# Automated Drink Mixer and Dispenser for Ususan Elementary School's Feeding Program

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**Abstract**

Ususan Elementary School's feeding program has been very successful in nourishing back the pupil beneficiaries to their normal health requirement. But because of the limited budget allotted for the feeding program, a lot of ways and means are being implemented so as not to waste a single peso from the budget. Indeed, every single peso allotted for the program is very essential in keeping up the menu they provide as nutritious as possible. But due to the manual handling of ingredients, wastage in the preparation and distribution of food are unavoidable. Specifically for the drinks, it is very hard to measure the correct amount of ingredients when talking about huge number of servings.

And to that end, the proponents have come up with the design project **"Automated Drink Mixer and Dispenser for Ususan Elementary School's Feeding Program,"** which is expected to be of great help to aid the dilemma of managing a wide-scale feeding program for elementary pupils, thus providing them with nutritious drinks that their growing bodies require, without sacrificing the amount of ingredients to be used.

## Background of the Study

Child malnutrition cuts across all island groupings. Western and Eastern Visayas, Southern and Central Mindanao, Bicol and even parts of the NCR have prevalence rates of underweight over 13%. In addition, over 30% of all children under the age of 5 years suffer from anemia. Furthermore, the prevalence of short-term hunger among school-age children is increasing at an alarming rate. Children experiencing short-term hunger go to school with an empty stomach, causing them to be restrained from their natural learning process. This is the main reason why only seven (7) out of ten (10) grade school pupils finish their elementary education.

The most effective means to target childhood malnutrition and short-term hunger is through the public school network, as Senator Angara said. Unfortunately, these schools heavily rely on senators, congressmen, and private individuals and corporations. Up to this date, there is no legislation that covers the feeding program among public grade school pupils.

The government, seeing this as a problem, is formulating solutions to address these problems among school-age children. Projects such as breakfast feeding and milk and fruit juice feeding are currently undertaken by the Department of Education (DepEd) and Department of

Social Welfare and Development (DSWD), but mainly vary from place to place because of financial difficulties, as stated above.

Moreover, these projects require a lot of manpower, considering that feeding programs cover hundreds of pupils. When dealing with food, one must be careful with it; food safety must always be practiced. Food safety, as the name suggests, is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food-borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning. In developed countries there are intricate standards for food preparation, whereas in lesser developed countries the main issue is simply the availability of adequate safe water, which is usually a critical item.

Fortunately, these projects show positive outcomes, not just to the children's health, but also to their attitude towards schooling; many children showed their assertiveness and insist on their right to go back to school so not to miss out on their daily milk pack. During the 2005 – 2006 Milk Feeding Program between the DepEd and the Philippine Charity Sweepstake Office (PCSO) Visayas, a young boy who was a habitual absentee, returned to school upon learning of the free chocolate milk being given and managed to remain in school for the rest of the year. Another beneficiary in the Siquijor dairy zone, who had a dairy farmer for a neighbor, would volunteer to help in the cowshed, in exchange for a glass of milk.

**Statement of the Problem**

Ususan Elementary School's feeding program has been very successful in nourishing back the pupil beneficiaries to their normal health requirement. But because of the limited budget allotted for the feeding program, a lot of ways and means are being implemented so as not to waste a single peso from the budget. Indeed, every single peso allotted for the program is very essential in keeping up the menu they provide as nutritious as possible. But due to the manual handling of ingredients, wastage in the preparation and distribution of food are unavoidable. Specifically for the drinks, it is very hard to measure the correct amount of ingredients when talking about huge number of servings. It is prone to miscalculations of ingredients that leads to a surplus or shortage of servings. Either way, it is such a waste of time, effort and money on their part. In order to help minimize such circumstances of wastage and other related problems in the food preparation, the proponents have decided to implement an automated system, starting with the preparation of their nutritious beverages. The proposed project Entitled **"Automated Drink Mixer and Dispenser for Ususan Elementary School's Feeding Program"** seeks to specifically find the answers to the following questions:

1. What specific kind of system can help in improving the process of preparation for the drinks used in Ususan Elementary School's feeding program?
2. What processes in the manual system of the preparation of drinks in the feeding program must be observed so as to minimize the instances of wastage of ingredients?
3. What methods and strategies must be observed to make the existing process more time and cost efficient without compromising the safety and sanitation of the whole system?

