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Biometric System for Class Attendance

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A B S T R A C T

Whole world and administrators of Educational institutions' in our country are concerned about regularity of student attendance. Student's overall academic performance is affected by the student's present in his institute. Mainly there are two conventional methods for attendance taking and they are by calling student names or by taking student sign on paper. They both were more time consuming and inefficient. Hence, there is a requirement of computer-based student attendance management system which will assist the faculty for maintaining attendance of presence. The paper reviews various computerized attendance management system. In this paper basic problem of student attendance management is defined which is traditionally taken manually by faculty. One alternative to make student attendance system automatic is provided by Computer Vision. In this paper we review the various computerized system which is being developed by using different techniques. Based on this review a new approach for student attendance recording and management is proposed to be used for various colleges or academic institutes.

Introduction

Biometric can be defined as any automatically measurable, robust and distinctive physical characteristics or personal trait that can be used to identify an individual or verify the claimed identity of an individual [9]. It is also science and technology of authentication by measuring persons' physiological or behavioral features.

In order to keep record of class attendance in most institution in developing countries like Nigeria, the process being adopted is the use of pen and paper for student class attendance, and this has been prove to be very stressful, time consuming, unreliable, inaccurate and inefficient [1]. Empirical evidences have shown that there is a significant correlation between students' attendances and their academic performances [1]. There was also a claim stated that the students who have poor attendance records will generally link to poor retention [2]. This is also agreed by

Mazza and Dimitrova where they both claimed that the students' attendances to the course may indicate their behaviours towards the subject where it can be used to judge their tendency and commitment to the course [3].

Attendances of every students are being maintained by every school, college and university. Faculty has to maintain proper record for the attendance. The manual attendance record system is not efficient and requires more time to arrange record and to calculate the average attendance of each student. Hence there is a requirement of a system that will solve the problem of student record arrangement and student average attendance calculation. The proposed system should store the absent and present student's attendance details in electronic format so that management of attendance becomes easy.

According to the research carried out by [7], it was discovered that the use of biometric for attendance has eliminated need for stationary materials and personnel for keeping records, thereby reducing stress of manual attendance process.

The use of computerized biometric examination screening and class attendance monitoring system with fees management will eliminate impersonation of candidates during examination; also eliminate idea of student writing names of absent student on the class attendance list. The system can also be used to verify student tuition payment status either in the classroom or before entering examination hall. A fingerprint scanner will be used to collect fingerprint sample and with the aid of an application it will be used to detect those unique features to identify the person by comparing the features to sample on database. The uniqueness of fingerprint is determined by the pattern of ridges and furrows as well as the minutiae points [8].

How does it work?

Fingerprint identification is the oldest method that has been successfully used in numerous applications. Each of our ten fingerprints is different from one another and from those of every other person. Even identical twins have unique fingerprints. That makes them ideal for personal identification. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint is determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur when a ridge splits apart or a ridge ends.

When the student returns to be identified, the finger scanner again scans the finger. The computer software now compares the new template with the other templates in the database. When a matching template is found, the student is identified. This identification and matching process takes under one second to complete. At no time is a fingerprint image ever stored and no fingerprints can be recreated from the template.

There are some problems in conventional attendance tracking system like one is a student missing out their name, while the other leads to a false attendance record. Another issue of having the attendance record in a hardcopy form is that a lecturer may lose the attendance sheet [7].

Finger is scanned and Unique points identified.

Points are transferred to binary number. The fingerprint is then

Number is encrypted and equals the student's ID number.

Fig 1.0 Biometric Scan Technology

For student attendance analysis, to obtain the student attendance percentage, manual computation has to be performed by faculty. Old conventional methods for student attendance is still used by most of the universities. As this method is used, many students are helping their friends by signing in their attendance in case of their absent in the institute. So while this method is used, attendance records are analyzed and maintained manually by the faculty to know the present and absent student list.

The faculty has to take attendance again if the attendance sheet is being lost and in this case absent students get chance to make their present in new sheet. This procedure, besides being troublesome for lecturer, it will also affect students as time is expended on signing, verifying and submitting the attendance sheet manually. Therefore, a computerized system that can manage and help the lecturers to take attendance easily and maintain that attendance has to be developed. The faculty can easily access this system. Manipulation and management of student attendance data have to be taken care by the system so that the manual analysis of student attendance by the faculty will be removed. The system should automatically analyze all the data as it was transferred by the faculty.

Technological improvements can be useful tools to help in the development of new systems to eliminate the disadvantages of the classical methods while enhancing its advantages. All of this review has shown that in most of the higher academic institutions attendance records have primarily become the proxy to determine the student's success. In this paper for student attendance, I worked on present a unified management system using information technology for different purpose in an organization.

