, magazines, journals and other related thesis. Some concepts of this study were acquired through formal and casual interviews with people who in one way or another have good background of the study and are indeed knowledge in this chosen field of study.

Proper methodology was employed in every step of the way to ensure a positive and favorable result. First, initial observation was made from the manual method of checking test paper and the existing examination checker system. The ideas on how to limit and define the whole function of the system came next. Afterwards, brainstorming was made to define each and every part of the system from the software function up to choosing of the hardware devices. This played a significant role in the fulfillment of creating the system. Later on researches and interviews where conducted to verify and prove that every idea for the system are feasible.

3.2 Block Diagram of the Electronic Checker System

The PC Based Electronic Checker for the Standardized Entrance Examination is composed of a printer, used to feed paper, and a sensor. Items are answered by marking specified areas of the answer sheet with the use of carbon pencil. The results are converted into digital values. The answer key sheet is to be scanned first and to be stored in the memory where the rest of the sheets to be scanned are being compared with as shown in Figure 3-1. Block Diagram for the Electronic Checker System. The system program, programmed in Turbo C++, provides data processing for checking the items answered and also provides the database used.

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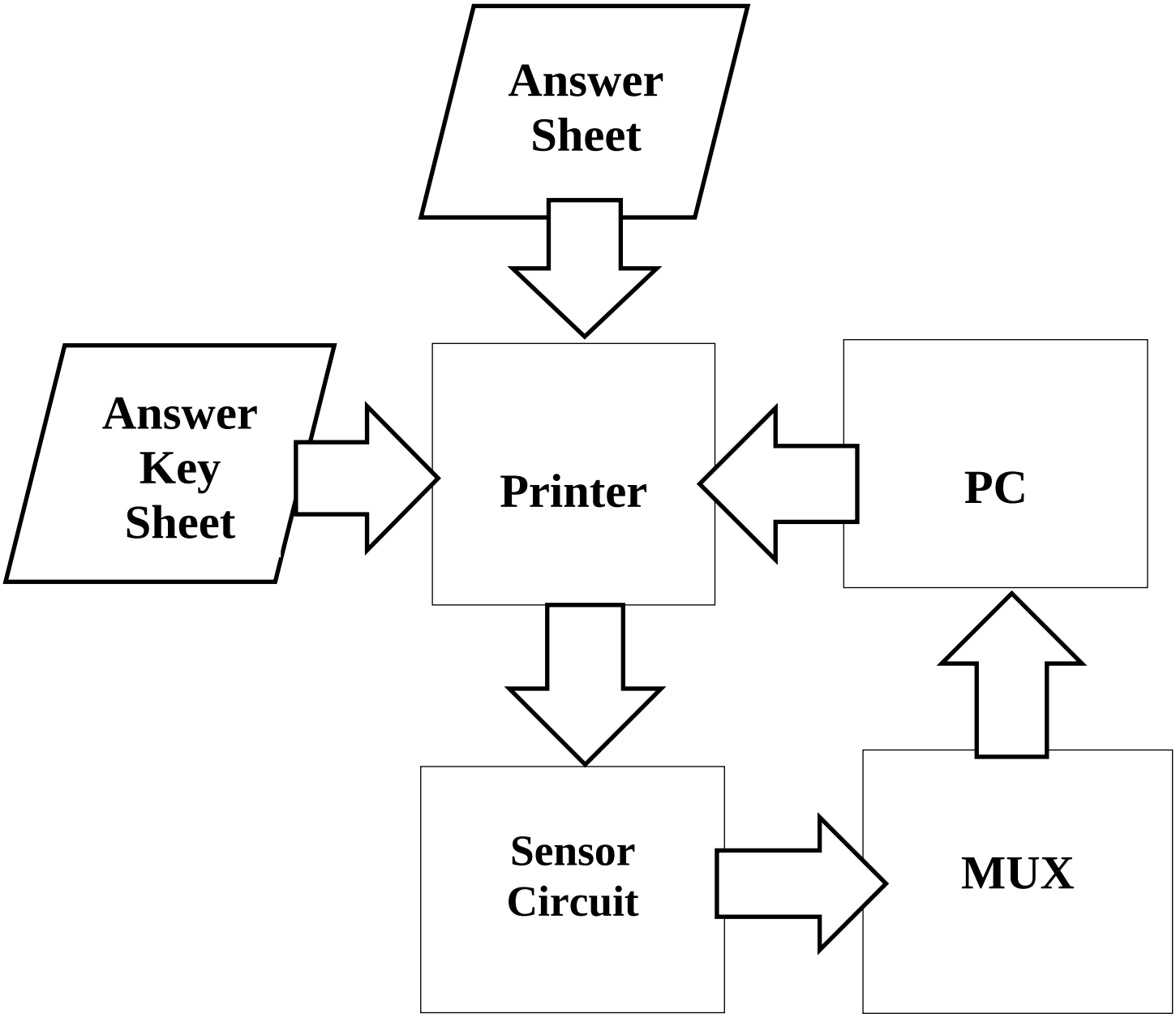

Figure 3-1. Block Diagram for the Electronic Checker System

3.3 Hardware Schematic Diagram

The sensor circuit for detecting answer uses infrared sensors. Eight sensors are used for answers. The variable resistors were used to adjust the sensitivity of the sensors as shown in Figure 3-2. Hardware Circuit Diagram. The principles behind the prototype were the conductivity of carbon and reflection of light by the use of sensors. The idea was how black absorbs light and how transceiver sensors detect black.