**Significance of the Study**

The proposed project has chosen a public elementary school, specifically Ususan Elementary School, to offer help on the following stakeholders:

- **School-** the school, especially the Feeding Program Coordinator, cooks, assistants and other staffs will find drink preparation as an easy job because of the provided automation of mixing and dispensing drinks. It will also lessen, if not eradicate, the errors in the amount of the ingredients needed to make the drinks.
- **Parents-** the proposed project aims to eradicate, if not reduce the children's malnourishment by providing a machine that mixes and dispenses nutritious drinks for the pupils under the feeding program. They are assured that their children still receives the nutrition they need,
- **Pupils-** the children shall be the main beneficiary of the proposed project, because they are given another option in receiving the nutrients that their body needs, thus making them healthier, stronger, and more health-conscious; this will make them more active in participating school-related activities.

**Method of Research**

The research will be using the descriptive and experimental methods of research. Manuel and Medel (1976) define descriptive research as "*the description, analysis, and interpretation of the present nature, composition or processes of phenomena."* The focus is on prevailing conditions, or how a person, group, or thing behaves or functions in the presents.

Good (1963) defined experimental research "*as a method or procedure involving the control or manipulation of conditions for the purpose of studying the relative effects of various treatments applied to members of different samples.*" The basic purpose of experimental research is to discover the influence of one or more factors upon a condition, group, or situation, purpose of which is to discover "*what will be."* It is a highly controlled procedure in which manipulated treatments or actions from a factor or condition, called the experimental or independent variable, are applied upon another factor or condition, called the dependent variable. All other actions must be equal or constant so as to observe the effect of the former to the latter. It is believed that the processes and approaches used in these kinds of research are the most effective for this study.

**Data Gathering Procedure**

Preliminary interviews, written into transcript of interviews, were initially performed to gather essential facts and professional opinions needed for the project **"Automated Drink Mixer and Dispenser for Ususan Elementary School's Feeding Program."** The questions the proponents gathered rely mostly on the feeding program of Ususan Elementary School: process and policies of the program, personnel involved, the need for automation, and other important information needed to supply the project.

Dispensing the exact amount of ingredients for each kind of drink to be processed by the machine was very important since it significantly affected the taste of the end product. The proponents will base the proportion of the ingredients per drink from the actual proportion of

ingredients already used in the manual process. The experiment will show the average error in percentage out of 5 trials of each dispensed ingredient for a specific kind of drink concocted. For attaining the results, the proponents will measure the consistency of each ingredient dispensed.

**Conclusions**

In retrospect, the development of the design project entitled **"Automated Drink Mixer and Dispenser for Ususan Elementary School's Feeding Program"** have provided us with sufficient information to conclude that:

- An automated system of producing a variety of drinks to be consumed by pupils is effective and efficient in terms of time, energy and resources;
- The accuracy of the ingredients' ratio and proportion is an essential factor in minimizing the instances of ingredients wastage; and
- Strict sanitary measures must be strictly followed at all times to avoid contamination within the machine itself.

**Recommendations**

In the process of developing this design project, the proponents came up with the following suggestions and recommendations for future researchers:

- Use a mixing chamber that is capable of maintaining a constant temperature (hot or cold) to preserve the drink in its best form;
- Add security features such as password protection in refilling ingredients; and
- Further enhance the overall technical design of the prototype.

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# AUTOMATED THESIS ROOM W/ INFORMATION BOARD USING LED ARRAY

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**Background of the Study**

The thesis room (Room 300) at CEAFA is very common to Computer Engineering students and faculties. It has been currently used for special functions such as meeting of faculties, class discussion which requires appropriate equipment for presentation, and especially thesis defense is held here.

This study aims to lessen the extra persons during thesis defense. These persons are those who are in charge in different task inside Room 300 like of those who are responsible for time-keeping to ensure the time limit for presenting the thesis and also for the question and answer portion.

The on-going process inside the thesis room is unknown for the next proponents and committees unless the facilitator will inform them the next move to be done. This procedure is time-consuming, requires much effort and often causes delays. It will be more efficient if the persons outside will be informed ahead about the proceedings.