The main objective of this project work is to completely eradicate problems of data loss, manipulated attendance record and most of the problems stated above in section 1.2 above. Also the application will have the following gain after implementation:

A. Consistency: The use of relational database system to store data eradicates problems of data errors, redundancy and data duplication; hence increasing data consistency.

B. There is Security and Integrity in Fees & Data management.

C. This software is very efficient in terms of speed of processing, student screening and space as records are accessed and modifications are made faster.

D. The system is very flexible to operate and personnel can easily be trained to handle it.

File operations are automatically maintained.

This work is targeted at developing a simulated application to explain how the computerization of a class attendance system will help improve the performance of the students in the school. Hence study was focused on the computerization of the attendance system of at the computer science department of Michael Okpara University of Agriculture Umudike. Hence the concentration of the work was on class attendance only using biometric system, hence the project work didn't expanse on other areas of either the biometric.

One of the many challenges facing schools today is accurately identifying students. The bottom line is that some schools receive federal and state money based on accurate and auditable records. In addition, schools need to provide a safe and secure environment for everyone on campus. Now more than ever, accurate student identification attendance system is key to the efficient operation of a school. Over the past few decades, schools have been implementing all kinds of new technologies to both enhance learning and improve operations. Smart boards, laptops and real-time internet resources are just a part of a student's everyday experience while some schools world-wide have been implementing biometric finger scanning to streamline operations, increase teaching time and enhance security. The adoption of an accurate biometric scan system will no doubt fill in the missing gaps and enhance the way attendance in schools are taken.

The research was limited to the university's attendance system and targeted at the computer science department of Michael Okpara University of Agriculture Umudike since it has direct concern to the research topic. The report cannot only be applied to at the computer science department of Michael Okpara University of Agriculture Umudike but also to any other institutions and establishment that wish to embark on the computerization of their attendance section of their organization. This research was carried out simultaneously with normal academic studies hence there was little to no time for a comprehensive research work.

Finance also affected this research work on area of typing and binding transporting form one library to the other in search of reliable information and also transporting to and from other related institutions. In summary this project work was faced with a number of restricting factors, which made the work impossible to get beyond this scope. The most pressing factors were:-

i. lack of finance
ii. epileptic power supply
iii. inadequate supply of data
iv. Inadequate time for the project work.

Fig.2 Fingerprint Reader

When most people think of biometrics, they think about high security technology - a technology that the government uses for passports and border control, that banks use to combat identity theft, that police use to find criminals, that we see in the movies. But the high cost, high security, futuristic biometric technology unthinkable in a school environment just a few years ago, is

here - and it's practical and affordable and being used in schools all over the world. Biometrics are automated methods of recognizing a person based on a physiological or behavioral characteristic. They include face, fingerprint, hand geometry, handwriting, iris, retina, vein and voice – anything that's a part of you.

Biometric technology has become an accepted method of identification. Specifically, finger scanning biometric identification has proven to be a better, faster, safer and more cost-effective solution than other methods of identification such as swipe cards and PINs. Finger scanning biometrics can provide an ideal solution for school administrators in their effort to identify and track students, provide accurate and auditable student records and provide a safer and more secure environment for students, teachers and staff. The following discussion provides information for school administrators who are evaluating biometric solutions for student identification, security and tracking.

Believe it or not, biometrics is not a new technology. The ancient Egyptians used bodily characteristics to identify workers to make sure they didn't claim more provisions than they were entitled - just like governments today are using biometrics to lessen fraud. Chinese merchants in the fourteenth century used palm prints and foot prints to identify children. Fingerprint recognition is by far the most developed technology today. It's trusted, cost-effective and easy to use. All biometrics have their strengths and weaknesses. The key is finding the right technology for the right application. Privacy Issues Biometric technologies don't conjure up the Orwellian fears they used to. Overall acceptance of biometrics has risen substantially over the past few years due to the after-math of 9/11, the proliferation of identity theft, technology improvements, and general understanding and awareness. Of course, some people still object at the mention of systems that scan fingerprints, but for the most part, people now understand that biometrics actually protect their privacy and that in most biometric applications, their fingerprints are not stored anywhere and their fingerprints can never be recreated from the encrypted digital template.

Why Biometrics in Schools?

Many areas in a school require identification. The most common kinds of identification currently in use are picture ID cards, PINs, and, of course, visual identification. Each of these methods creates its own issues and is a drain on the time and resources of IT departments. Cards are regularly forgotten, lost, mutilated and shared; PINs are easily forgotten, swapped or stolen. Also, visual identification is a poor solution, especially with today's considerable security concerns and reporting issues. By using biometrics for identification, the problems and costs associated with the current methods can be avoided and new standards of accountability can be put into place.

System Illustration Process

In the first block, new or existing student's biometric data such as fee management, department, semester and level are registered together with the fingerprint at the school's registration post (e.g. Bursars' office).