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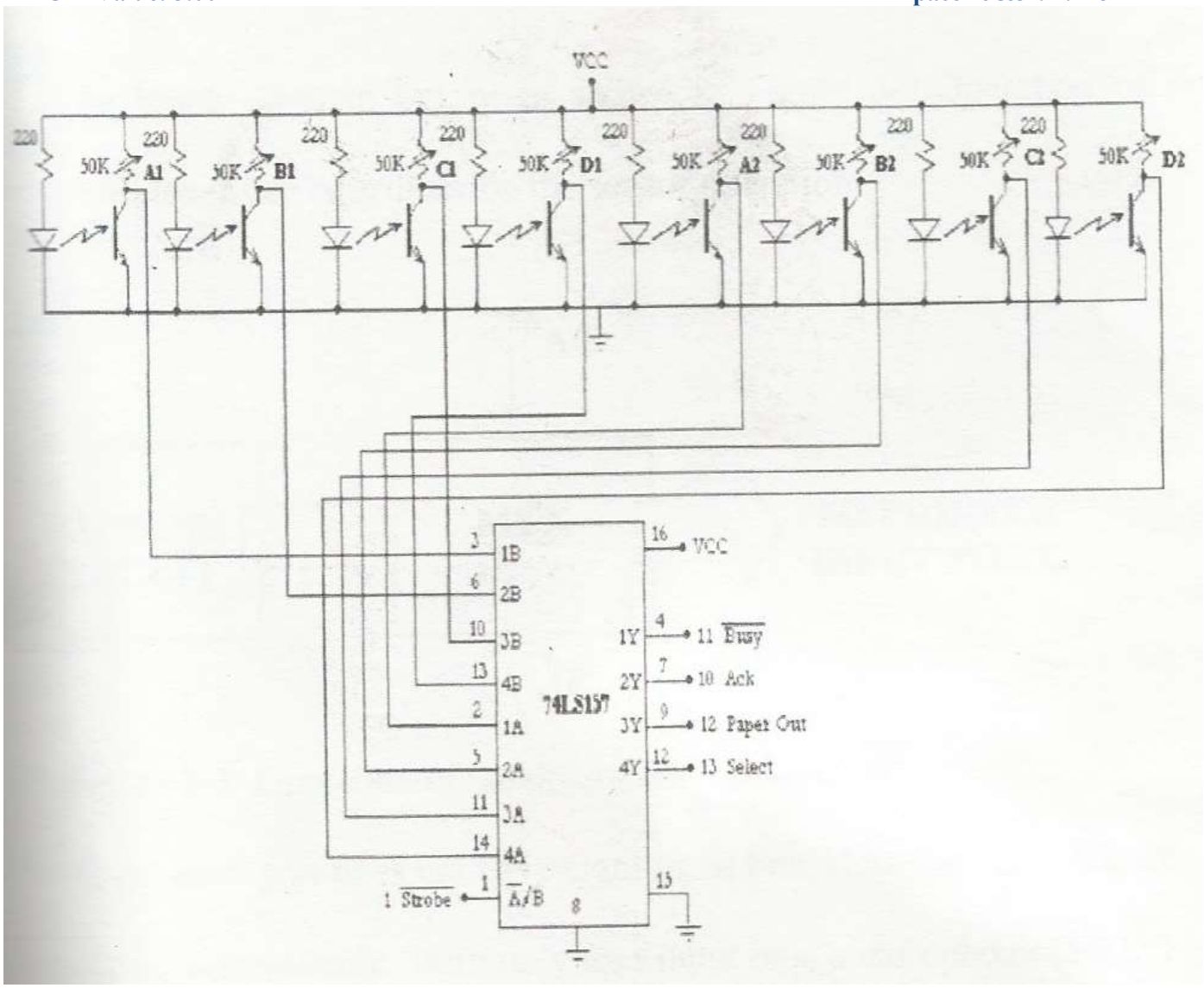

Figure 3-2. Hardware Schematic Diagram

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3.4 Circuit Description

The block diagram below as shown in Figure 3-3. Operation of the sensor multiplexer can best describe the sensor operation.

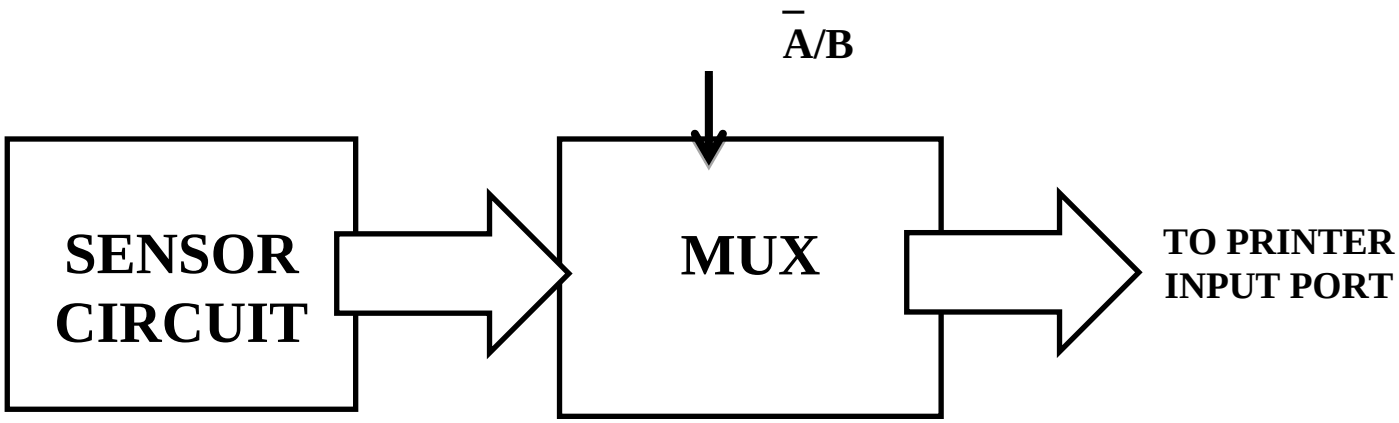

Figure 3-3. Operation of the sensor and multiplexer

The printer port does not have eight input bits. However, four bits on the status port are available. With only four inputs bits, a multiplexer (MUX) is needed to switch in each 4-bit set of data from the 8 bits of data from the sensor circuit. The output of this multiplexer goes directly to the printer input port.

Nibble mode is the preferred way of reading 8 bits of data without placing the port in reverse mode and using the data lines. Nibbles mode uses a Quad 2 line to line 1 line multiplexer to read a nibble of data at a time as shown in Fig. 3.4. Pin configuration of the Multiplexer (74LS157) used. Then it "switches" to the other nibble and reads it. Software can then