**Statement of the Problem**

At present, the room 300 or the Thesis Room is manually operated and the set-up is taking a lot of time. The process until now is inefficient because the there too many persons involve in the preparation for the thesis defense.

**Significance of the Study**

The beneficiaries of this study are the students and the faculties of Computer Engineering Department. This study will provide an information system outside the thesis room.

This study will serve as an improvement not only for the Computer Engineering Department and College of Engineering Community but most of all the University itself, because accomplishing the project proves that the PUP is not an ordinary state university. That the PUP can cope up with the new trends and technology regarding education sharing and School facilities. Finally, this research will eventually help the Computer Engineering Department for the accreditation of facilities.

**Detailed Procedure**

For the proponents to come up with the design project titled “Automated Thesis Room with Information Board using LED Array”. The proponents need to perform a lot of research to make these things possible; they conduct some reviews for the availability of the previous thesis documents of the Computer Engineering students. Planning and organizing has a

great significance in doing a task. Given below are the procedures followed by the proponents in making the design project:

1. Gathering of information and data needed for the design project.
2. Planning for the additional device in the automation of Room 300.
3. Analyzing the materials to be needed
4. Canvassing and checking for the availability of materials needed.
5. Designing the circuit.
6. Gathering of materials needed to construct the module.
7. Making a program for the software of the system.
8. Interfacing of hardware to software, subsequently testing.
9. Interfacing the module to the device for testing purposes.
10. Assembling the module into a box.
11. Installing the device in the Room 300.
12. Conduct some testing.
13. Cabling and wiring.
14. Cleaning the work area.

**Functionality and Testing**

After the devices were fabricated, the proponents would be responsible for the functionality and testing of their design project wherein the output of the circuit used will be discussed.

For the testing of the effectivity of the information board, the signal strength must be considered first. The signal varies upon the SIM card being selected, depending on the location. The system will not instantly power up upon connecting the supply.

Messages will be displayed with the help of right pass code (numbers 6, 7, 8 respectively) at the start of the message. Without these numbers at the beginning of the message will result to a reply of “Invalid Message” to the master number being registered in the phonebook of the SIM card of the info board. The numbers 6, 7 and 8 also corresponds to different colors of the message to be displayed.

The number 6 corresponds to color RED; 7 for color GREEN and 8 for color ORANGE. Messages in the info board can be deleted with the use of the exclamation symbol (!). All of the messages will be posted first before it deletes all the messages that were being saved.

Exceeding the limit of characters will result to a reply of “Invalid Message”. The message will still be displayed but it will be broken. After sending a message with appropriate format will send a confirmation message.

**Conclusion**

The industries today are going in the phase with rapid changes in technology. They kept on trying to develop and enhance their system and facilities with the best and the most hi-tech equipments available in the market. They mostly adopt technologies that would help them to maximize and minimize the cost for most of their task. Common to this technology is the use of the device like computers and GSM modules to lessen their work.

In part of the project, the use of GSM module enables to display the messages of the events in the Information Board.

The design project has been developed using Experimental Method of Research. Hence through series of experiments, the proponents have

discovered and proven the assumptions they have set prior to the development of the project.

After thorough research and developing the project the proponents have come out on the following conclusions:

1. The proponents therefore conclude that the PIC16F877 offers more powerful and easy way.

2. By means of GSM technology, by the use of mobile phones events will display in the info board where ever you are.

3. Using Information Board LED array is better than dot matrix in reading the message that has been displayed.

4. The proponents also conclude upon the building of the project, they decided to make this project as detachable so that it also use not only in the Room 300 also in other purposes of the Computer Engineering Department.

Furthermore, the proponents highly recommend to their fellow students to continue this study about using present technologies today, the technologies now has a lot more features yet to be discovered.

**Recommendation**

In Computer Engineering Department Society, Room 300 is serves as the multifunctional room that that the Computer Engineering students and faculties have benefit. It is the venue that is very helpful during meetings, report presentation, lectures and during thesis defense.