The second block is the Biometric application database which serves as the central database in which all information of each students is stored. It can be accessed based on the user rights assigned to all users by the admin. Other users can be the lecturer, department worker etc.

In the third block (various school departments), courses for students that have payed their tuition(s) are registered in the database and stored.. This can be done only if the school's registration post validates and gives permission to the student record.

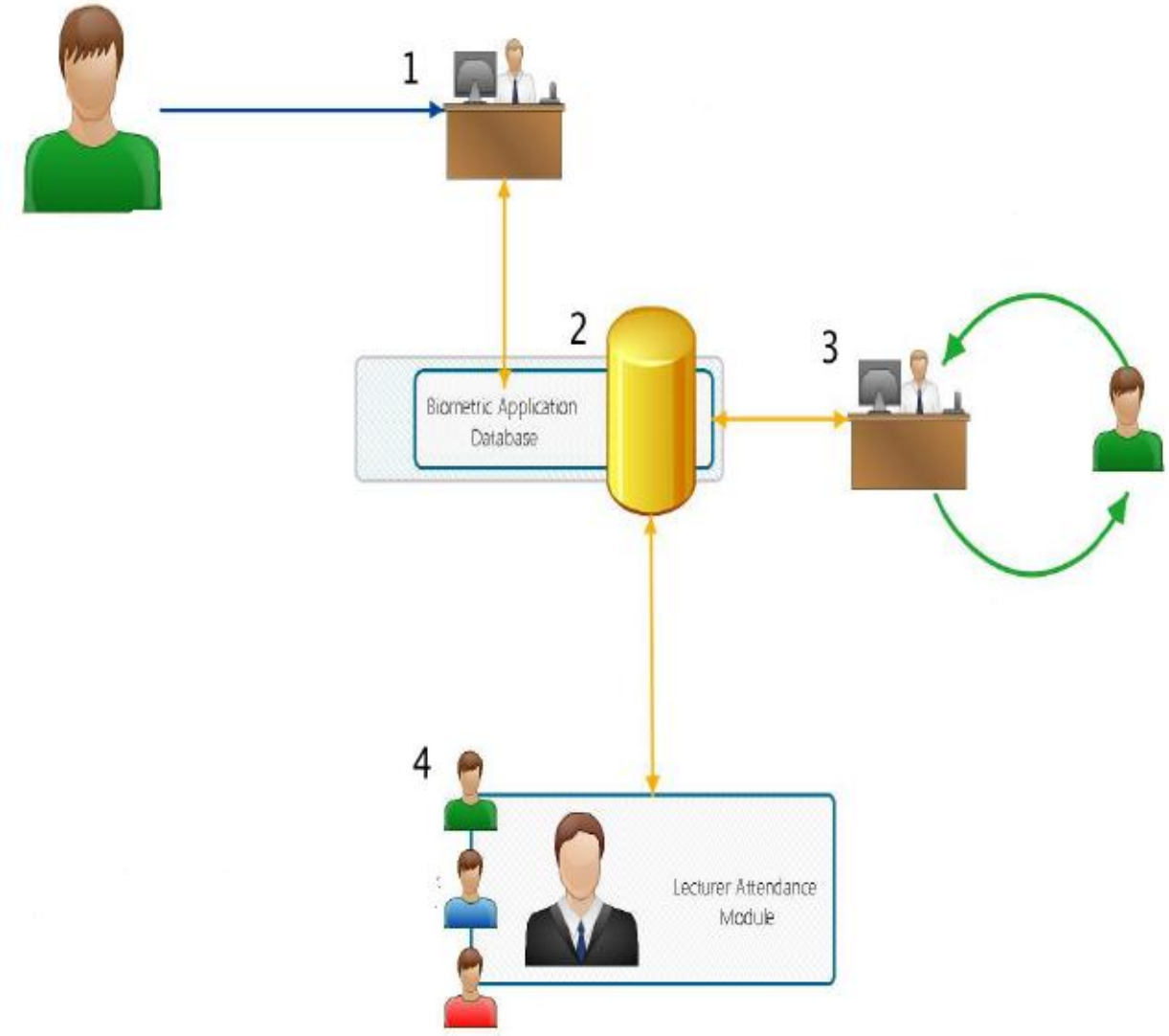


Fig.3 Practical Applications in Schools

The fourth block is divided into the lecture mode and examination mode. In the lecture mode, the lecturer uses a fingerprint module to get the attendance of all students in the class. The lecturer can either save or print the attendance taken.

In the examination mode, the fingerprint module is used for examination screening and attendance, whereby it would verify each students' qualification for the examination according to the stored infomation (fees management, course registration and 80% attendance in class). Also it takes the attendance for the examination twice, before entry into the examination hall during screening and after signing out.