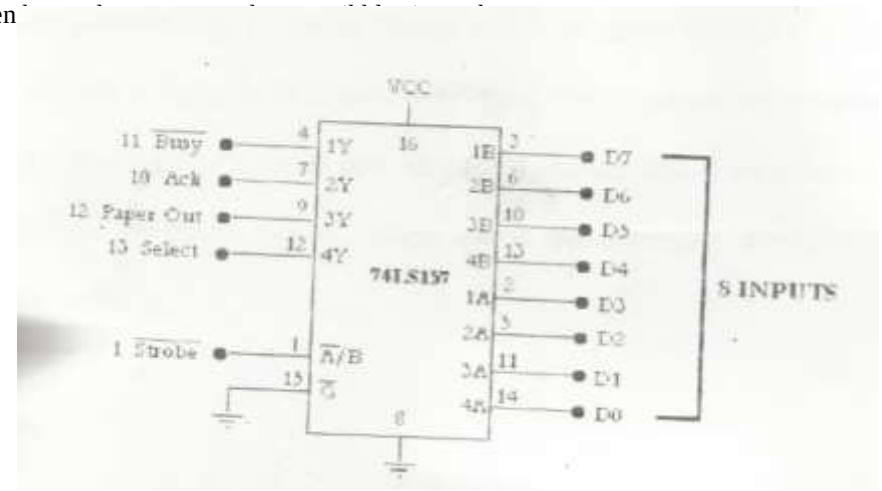

Figure 3-4. Pin Configuration of the multiplexes (74LS157) used

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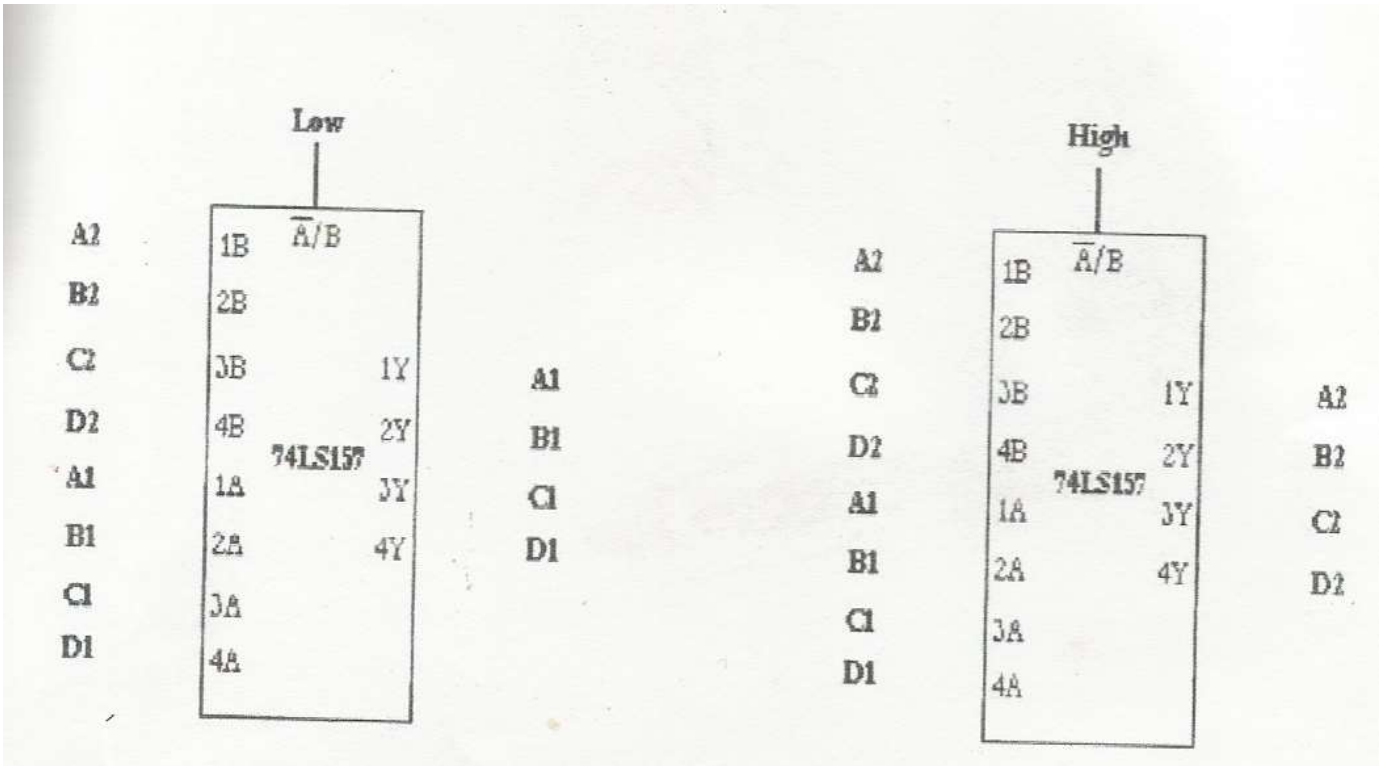

Figure 3-5. Operation of the multiplexes 74LS157

The operation of the multiplexes 74LS157 as shown in Fig 3.5. operation of the sensor and multiplexer, Quad 2 line to 1 line multiplexer is quite simple. It simply acts as four switches. When the A/B input is low, the A inputs are selected. E.g. 1A passes through to 1Y, 2A passes through to 2Y etc. when the A/B is high, the B inputs are selected. The Y outputs are connected up to the Parallel Port's status port, in such a manner that it represents the MSnibble of the status register. while this is not necessary, it makes the software easier.

3.5 Design/Flowchart of the Program

The following figures shows the design/flowchart of the program.

Figure 3-6 shows Password flowchart of the system. The user will be asked to key in a password, the input will be compared against the default password for authentication. If it is equal, the program will exit and transfer the control to the calling function otherwise an invalid message will be displayed and will be asked to input again.

Figure 3-7 shows Scan flowchart of the system. Get the number of items. The items will be asked. If the number of items is less than the first condition which is 50, get the ID number, Call Scan_AnswerSheet () function then return to the calling function. On the other hand, if it does not satisfy the first condition, check whether it is less than 100. If it is, get the ID number and call the Scan_AnswerSheet() function. If all conditions were not satisfied, display an invalid entry message and get number of items again.

Figure 3-8 shows Scan_AnswerSheet() flow chart – for 50 item maximum. Counter variable will be initiated to zero to start the count. The counter will check if it is less than 5, while it satisfies the condition. The decoded first byte will be assigned to answer variable with counter as its index. The decoded second byte will be assigned to answer variable with counter added by 50 as its index., after which the counter will be incremented by 1. Until the value of counter is not less than 25, the function exists and returns the control to the calling function.

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Figure 3-9 shows Scan_AnswerSheet2() flowchart – for 100 items maximum do the same with Figure 3-9 but change 25 to 50.

Figure 3-10 shows Scan_Idnumber() flowchart. Initialize counter variable to zero. Compare current value of the counter with the default value. While it is true, decoded bytes will be assigned to a variable with counter as its index, and then the counter will be incremented by 1. When the current counter value is equal or greater than the default value, the function exists and returns the control to the calling function.

Figure 3-11 shows Sort_by_Name flowchart. Initialize both variables to zero, while the counter is less than the total entry. Compare name{counter} with name{counter+1}. If it's true, calls Swap_Record() function then assign flag with 1. Otherwise increment the counter while you and again with the total entry value. The function exits when the counter value exceeds the total entry value.

Figure 3-12 shows Swap_Record() flowchart. The function works using a temporary variable that will hold the current value passed by a variable name[counter], then this variable will hold a new value from another variable name[counter+1], with this last variable name[counter+1] will hold the data stored from the temporary variable. The only reference is the counter index.

Figure 3-13 shows Search flowchart. Initialize counter variable to zero. Get ID number, compare counter value is less than total entry value then compares the inputted value against stored values referred by its index value. If it is true, then display the record otherwise increment the counter and compare with the total entry value. The program will only exit if either of this condition is meet. Input value is equal to some stored value or the counter value exceeds the total entry value with a display of no record found.

Figure 3-14 shows Refresh flowchart. The purpose of the function is to clear all values of Name, Score, ID number by assigning NULL values to it until the counter variable exceeds the total entry value.