Installing of GSM Information Board Using LED Array will help a lot in displaying events for the students and the faculty will encourage reading it than in bulletin board. For this, the proponents recommend to those people that will manage the project to use it wisely, properly and carefully in order it to last for a long period of time.

For the sustainability of this study regarding the maintenance of load for the SIM card the proponents suggest to register first the SIM card to a cheaper load promo when it will be used especially in the day(s) of thesis defense which it will be used most of the time during that whole day. The budget for the load can be cut out from the fee of the thesis defense proponents during that day. It will also be a good help having a monitoring sheet where the details will be listed if when it will be used and the duration, when the load was loaded to the SIM card and when it was registered to a promo.

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**Supporting Pictures**

# Car SMS Speaker Using Bluetooth Technology

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**Abstract**

The primary purpose of this project was to design and develop a device for safety driving using SMS (Short Message Service) to audio output system via Bluetooth. Another aim was to serve as a functional speaker for all incoming text messages while driving or doing an indoor activity. The proponents have come up with this idea as they had observed the drivers who wantto have a safe driving while entertaining incoming text messages without any distractions and be their eyes on the road. In this research project, the researchers were able to develop hardware and software that comprises the designed project. It is a battery-operated speaker device that processes the received text message with a corresponding memory address allocated in the voice module. It can also be installed in a closed door vehicle. Moreover, aJ2ME application was installed on who is the sender of the message.

This will allow sending a specific port other than the native inbox. In this way, the other application installed on the driver's mobile phone will listen to that particular port and pick up the SMS. Therefore, it will automatically transfer all filtered incoming text by pairing to the Bluetooth module located in the device and as the MCU processes the messages, it will be read aloud to the speaker. Nevertheless, the device can also be used as a helpful tool for public and private emergency purposes.

**Background of the Study**

The cellular phone has brought with it many conveniences and luxuries. It has definitely made communication so much easier. However, when it comes to road safety, the cellular phone may be considered a hazard especially when SMS was introduced. Ever since the advent of text messages, society has grown aware of the dangers of texting while driving. Text messages are brief messages which are often limited to 160 characters and can be sent from one cell phone to another. This ability to be able to send short messages has been embraced by millions of people worldwide, as shown by the number of text messages exchanged every day.

Unfortunately, the service is so convenient that some compose and send text messages anytime and anywhere – while walking, eating, and even the growing number of accidents caused while texting and driving has put to the forefront of *texting while driving.* Driving is an activity that requires full concentration and composing, reading, and sending will comprise the driver's concentration. Nowadays, we can find many studies that examine the effects of texting while driving. The one conclusion is texting impairs a driver's abilities. One of the most obvious thing that happen when a driver is texting while driving is that the driver would avert

his eyes from the road for around five seconds. This is more than enough time for a person to run in front of the vehicle or for the vehicle in front of you to make sudden stop or to miss seeing the light change. Another thing that happens when a driver is texting, his mind would be on the message he is reading or composing. This, of course, prevents the driver from thinking quickly and compromises his reflexes. Chances are, he will not be able to react quickly to a situation on the road because he is thinking of something else. In this paper, we propose a system that uses Text-to-Speech algorithm and provides hands free calling. This will allow to lessen the vehicular accidents concerning with texting while driving because an automatic conversion of SMS to speech will be provided that does not require attention as said to some research that "inattentiveness" is the second major cause of road mishaps in the country.

**Statement of the Problem**

This study was formulated to provide a safe driving by using text-to-speech algorithm and as well as hands free calling. This system will lessen the vehicular accidents that concerns with texting while driving. Specifically, this study was conducted to answer the following questions:

1. In what way can you prevent from being distracted while driving in accessing your text messages?
2. Why texting while driving is more dangerous than drunk driving?
3. What are some effects of texting while driving?
4. What would be the benefits of this system among drivers who are fund of text messaging?
5. Did wireless headsets improve driving safety?

**Significance of the Study**

The study will provide enough benefit to the professional and novice drivers who use mobile phone as anticipated while driving. It will lessen the dangers of driving brought by distraction from using mobile phone which lead to seriously endangering not only the individuals in their vehicles, but also pedestrians, cyclists, and other motorists. It would be much easier for the drivers to read received messages without taking away the use of one hand and requires you to occasionally glance at your mobile phone. It also allows answering call and enables hands free conversation to the user keeping both hands on the wheel while keeping their eyes on the road and ensuring drivers are complying with distracted driving laws.