Why would a school use biometrics? Quite simply, to save time and money - improve operations. Biometric technology can also provide benefits in terms of convenience,

safety and security. A typical first installation in a school is in the cafeteria where accurate records are critical for reimbursement from the federal government's $9 billion free and reduced lunch program. Schools can then use the same biometric database to identify students to other applications such as those used for attendance, in the nurse's office, in the library or media center and on the bus. Once biometrics is being used successfully in one part of a school, the idea is usually embraced in other areas as well. Schools even use it for student identification at athletic events and dances to keep out other students who don't belong.

School Access: A controlled environment is critical to a school's success. Access to the school must be permitted only to authorized persons. Students, teachers, staff and recurring visitors can be accurately time-stamped and identified using biometric finger scanning technology and attendance applications. Administrators will have an irrefutable record of the date and time of each person's entry into the building. Biometric finger scanning systems can assure administrators that those entering their schools actually belong there.

Attendance: School administrators are being held accountable by federal and state governmental funding sources for accurate and auditable attendance records since certain funding is provided based on the number of students who attend the school each day. Schools that have made errors in attendance reporting have been required to pay back hundreds of thousands of dollars to the governmental funding sources. Biometric finger scanning technology provides administrators with irrefutable proof of student attendance for accurate and auditable reporting. In addition, administrators can be provided with period-by-period attendance records in real-time, quickly identifying students who are not in the appropriate classrooms. Also, teachers of large classes, such as band, orchestra, chorus, and physical education can use the entire classroom period for instruction instead of using valuable time to take attendance.

Cafeteria: Most cafeteria debit systems use swipe cards or PINs. Schools are now using finger scanning to eliminate the expense and problems associated with these systems and to ensure accurate reporting. Biometrics are also being used in vending machines to increase reimbursements and decrease costs. In addition, by integrating a biometric finger scanning system with the cafeteria application, accurate lunch reporting for students entitled to the free or reduced lunch program is provided anonymously, with the important result of increasing participation by eliminating embarrassment.

Library: School libraries store thousands of dollars of schools' assets such as books, periodicals, recordings and pieces of art. Librarians can use finger scanning to replace library cards eliminating the sharing of library cards with students who have overdue materials.

Nurse's Office: School nurses are charged with dispensing medication to students every day. In many schools, nurses change duties or teachers and substitutes dispense medication when the school nurse is unavailable. Finger scanning provides an irrefutable record, and prevents any potential life threatening errors.

Transportation: School students get lost or get off at wrong schools and bus stops each day, especially young students. New bus drivers are hired throughout the school year due to turnover or their routes are frequently

changed. This makes it difficult for them to get to know the students well enough to visually identify them and where they belong. School districts have implemented finger scanning on buses in order to help the driver know if the student is on the correct bus, goes to the correct school and gets off at the correct stop.

Other Applications: Wireless applications now being developed can assist large schools in hallway monitoring. This technology can also be applied to off-site student identification for field trips and outdoor events. Emergency identification as a result of a fire or other disaster is a critical use of this technology.

As we move into the 21st century, schools are faced with a myriad of problems never encountered in previous decades. Security has become a significant concern. It is now crucial that school administrators know who is in their schools and where the students are at all times. Accurate and auditable attendance and reporting is vital in not only securing, but also maintaining, essential governmental funding. Accurate identification and tracking of students is now critical in all aspects of the day-to-day management and administration of our schools. Biometric finger scanning identification offers a cost-effective, reliable, easy and efficient way for school administrators to know for certain who is in their schools, where the students are each period of the day, and that they receive the services they require and deserve. By utilizing the unique fingerprint of the student for identification, tracking, and security, the problems and costs associated with the current expensive or inaccurate methods of identification are avoided. Finger scanning is the missing component that provides the irrefutable accuracy that has long been needed in our schools.

System Design and Analysis

The system adopted biometric access control techniques, which is designed with extended graphical user interface by using Microsoft visual studio 2012 and integrated with Microsoft fingerprint reader. The student information is stored by MSACCESS, which serves as database located in the user's computer or server. The access point is through the use of the simulated fingerprint scanner as an input device.

Design Architecture

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering.

If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development,"[3] then design is the act of taking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. Until the 1990s systems design had a crucial and respected role in the data processing industry. In the 1990s standardization of hardware and software resulted in the ability to build modular systems. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering.

Object-oriented analysis and design methods are becoming the most widely used methods

for computer systems design. The UML has become the standard language in object-oriented analysis and design. It is widely used for modeling software systems and is increasingly used for high designing non-software systems and organizations.