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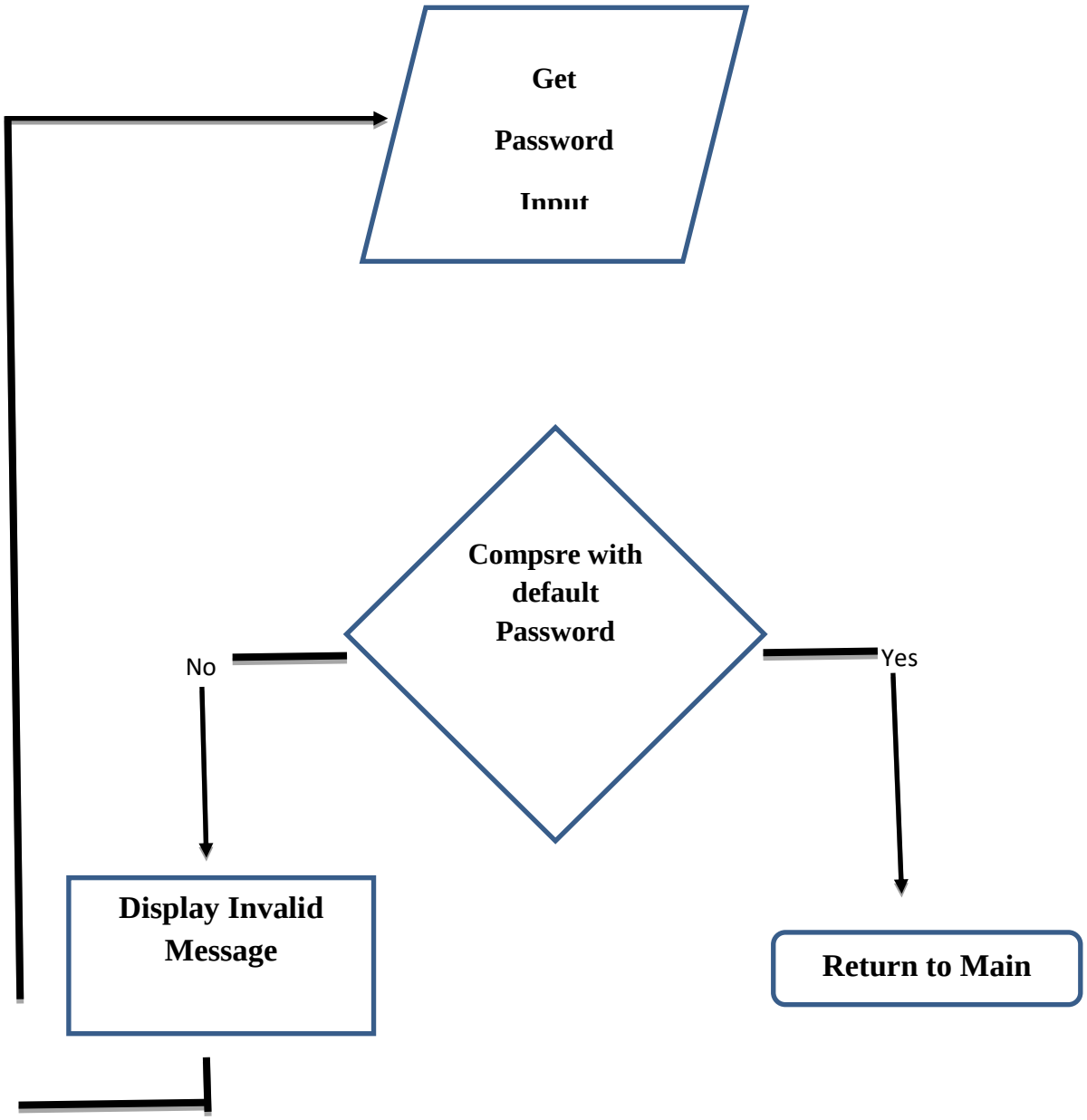

Figure 3 – 6. Password flowchart of the system

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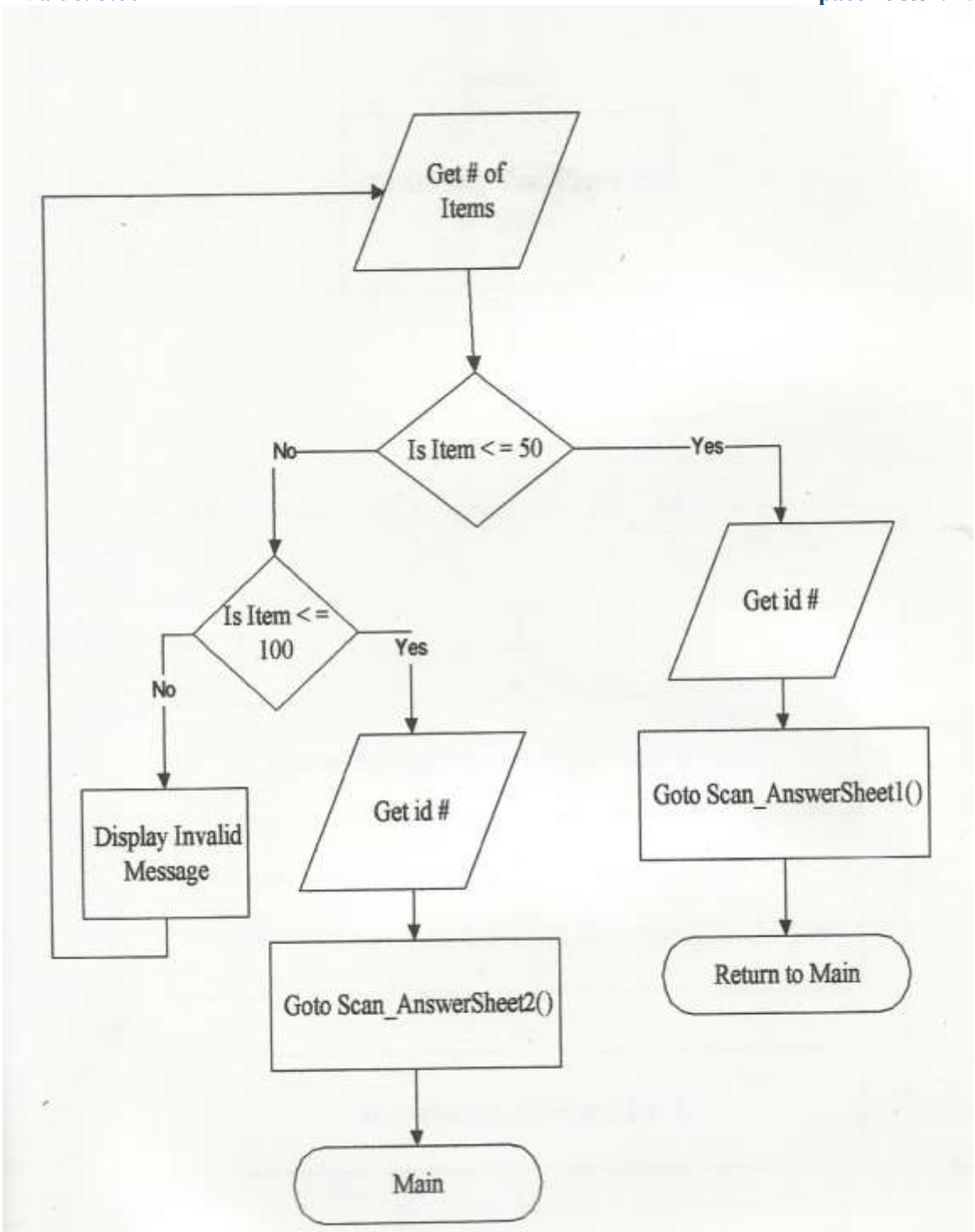