The use of Car SMS Speaker through Bluetooth Technology will reduce the alarming and growing statistics of accident cause by texting while driving here and around the world as one of the many causes of vehicular accident. These prevent drivers to experience cognitive overload while reading during driving. Hearing your text messages allows you to be aware of what the message you have received in the comfort of not holding your phone to read it. Some messages needs urgent response and often we don’t know whether the message needs to be read at once or not, so we pick up the phone to read it.

**Data Gathering Procedure**

To collect the data, we handed out the questionnaires personally to the respondents and conduct interviews personally. The respondents to our survey are chosen using stratified random sampling. Moreover, the interviewees are chosen using purposive sampling using pure random sampling.

**Detailed Procedures**

The following general processes should be accomplished:
1. Research and Data Gathering
2. Analyzing and Planning
3. Circuit Designing and Programming
4. Testing
5. Debugging
6. Implementation

**Functionality Testing**

All projects may come across different problems no matter how every process was scrutinized from the basic up to the complicated one. In that way, functionality testing and debugging from time to time is a good practice that should be done. The filtrations of the words to its correct interpretation which Filipinos used to do in SMS are what the proponents consider from the very beginning.

Upon starting the hardware and software materials, several experiments are attempted to come up with the desired output. And some problems were encountered. One of it is the part where the The project would be considered a success if and only if the expected output was reached considering proper interfacing, working program, the machine and devices.

**Conclusion**

After all the research, data gathering, studies and experiments, based on the findings and the given results, we therefore conclude that adding more memory modules will give the speaker device a wide range of word libraries; in contrary memory expansion will make the device slower in terms of processing making the microcontroller slower. For this reason, the proponents choose not to incorporate it with too much memory.

**Recommendation**

The proponents recommend the following enhancements to those who wish to improve the project in the future:

• The proponents recommend for future researchers to find an alternative memory module that is bigger in terms of data storage than the one used by the proponents. This will widen the words that can be accessed.

• The proponents recommend for future researchers to use other microcontroller unit other than PIC18F1220 that has faster processing rate and can accommodate a larger memory module without affecting its performance.

• The proponents recommend for future researchers to use other ways to make the voice quality of the device be as its best as possible.

• The proponents recommend for future researchers to include voice to text converter in order for the user to reply using his voice; thus making it possible to reply without touching his/ her phone.

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# CEAFA (COLLEGE OF ENGINEERING, ARCHITECTURE, AND FINE ARTS) EQUIPMENT INVENTORY SYSTEM

Proponent: Bisuña, John Vincent C.

**Abstract**

The traditional system of inventorying equipment in the departments of CEAFA building consumes a lot of time and effort to be properly managed on the part of personnel assigned.

Using the data gathered through series of interviews with the people involved in the inventorying of equipment and knowledge on creating a database system, a solution was conceptualized which is basically a web-based database system. Creating the system consists of painstakingly amount of coding in PHP Language and uses MySQL Database.

On the new system, the personnel must be able to update, delete, generate a report with its costing, and view the inventory of equipment with just a few clicks and use of internet.

We'll discover on this study how the new system was able to address and solve the major problems concerning the old system and see if it became successful on the development and enhancement of inventorying the equipment of CEAFA building departments.

**Background of the Study**

As a part of the Polytechnic University of the Philippines, CEAFA campus still uses the traditional way of inventorying the equipment that are deployed by the Property and Supplies Office. Manual checking and transactions are implemented therefore, taking long period of time to organize the record of the equipment in the Property and Supplies Office. Because of the said situation, I come up with the idea of creating an inventory system that will be very helpful for easier management and monitoring of the equipment.

The system deals with the computerization of the inventory of equipment. This system will be designed for the Dean of College of Engineering, Dean of the College of Architecture and Fine Arts, and the Chairpersons in all the Department of the said Colleges to lessen work with a concrete and reliable manipulation of data. On the existing system, the process of inventorying equipment is manually done by a lot of worker or employees. But with my proposed project, they just have to encode the data with lesser amount of workers needed and come up with a much organized and updated system.