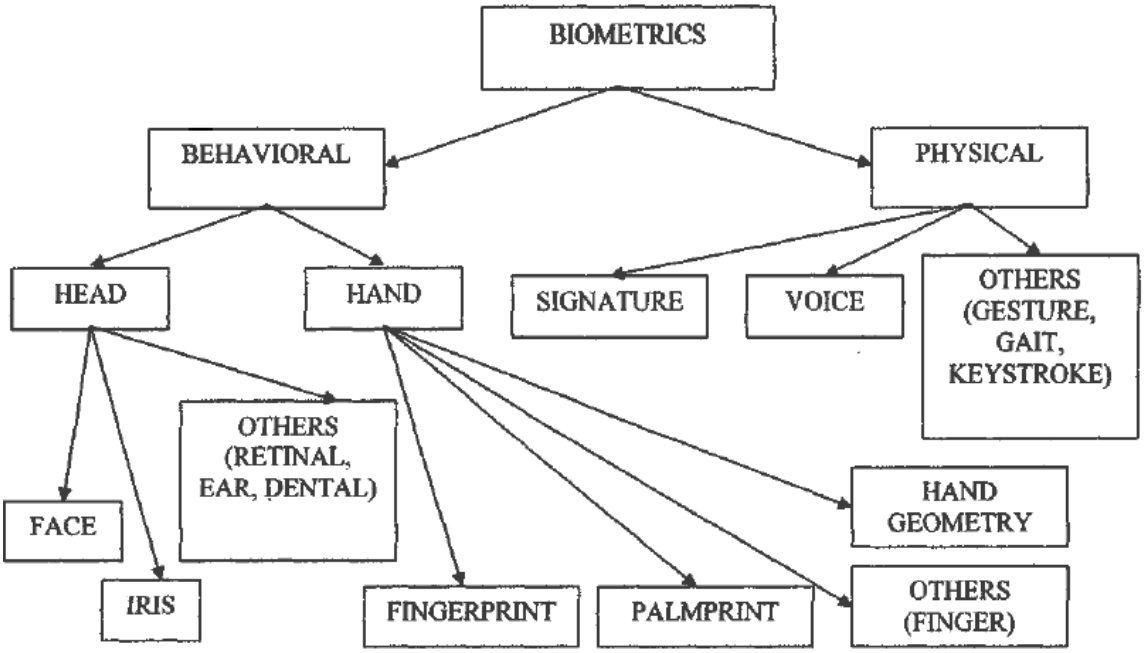


Fig.4 Biometric Scan Methodologies

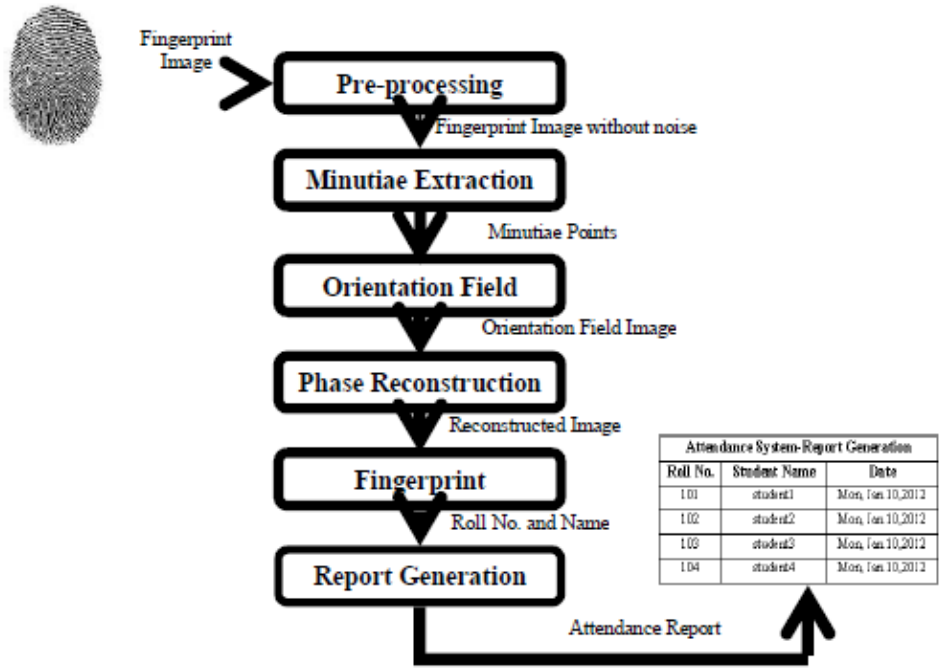


Fig.5 Logical Design of the Biometric System

Logical design

The logical design of a system pertains to an abstract representation of the data flows, inputs and outputs of the system. This is often conducted via modelling, using an over-abstract (and sometimes graphical) model of the actual system. In this context of systems design include are Logical design which include ER Diagrams i.e. Entity Relationship Diagrams.

Physical design

The physical design relates to the actual input and output processes of the system. This is laid down in terms of how data is input into a system, how it is verified/authenticated, how it is processed, and how it is displayed. In Physical design, the following requirements about the system are decided.

- Input requirement,
- Output requirements,
- Storage requirements,
- Processing Requirements,
- System control and backup or recovery.