Figure 3-7. Scan flowchart of the system

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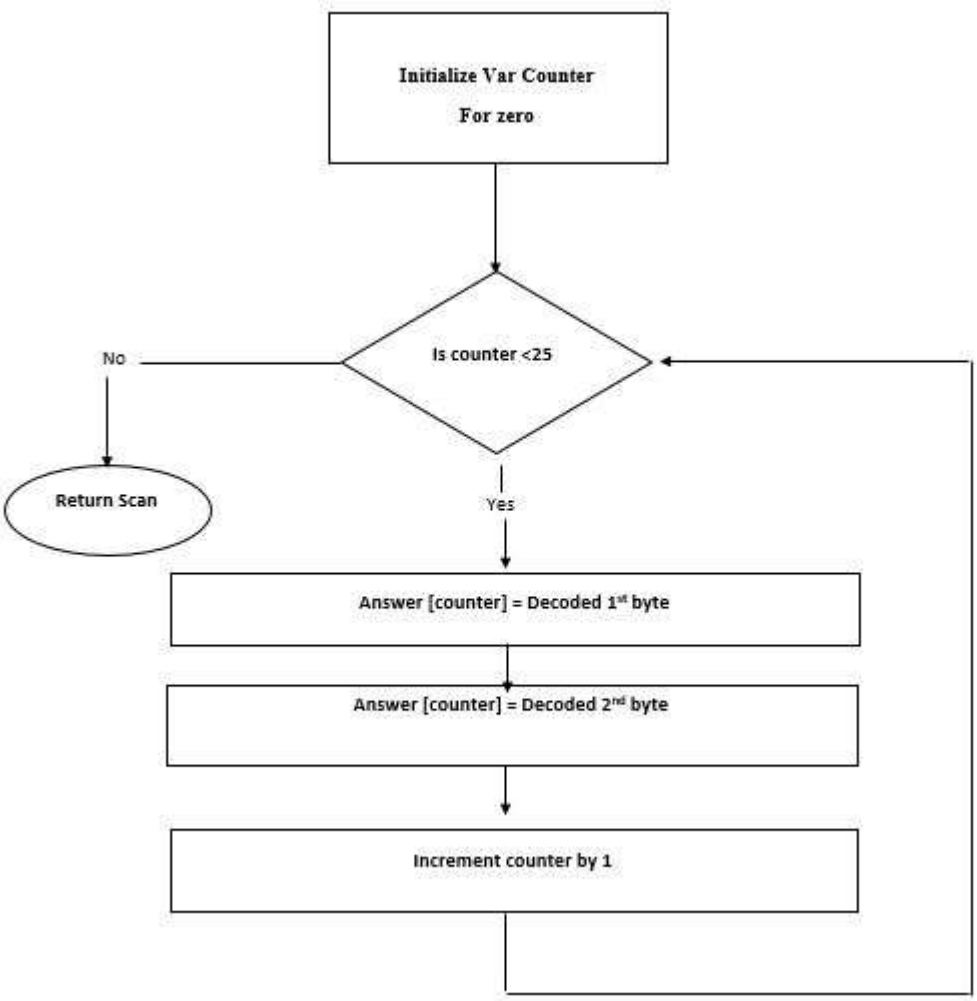

Figure 3-8_AnswerSheet()flowchart-for 50 item maximum

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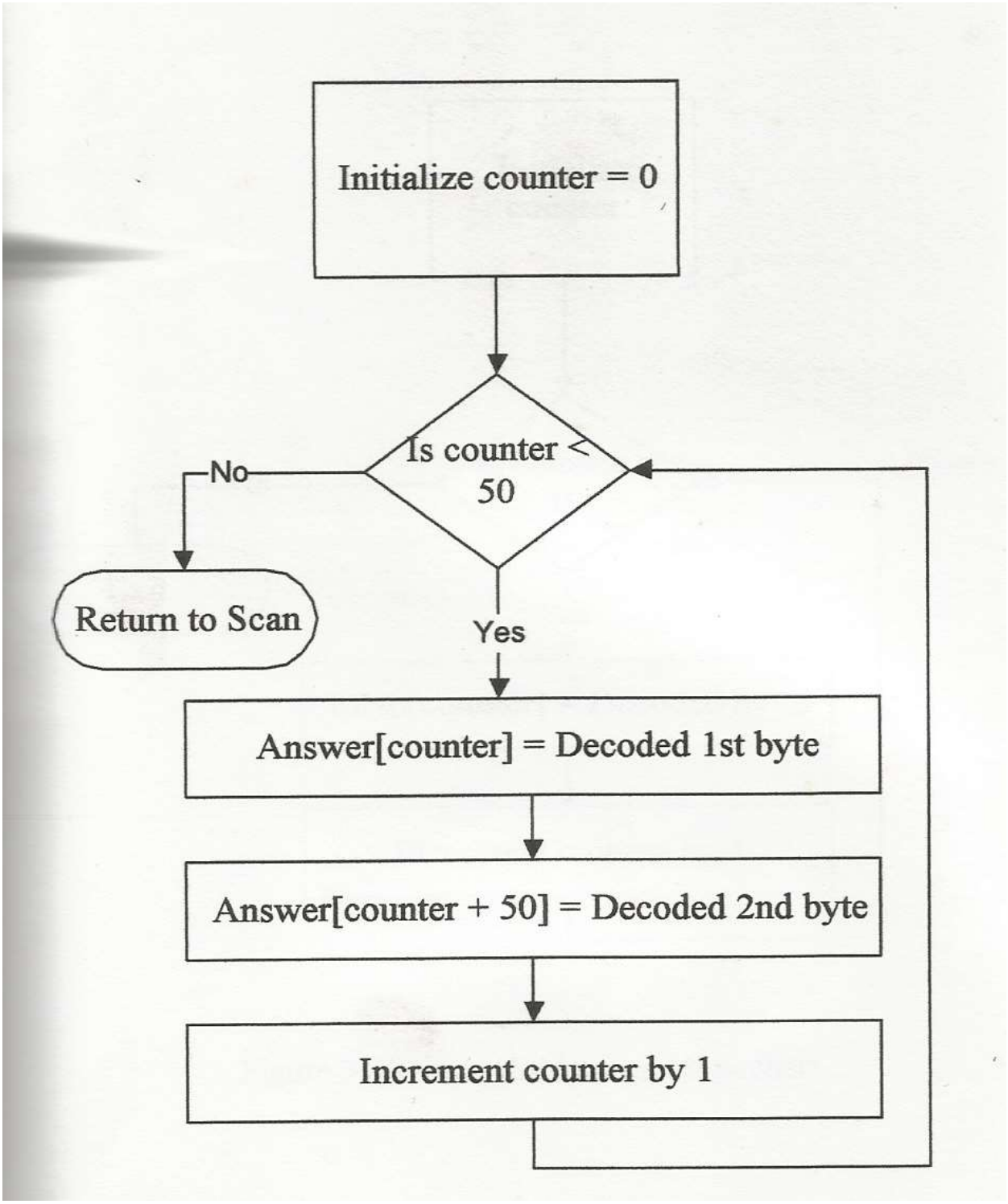