This will eventually change the manual operation of the updating, viewing, writing, and maintaining of all the information, as well as the reports and status of the equipment which are concern on the CEAFA building. Computerization of the system will create a noticeable improvement on the process when it comes to speed and accuracy.

Basically, my aim is to eliminate possible human errors that might occur during manual handling, like inaccurate tallying and recording of equipment items during the actual inventories. Another is to save time on writing paper work every time an adding and removing of equipment will be done, because the project will reduce a vast amount of work in the long run.

**Statement of the Problem**

Equipment are properties of an establishment which are readily available for everyday use. This is subject for physical wear and tear due to its purpose and usage. Manual monitoring of these equipment consumes a lot of time and effort on the part of CEAFA inventory management. Since the process is manually implemented, this normally leads to human error such as inaccuracy in tallying and recording upon actual inventory. Also, inspection or checking of the given data would not be an easy task to do where a lot of paperwork will be involved.

**Objectives of the Study**

The key objective of the study is to develop and create a system for the equipment' inventory of the CEAFA building which will solve the main problems on the existing or traditional system of equipment' inventory of the said building.

***Specific Objectives:***

- To create a database of the equipment of all the rooms and other areas on the CEAFA building.
- To record data in a faster and accurate way.
- To provide information about the status of the equipment and its costing.
- To develop a system that will handle, manage, and safeguard the records properly.
- To provide possibility for system growth by improving or enhancing the current system.

**Significance of the Study**

The importance of this study is for all the equipment in the CEAFA building to be properly managed. This study will serve as a basis or justification of all equipment that needs to be either repaired or replaced which may result for a potential cost-savings on the part of the school. This inventory system may also contribute to an easier way of monitoring and reviewing certain transactions involving the equipment which will be properly organized on the system basing on the time and date the transaction took place. This may also be of great help to anticipate inventory needs for equipment as well as its equipment handling requirements.

**Research Design**

The waterfall model is the approach that I would be using for my system development life cycle since my system would be described as a development method that is linear and sequential. I would also make use of the advantage of waterfall development which is to allow for departmentalization and managerial control. I would be able to set a schedule with deadline for each stage of the development process of my system. Development moves from concept, through design, implementation, testing, installation, troubleshooting, and ends up at operation and maintenance.

This study will be using descriptive method of research. The concern of the

descriptive design is the detailed description of the present situation, set of conditions, group of persons, a system of thoughts, class of events and current practices. Analysis of the present condition would lead to finding solution for the prevention of the future problem and guide the present status. This was used because it discusses the broad details of all the information as well as its specifications.

**Conclusion**

On the first part of this study, the following objectives are listed. First, to create a database of the equipment of all the rooms and other areas on the CEAFA building. Second, to record data in a faster and accurate way. Third, to provide information about the status of the equipment and its costing. Fourth, to develop a system that will handle, manage, and safeguard the records properly. And last, to provide possibility for system growth by improving or enhancing the current system. These objectives boils down to the key objective which is to develop and create a system for the equipment' inventory of the CEAFA building which will solve the main problems on the existing or traditional system of equipment' inventory of the said building.

The first objective was satisfied by the System Administrator's control which is the capability to add and assign rooms on different departments. Since the input of equipment is done by just selecting from the database of the system and not by manually writing it, I believe that the second objective was accomplished. The third objective was also attained because in every table of equipment there is always a corresponding status and costing. As compared with the traditional system, the new system uses a web-based server wherein users can easily access the records wherever as long as there is an internet and is viewed in a very organize manner. Also, they're definitely assured with the security since the users have their own private account which leaves the system in passing off the fourth and last objective.

Therefore, having achieved all the objectives of the project, the CEAFA Equipment Inventory System really is a developed system for equipment' inventory of Departments inside the CEAFA campus.

**Recommendation**

Upon developing the system, I encountered a lot of problems especially on the programming part. So in case you are a student and about to take a design project mainly on programming, I advise that you become more censorious with the planning stage before doing the actual programming of the system.