Put another way, the physical portion of systems design can generally be broken down into three sub-tasks:

- User Interface Design
- Data Design
- Process Design

User Interface Design is concerned with how users add information to the system and with how the system presents information back to them. Data Design is concerned with how the data is represented and stored within the system. Finally, Process Design is concerned with how data moves through the system, and with how and where it is validated, secured and/or transformed as it flows into, through and out of the system. At the end of the systems design phase, documentation describing the three sub-tasks is produced and made available for use in the next phase.

Physical design, in this context, does not refer to the tangible physical design of an information system. To use an analogy, a personal computer's physical design involves input via a keyboard, processing within the CPU, and output via a monitor, printer, etc. It would not concern the actual layout of the tangible hardware, which for a PC would be a monitor, CPU, motherboard, hard drive, modems, video/graphics cards, USB slots, etc. It involves a detailed design of a user and a product database structure processor and a control processor. The H/S personal specification is developed for the proposed system.

File Design

The database was design using Microsoft access. The file was design and bounded to the input interface using the OLEDB 4.0 Control (Object Linking and Embedding Database Connectivity) for a 32 bit operating system. The structure of the database file is shown below:

Design Methodology

The waterfall design model was used in this project. The waterfall model is a sequential development approach, in which development is seen as flowing steadily downwards (like a waterfall) through several phases, typically:

Requirements analysis resulting in a software requirements specification

a) Software design
b) Implementation
c) Testing
d) Integration, if there are multiple subsystems
e) Deployment (or Installation)
f) Maintenance

Table.1 File design for Courses Offered

Field name	Data type	Size
ID	Integer (Primary Key)	2
Reg Num	string	15
Course Name	string	30
Day1	string	30
Day2	integer	30
Day3	integer	30

Table.2 Detail Information Data Storage Design

Field name	Description	Data type	Size
ID		Integer (Primary Key)	5
Fname	Full Name	String	30
Gender	gender	String	30
Regnum	Registration Number	String	15
Dept	Department	String	30
College	College	String	30
Level	Level	String	5
Courses	Courses	String	30
Rdate	Registration Date	String	30
Pix	Biometric Scan	string	200

Alternative Design Methodologies

Rapid application development (RAD)

Rapid application development (RAD) is a methodology in which a systems designer produces prototypes for an end-user. The end-user reviews the prototype, and offers feedback on its suitability. This process is repeated until the end-user is satisfied with the final system.

Joint application design (JAD)

Joint application design (JAD) is a methodology which evolved from RAD, in which a systems designer consults with a group consisting of the following parties:

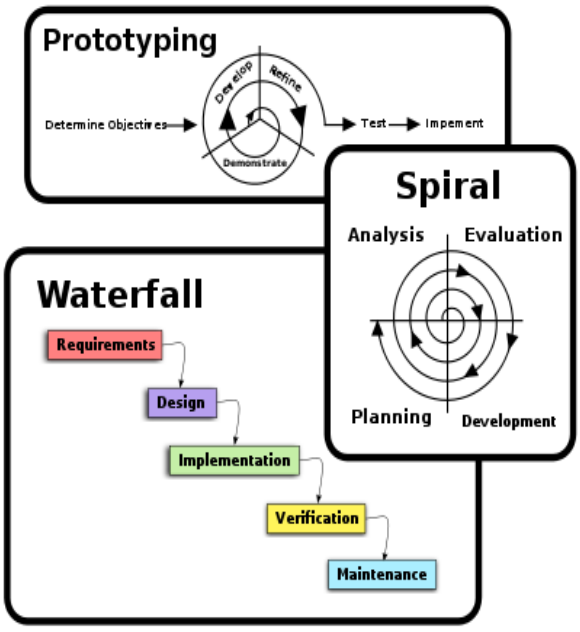
- Executive sponsor
- Systems Designer
- Managers of the system

JAD involves a number of stages, in which the group collectively develops an agreed pattern for the design and implementation of the system.

Related Terms

- Benchmarking — is an effort to evaluate how current systems perform
- Computer programming and debugging in the software world, or detailed design in the consumer, enterprise or commercial world - specifies the final system components.

- Design — designers will produce one or more 'models' of what they see a system eventually looking like, with ideas from the analysis section either used or discarded. A document will be produced with a description of the system, but nothing is specific — they might say 'touch screen' or 'GUI operating system', but not mention any specific brands;
- Requirements analysis - analyzes the needs of the end users or customers
- Systems architecture - creates a blueprint for the design with the necessary specifications for the hardware, software, people and data resources. In many cases, multiple architectures are evaluated before one is selected.
- System testing - evaluates the system's actual functionality in relation to expected or intended functionality, including all integration aspects.