Figure 3-9_AnswerSheet()flowchart-for 100 item maximum

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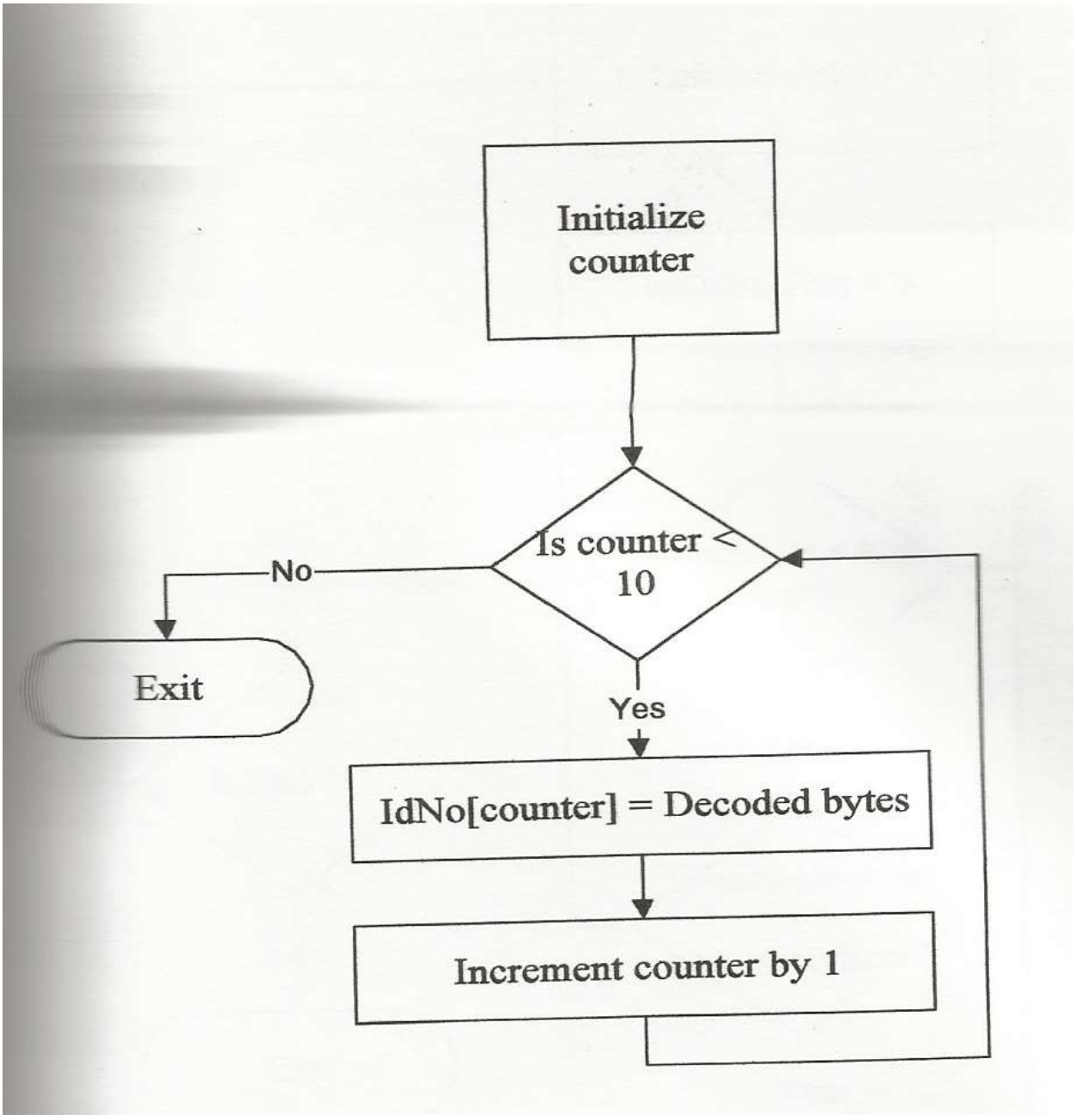

Figure 3-10. san_IdNumber()flowchart

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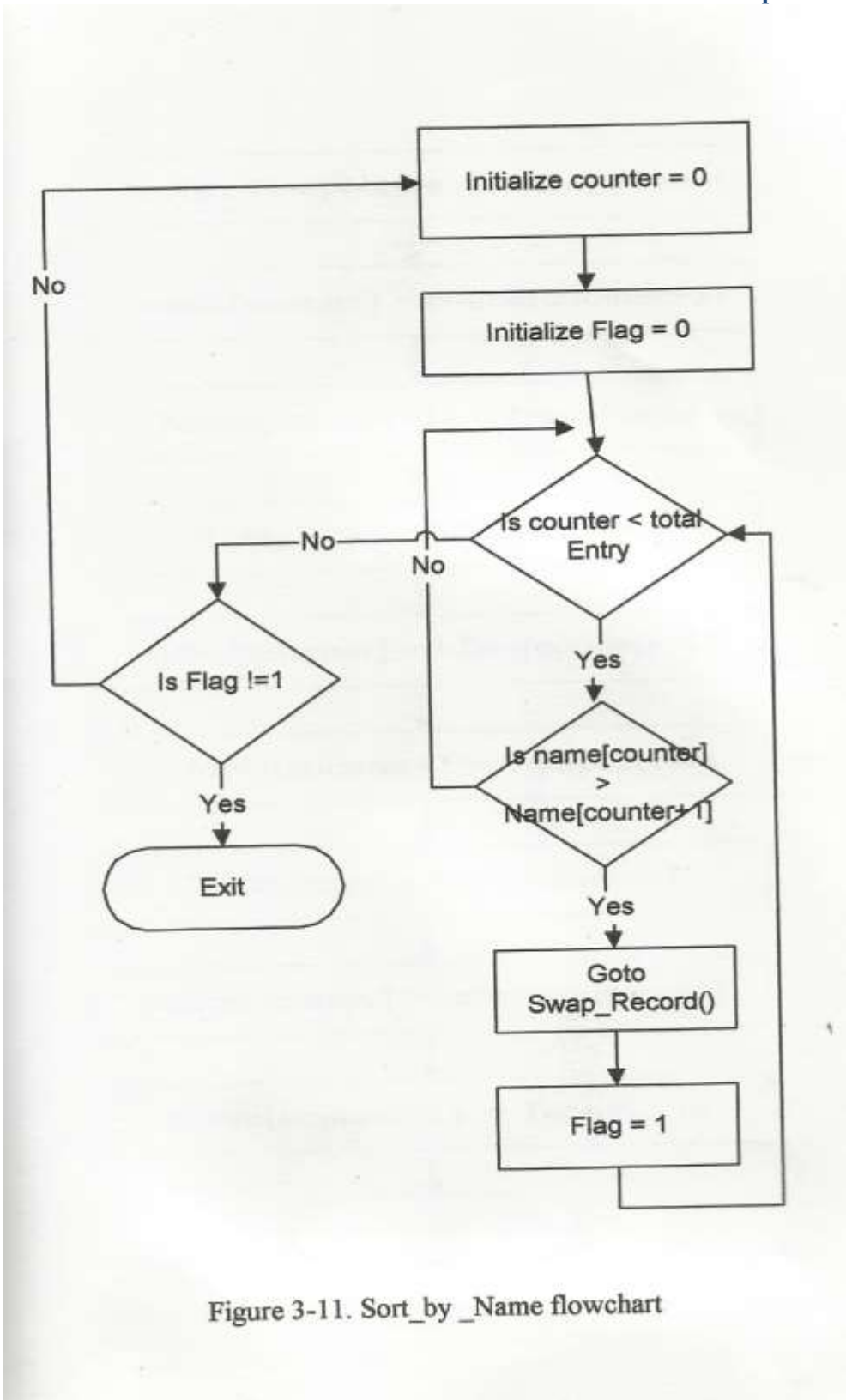