For fellow students who would like to continue or improve this study, I recommend to use a barcode system for registration and tagging of equipment to cut out the need for manual recording of equipment and make the system more efficient. The RFID (Radio-frequency Identification) technology can also be used in developing this system, which is majorly used by different companies for the purpose of identification and tracking. It can be used on the system to exchange data between a reader and an electronic tag attached to the equipment. Another advice in developing this system is to go beyond the boundaries of the subject particularly outside the CEAFA building.

I also recommend further improvements to this project as different technologies arise rapidly in the years to come and will be available for utilization on this kind of system.

And as for the professors and instructors, it would be much better if they can fully motivate and encourage their students to take time to study and show them their willingness to assist. It would be of much help for the students if they also produce or display helpful thesis documents for further references.

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# Child Monitoring using Radio Frequency Technology for Down Syndrome Association of the Philippines

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**Abstract**

This project entitled, "CHILD MONITORING USING RADIO FREQUENCY TECHNOLOGY FOR DOWN SYNDROME ASSOCIATION OF THE PHILIPPINES, INC" is composed of the parent module and the child module which communicate with each other via Radio Frequency (RF). Specifically, this project used receiver and transmitter modules with amplitude shift keying modulation which has 434MHz Frequency. The role of the child module is to transmit signal over this frequency while the parent module is the receiver of this signal. This study is based on the interview and survey from the members of the Down Syndrome Association of the Philippines, Inc., an organization established in 1992 that brings together children with Down's and their families which chose Mrs. Corazon Magallon and her son Angelo, as the beneficiary of the project. Findings show that the project's safe zone is less than five meters. When the child steps out of the safe zone, the parent module's two alert features, the beeping sound and the vibrating alert, activate. The parent module is also earphone- capable which means that the beeping sound activates on the earphone when the parent inserts it to the socket. In addition, the parent module has two low battery indicators. One indicator turns on when the parent module's battery source reached its low battery reference voltage. The other indicator at the parent module turns on when it receives a signal from the child module's low battery indicator. Although there is low battery indicator of the child module at the parent module, the child module still has its own low battery indicator.

This project can be one of the many applications of Radio Frequency technology. Based on the surveys and interview, Child Monitoring using Radio Frequency Technology is ideal to parents who find it hard to keep an eye on their child when outdoors.

**Background of the Study**

If a physically, mentally and emotionally stable child is usually hard to control, then picturing out a guardian disciplining his/her child that has illness or disorder will be much more difficult. This condition is present in children who were born with Down syndrome. Based on medical studies these children have a delayed mental development and can be easily identified through their physical traits:

1. Flat facial features, small nose
2. Upward slant of the eyes
3. A crease across the center of the palm, known as a Simian crease
4. Hyperflexibility
5. Small folds of skin on the inner corner of the eyes
6. Large space between first and second toes
7. Enlarged tongue in proportion to the mouth

Late development of the growth of these special children also implies the late in responding into another's agenda with them, especially to the parents. For that reason, the parents have to rely to their instinct and strength to understand and find their kid's needs.

Special children with Down Syndrome is no different than any normal children, as much as normal children intends to play more inside nor outside of the house so does these special children. But our society has moved towards passive consumption and entertainments, places where children can safely move, make noise and play on the wild side have disappeared. At the same time, society's definition of what's "normal" for children has narrowed considerably, making life hard not just for the very active child, but for all children who might like to explore through movement and "hands-on" learning.

Parents normally guide and protect their children but to active children somehow some failed to do so. That is why setting up limitations that abide the children's safety will make them more relaxed. And this action is the so called preventive care. This is the main reason why the proponents came up with the research entitled "CHILD MONITORING USING RADIO FREQUENCY TECHNOLOGY FOR DOWN SYNDROME ASSOCIATION OF THE PHILIPPINES, INC." In this research, what the proponents have in mind is to use Radio Frequency (RF) technology, a wireless technology, as a way of monitoring the child's distance from his/her guardian when doing outdoor activities such as going to theme parks.

Nowadays, RF is commonly used for wireless communication because of its many applications. It can be used to transmit and receive data among devices and can be thought as a cable replacement technology.

Furthermore, according to Wikipedia.com, Radio Frequency is a rate of oscillation in the range of about 30 kHz to 300 GHz, which corresponds to the frequency of electrical signals normally used to produce and detect radio waves.