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Implementation and Evaluation

Program evaluation is a systematic method for collecting, analyzing, and using information to answer questions about projects, policies and programs,[1] particularly about their effectiveness and efficiency. In both the public and private sectors, stakeholders often want to know whether the programs they are funding, implementing, voting for, receiving or objecting to are producing the intended effect.

Program implementation is the realization of a technical specification or algorithm as a program, software component, or other computer system through computer programming and deployment. Many implementations may exist for a given specification or standard. For example, web

browsers contain implementations of World Wide Web Consortium-recommended specifications, and software development tools contain implementations of programming languages.

While program evaluation first focuses around this definition, important considerations often include how much the program costs per participant, how the program could be improved, whether the program is worthwhile, whether there are better alternatives, if there are unintended outcomes, and whether the program goals are appropriate and useful.[2] Evaluators help to answer these questions, but the best way to answer the questions is for the evaluation to be a joint project between evaluators and stakeholders.[3]

The process of evaluation is considered to be a relatively recent phenomenon. However, planned social evaluation has been documented as dating as far back as 2200 BC.[4] Evaluation became particularly relevant in the U.S. in the 1960s during the period of the Great Society social programs associated with the Kennedy and Johnson administrations.[5][6] Extraordinary sums were invested in social programs, but the impacts of these investments were largely unknown.

Program evaluations can involve both quantitative and qualitative methods of social research. People who do program evaluation come from many different backgrounds, such as sociology, psychology, economics, and social work. Some graduate schools also have specific training programs for program evaluation.

(1) Doing an evaluation

Program evaluation may be conducted at several stages during a program's lifetime. Each of these stages raises different questions to be answered by the evaluator, and correspondingly different evaluation approaches are needed. Rossi, Lipsey and Freeman (2004) suggest the following kinds of assessment, which may be appropriate at these different stages:

- Assessment of the need for the program
- Assessment of program design and logic/theory
- Assessment of how the program is being implemented (i.e., is it being implemented according to plan? Are the program's processes maximizing possible outcomes?)
- Assessment of the program's outcome or impact (i.e., what it has actually achieved)
- Assessment of the program's cost and efficiency

System Requirements

To be used efficiently, all computer software needs certain hardware components or other software resources to be present on a computer [1]. These prerequisites are known as (computer) system requirements and are often used as a guideline as opposed to an absolute rule. Most software defines two sets of system requirements: minimum and recommended. With increasing demand for higher processing power and resources in newer versions of software, system requirements tend to increase over time. Industry analysts suggest that this trend plays a bigger part in driving upgrades to existing computer systems than technological advancements. A second meaning of the term of System requirements is a generalization of this first definition, giving the requirements to be met in the design of a system or sub-system. Typically

an organization starts with a set of Business requirements and then derives the System requirements from there.

For effective operation of the new system, hardware, software and personal specification are required. Below are some details of the system requirements.

Hardware Requirements

The following minimum requirements should be met to ensure smooth operation:

- Pentium* III 500 MHz or higher processor (Pentium 4 2.4 GHz or higher or any AMD64 or Intel64 processor recommended)
- Main memory: 1 GB physical RAM (2 GB recommended)
- Hard disk: 3 GB available disk space for a minimal install, 5 GB available for a graphical desktop (more recommended)
- Sound and graphics cards: supports most modern sound and graphics cards, 800 x 600 display resolution (1024 x 768 or higher recommended)
- Booting from CD/DVD drive or USB-Stick for installation, or support for booting over network or an existing installation of the application more information at Installation without CD

The hardware requirement is a windows pc that has the following

- Hard Disc Not less than 2.0GB
- Memory Not less than 128 MB
- CD Rom 56 xs

Software Requirements

Software Requirements is a field within Software Engineering that deals with establishing the needs of stakeholders that are to be solved by software. The IEEE Standard Glossary of Software Engineering Technology defines a software requirement as:

1. A condition or capability needed by a user to solve a problem or achieve an objective.
2. A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed document.
3. A documented representation of a condition or capability as in 1 or 2.

Software Requirements can broadly be broken up into Elicitation, Analysis, Specification, and Management.

- Analysis

Analysis is the logical breakdown that proceeds from elicitation. Analysis involves reaching a richer and more precise understanding of each requirement and representing sets of requirements in multiple, complementary ways.

- Specification

Specification involves representing and storing the collected requirements knowledge in a persistent and well-organized fashion that facilitates effective communication and change management. Use cases, user stories, functional requirements, and visual analysis models are popular choices for requirements specification.

- Validation

Validation involves techniques to confirm that the correct set of requirements has been specified to build a solution that satisfies the project's business objectives.

- Management

Requirements change during projects and there are often many of them. Management of this change becomes paramount to insuring that the correct software is built for the stakeholders.