Figure 3-11. Sort_by _Name flowchart

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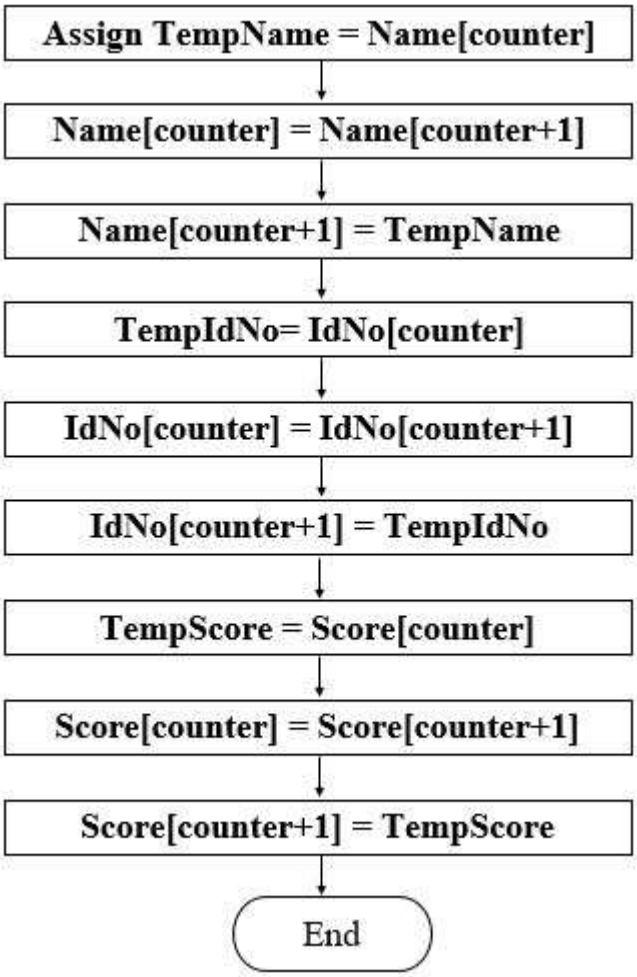

Figure 3-12. Swap_Records() flowchart

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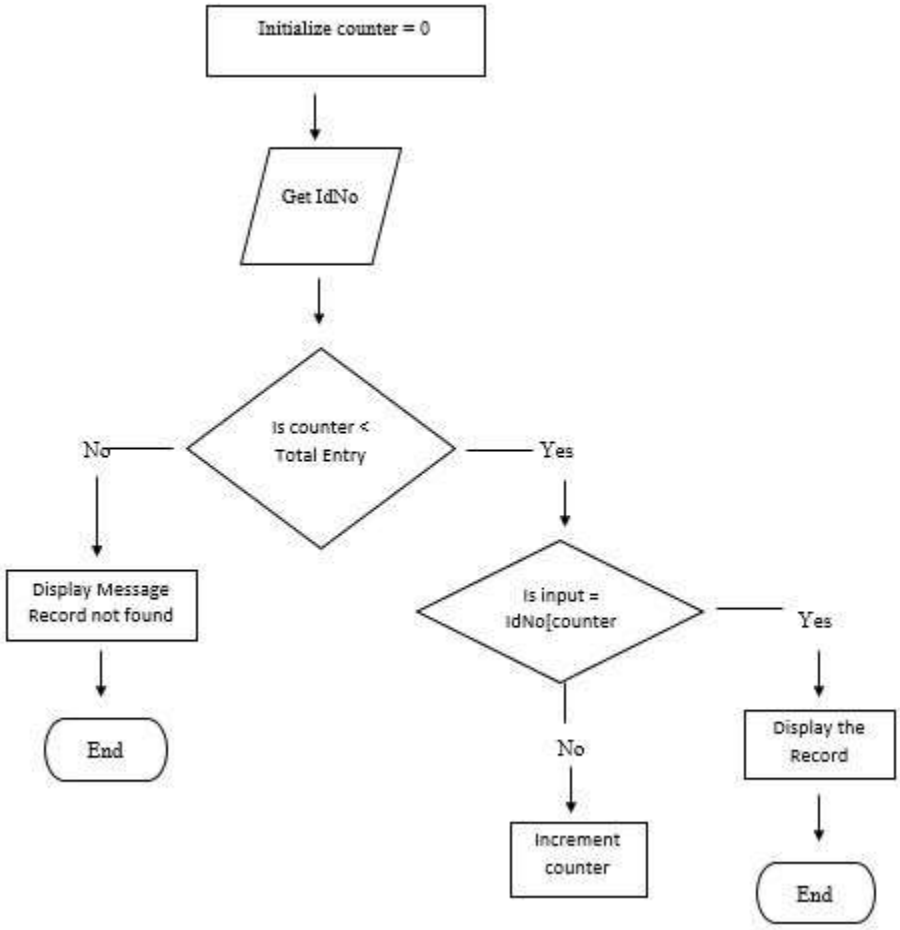

Figure 3-13. Search flowchart

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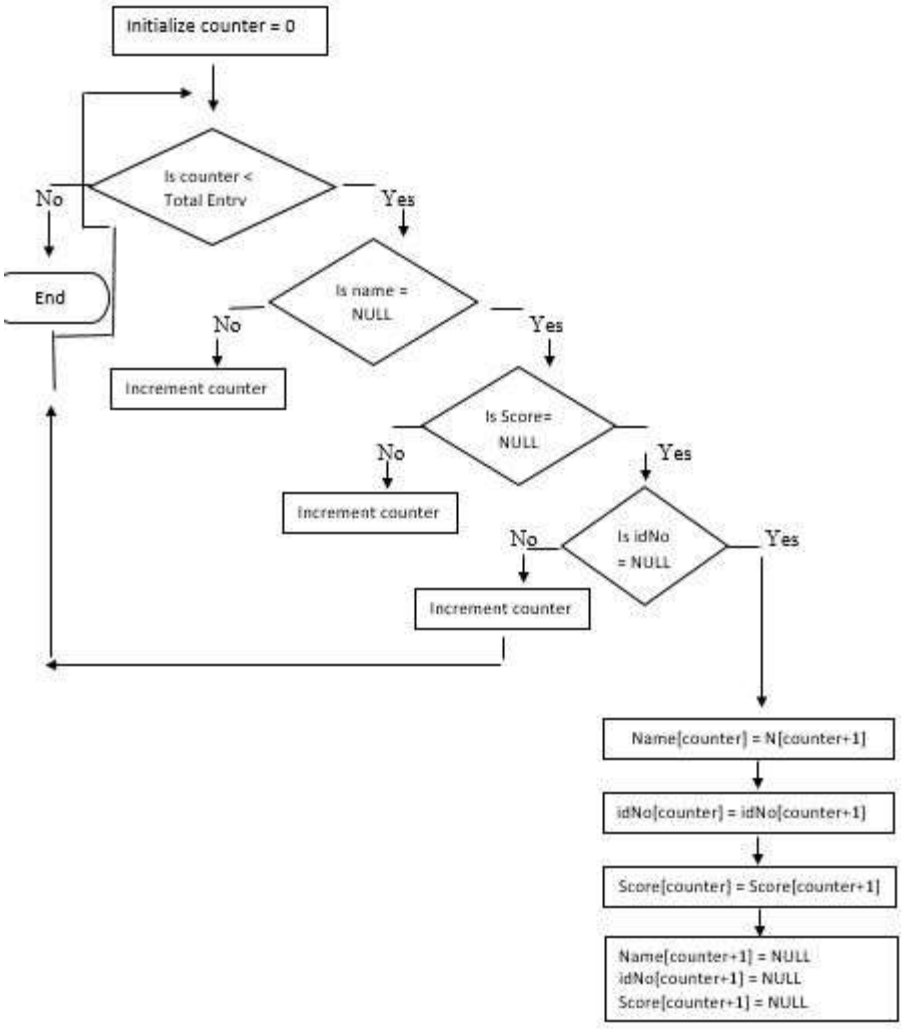

Figure 3 – 14. Refresh flowchart

IMPLEMENTATION OF THE ELECTRONIC CHECKER SYSTEM

4.1. Hardware and Software Design

With the escalating desire to improve our way of life, man as a rational being never stops looking and searching for inventions that will eventually bring forth welfare and comfort to humanity that is earth friendly.

Thus, the proponent, who is an educator of a state college, particularly at the Naval Institute of Technology situated in the Northern part of Leyte came up with an idea to design a machine that will eventually help n saving time, effort and energy in checking the papers of the conducted standardized entrance examination, that is every opening of the school year of the said state college. More so, the designed machine will also be used in checking other test papers for as long as the type of exam is multiple choice.

The design is called, PC based Electronic Checker for the Standardized Entrance Examination.

Low cost, because it only entails minimal amount of money to come up with the system compared to the existing commercialized electronic checker in the market today. Love of work, ingenuity, patience and perseverance3 to come up with a workable system are the only investment to realize this system which is helpful to the college and in one way or the other, may add prestige to the institution because of its fast delivery of service to its clientele. The

PC Based Electronic Checker for the Standardized Entrance Examination requires 220 volts supply. Before turning on, inspect whether the connector is properly attached to the parallel port. A password is needed to ensure that only the authorized user is operating the system that is for security reasons on the part of the system and the concerned individuals assigned to take care and carry out the efficiency of the working condition of the system. The feeding of the answer sheets is the same as feeding paper in a printer. Items are answered by marking specified areas of the examination sheet with the use of carbon pencil. The answer key sheet is to be scanned are being compared with. The shaded area of the scanned sheets as well as the results of the scanned answer sheets such as ID numbers and scores are displayed in the monitor and can be manipulated through the software, programmed in Turbo C++. The software is capable of sorting the names and ID numbers, searching records, ranking the scores, and also provides the database used.

4.2 Performance Evaluation

The system checks 3 answer sheets per minute. The percentage error depends on the darkening and shading the area for the specified answer. Carbon pencil with high intensity s recommended to provide accurate result. The final performance was acceptable when tested during the final examination of the students. A faster and efficient result is achieved compared to the old style of checking which is the manual checking. Compared to the existing system, Op – scanner is more preferable in terms of speed, efficiency and accuracy. But in terms of cost, the PC Based Electronic Checker s cheaper yet as effective as its predecessors. The user can modify, improve and reengineer the design to compete the existing electronic checker in the market in terms of speed accuracy and efficiency.

4.3 Economic Evaluation

The Existing Examination Checker System

Behind the advantages it can give, some problems are still encountered by the user. The Op – Scanner cost provide to have their own op – scanner. Other universities, colleges and companies are contented to rent it for a couple of day just to make the checking of the examination for a minimal time to have more reliable results. Aside for being expensive, it requires a proper knowledge to operate this. The operator of this machine must learn the dos and don'ts from the provider of the machine, to ensure successful checking.

The Proposed System

The low cost PC Based Electronic Checker for the Standardized Entrance Examination is an example of a software and hardware interaction. This is developed to check examination paper automatically rather than dong t manually. It serves as the best solution for the existing problem that provides the following:

PC Based Examination Checker is a cost effective one. This is means that it is developed to provide the same function through the application of the principle of the printer's roller mechanism n\but in economical cost. The components of the hardware are locally available and there is a wide range of electronics stores in the city. The cost of each differs from one store to another. The materials will be purchased in stores where, their cost are more affordable. The estimated cost of this project is assumed to be worthy and reasonable for its performance in giving an accurate checking capability.

The operation is easy, that anybody can operate. The machine is developed to be a user friendly one.

QUANTITY	UNIT	DESCRIPTION	UNIT PRICE (P)	TOTAL PRICE (P)
1	Piece	Ink Jet Printer (BJ200)	1,500.00	1,500.00
8	Pieces	IR Sensor (Black)	30.00	240.00
8	Pieces	IR LED (Blue)	9.00	72.00
1	Piece	74LS157	12.50	12.50
2	Pieces	6V Relay	28.00	56.00
2	Pieces	2N222	2.00	4.00
2	Pieces	IN4001	1.00	2.00
8	Pieces	Potentiometer (50KQ)	12.50	100.00
8	Pieces	Resistor (2200)	0.25	2.00
1	Pieces	DC Adaptor	135.00	135.00

4	Pieces	LED	2.00	8.00
2	Pieces	PCB 201	20.00	40.00
2	Pieces	PCB 401	33.00	66.00
1	Piece	DB 25(Male)	30.00	30.00
12	Pieces	TCR Block	12.50	150.00
1	Piece	RS232 Cable	60.00	60.00
2	Pieces	RJ 45	7.50	15.00
1	Piece	Modular Jack	25.00	25.00
1	Piece	1C Socket	4.00	4.00
4	Feet	LAN Cable	4.00	16.00
4	Meters	Stranded Wire	1.25	5.00
3	Meters	Solid Wire	1.25	3.75
2	Feet	Ribbon Wire	24.00	48.00
5	Meters	Soldering Lead	5.00	25.00
1	Piece	Casing	400.00	400.00
60	Pieces	Oslo Paper	1.00	60.00
1	Piece	AC Plug	15.00	15.00
1	Piece	Switch	10.00	10.00
1	Box	Screw	20.00	20.00
1	Quart	Pant	120.00	120.00
			TOTAL	**P 3,244.25**

4.4 Results

The PC Based Electronic Checker for the Standardized Entrance Examination requires 220 volts power supply. Before turning on, inspect whether the connector is properly attached to the parallel port. A password is needed to ensure that only the authorized user is operating the system. The device is composed of a printer, used to feed paper, and infrared sensors for detecting answers. Item are answered by marking specified areas of the answer sheet with the use of carbon pencil. The project is designed to respond to the shaded areas. The answer key is to be scanned and to be stored first in the memory. If the answer or the shaded area in the answer sheet is incorrect, the computer will disregard the converted digital value. Otherwise, the computer will increment the score. After the answer sheet has been scanned, the id number and the score will be displayed on the screen.

The system is composed of hardware and software. The hardware composes the printer, computer, multiplexer, sensor, keyboard, mouse while the software the system programmed in Turbo C++, thus it is capable of sorting the names and ID numbers, searching records, ranking the scores, and also provides the database used.
Moreover, the design of the electronic checker system has been fashioned to suit to the needs and demands of the user. No further complexities have been installed in the system, so that it will be user-friendly.

CONCLUSIONS

This study was presented the requirements, design and development for the new PC Based Electronic Checker for standardized entrance examination. The system checks 3 answer sheets per minute. The percentages for the error depended on the darkening and shading the area for the specified answer. The final performance was acceptable when tested in the university entrance examinations. From the store of information made available to and actually analyzed by the researcher, the following conclusions are drawn: The PC Based Electronic Checker provides quick result, which fasten the computation of the student's grade. It minimizes the error in checking and counting the correct answers. It uses specified formats that will make the students answering each item at ease. The students must follow directions and instructions properly. It simplifies the task by predefining formats for the materials used for the system. A faster and efficient result can be achieved, only if the device is modified and redesigned.

RECOMMENDATIONS

On the basis of the conclusions reached in this study, the following recommendations are proposed: The user can modify or improve the existing system based on their needs. The answer keys can be encoded instead of manually feeding it into the printer. Infrared sensor are highly recommended though it is expensive but it assures of an

accurate and better result. Carbon pencil with high intensity is recommended to provide accurate result. At most care and familiarization of the process on how to operate the system is necessary.

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