- Tool support for requirements engineering

The required software environment is basically:

- The windows operating system: Any version of windows that are not earlier than windows 98 will run this software effectively well. However since this application is a web based program, all operating systems that have problems running 32 bits programs successfully like Windows 8 will experience no difficulty in running the software due to compatibility mismatch.
- Quick-heal or any other Computer Antivirus

Operational Requirement

This database application system can only be operated by a user who has basic training of system database/website issues. To be able to keep track of the census data record, the operator must know the basic need for such task, which will not be anything else than security and data integrity.

Personnel Requirement

The requirement of personnel that should manage this system is training. The user must go through the training program before the handover and deployment phase.

Data Source

Data source is a name given to the connection set up to a database from a server. The name is commonly used when creating a query to the database. The database source name (DSN) does not have to be the same as the filename for the database. For example, this database file is named "census.sql" and can be set up with a DSN of "connection". Then DSN "connection" would be used to refer to the database when performing a query.

Implementation procedure

This involves the co-ordination of the effort of the user department in getting the new system into operation; it is good that, the details and the method of implementation are properly communicated within the area of interest. That is

- The user department
- The people that have to do with the changeover and the top management who may be directly affected by the activities involved under the implementation phase.

This is the most sensitive aspect of any computer based projects as the System will not work under detail and method of implementation are properly communicated within the area of interest.

They would cover the following.

- Designing standard
- Program design
- User training
- Test data
- Coding
- Cut over process.

Design Standard

The design standard adopted for this project work was the top-down standard. The major main of this software design is to realize a computerized data encryption and decryption system.

The new system will favor the graphic user interface of visual Basic.net and a database system for storing information will also be a part of this design work.

Program Design

The implementation of the main system was done in visual Basic environment. The program design stages cut across the following:

The design stage- the stage were all the required detail of the design are sketched on paper. All interfaces are designed to specification on paper.

The coding stage- at this stage, the design is actualized using the visual basic design environment as well as the code window. Test and running stage- finally, the codes are tested with sample test data. Debugging is also done here.

User Training- An Overview

The user must undertake the training on how to use this software to avoid wrong application of tools. However, help has been provided to assist you whenever you get confused. So always consult with the help.

Cut Over Process

The procedure that should be adopted for system of this nature is the pilot method of handover. In this method, the new system is allowed to run in parallel with the old one, while the user gets acquired the new system. Any bug discovered at this time is quickly corrected and testing continues

Algorithm/Pseudo-Codes

In mathematics and computer science, an algorithm is a step-by-step procedure for calculations. Algorithms are used for calculation, data processing, and automated reasoning.

An algorithm is an effective method expressed as a finite list[1] of well-defined instructions[2] for calculating a function.[3] Starting from an initial state and initial input (perhaps empty),[4] the instructions describe a computation that, when executed, proceeds through a finite[5] number of well-defined successive states, eventually producing "output"[6] and terminating at a final ending state. The transition from one state to the next is not necessarily deterministic; some algorithms, known as randomized algorithms, incorporate random input.[7]

Though al-Khwārizmī's algorism referred to the rules of performing arithmetic using Hindu–Arabic numerals and the systematic solution of linear and quadratic equations, a partial formalization of what would become the modern algorithm began with attempts to solve the Entscheidungsproblem (the "decision problem") posed by David Hilbert in 1928. Subsequent formalizations were framed as attempts to define "effective calculability"[8] or "effective method";[9] those formalizations included the Gödel–Herbrand–Kleene recursive functions of 1930, 1934 and 1935, Alonzo Church's lambda calculus of 1936, Emil Post's "Formulation 1" of 1936, and Alan Turing's Turing machines of 1936–7 and 1939. Giving a formal definition of algorithms, corresponding to the intuitive notion, remains a challenging problem.

The design stage- the stage were all the required detail of the design are sketched on paper. All interfaces are designed to specification on paper. The coding stage- at this stage, the design is actualized using the visual basic design environment as well as the code window.

Cut Over Process

The procedure that should be adopted for system of this nature is the pilot method of handover. In this method, the new system is allowed to run in parallel with the old one, while the user gets acquired the new system. Any bug discovered at this time is quickly corrected and testing continues

Conclusion

As we move into the 21st century, schools are faced with a myriad of problems never encountered in previous decades. Security has become a significant concern. It is now crucial that school administrators know who is in their schools and where the students are at all times. Accurate and auditable attendance and reporting is vital in not only securing, but also maintaining, essential governmental funding. Accurate identification and tracking of students is now critical in all aspects of the day-to-day management and administration of our schools. Biometric finger scanning identification offers a cost-effective, reliable, easy and efficient way for school administrators to know for certain who is in their schools, where the students are each period of the day, and that they receive the services they require and deserve. By utilizing the unique fingerprint of the student for identification, tracking, and security, the problems and costs associated with the current expensive or inaccurate methods of identification are avoided. Finger scanning is the missing component that provides the irrefutable accuracy that has long been needed in our schools.

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