**Statement of the Problem**

This research aims to respond to the worries of guardians with regards to the safety of their children having Down Syndrome. Specifically, the proponents endeavor to answer the following:

1. How can a guardian be confident enough to lessen his/her restrictions and allow the child to move freely when outdoor?
2. What device can automatically alert and help the guardian know if the child is near his/her location?

**Significance of the Study**

This project aims to support guardians for more reliable supervision to their child especially to those with Down Syndrome, by making a device that can provide wireless linkage of two parties through Radio Frequency Technology.

Giving children a chance to be outside, allows them to finally understand the way they interpret the world and its impacts on them. However, because of their natural impulsive behavior, there are instances that children with Down Syndrome gets a bigger incidence of being lost or missing at no specific time or place.

Although there is no substitute for good childcare, the reality is that consistent monitoring of children especially those individuals with special needs is practically not always possible. Developing a child monitoring device through RF technology for parents or guardians and their child could greatly decrease their stress and give them more freedom during their excursions. Also, since RF transmitter and receiver are much cheaper than GPS module, it may serve as an alternative especially to those people who cannot afford to buy such device that needs navigational map.

This research will be a good start in helping the community especially those schools that offer special education programs. Since special attention is needed by children with special needs, schools can use such concept and design a system that will be very useful in monitoring every child inside the vicinity of the school.

The device is not just applicable to children who need special attention but also to normal children and elderly for practical applications.

This study will also serve as a future reference for researchers on the subject of Information and Communications Technology applications.

**Data Gathering Procedure**

Data Mining is one data gathering technique that the proponents used in finalizing the project. It was accomplished through a common way of researching: browsing the pages of the books and other theses which started by going to the library of Polytechnic University of the Philippines - College of Engineering and Architecture, Technological University of the Philippines, Pamantasan ng Lungsod ng Maynila and Mapua Institute of Technology. Searching the internet is also one effective procedure to support this technique.

Then the proponents visited the office of the Down Syndrome Association of the Philippines, Inc. (DSAPI) at Rockwell, Makati City for clarifying matters about the beneficiary and the requirements in conducting a study from their association. With the permission of the DSAPI's Administrator, Ms. Adette Dela Paz, the proponents were able to scan and study books specifically tackling about Down Syndrome (DS).

Another good **data gathering procedure** that the proponents considered is by interviewing. This process took much of the proponents' time and effort. But this technique immediately captured the true feelings and opinions of a parent towards the project. Even in a short period of time, through personal visit at a parent's residence, the proponents were able to see personally how a child with DS behaves and interacts with his/her family, to other people and things. This study is very delicate because the beneficiary of this study will be an individual with Down Syndrome, thus the proponents chose to

interview their parent or guardian which is an effective method in gathering exact and reliable data for the study. Also, the proponents also considered knowing the side of the medical practitioners specifically a doctor conducting consultations for children with special needs such as those with Down Syndrome. Because of this step, the researchers found out that children with Down Syndrome are naturally impulsive and hyperactive that's why they give low-cost sessions of therapy which thus, making them trainable individuals. The researchers acquired data about the usual behaviors of the child when at school and the significance of the project to those of children.

Moreover, to strengthen this study, the proponents distributed two set of questionnaires. The distribution was done by in two ways: one is by personally handing over the questionnaire to the respondents and the other one is by creating an on-line questionnaire at www.freeonlinesurvey.com. The results were automatically sent to the official e-mail account of the proponents.

**Functionality Testing**

This project is composed of the main circuit for transmitter and receiver module and low-battery indicator circuit. The researchers have done several functionality tests for each module.

The researchers have set up a measured distance of 5 meters in an open field. The transmitter module is moved farther from the receiver module. Once the receiver module alarms, the displacement of the transmitter from the receiver is noted for the output result of the circuit.

**Conclusion**

In the course of this project, the proponents' objective is to answer the statement of the problem, *"How can a guardian be confident enough to lessen his/her restrictions and allow the child to move freely when outdoor?"* Through this project, this problem is proven to be resolved by means of the wireless linkage of the guardian and the child. Connecting two parties is possible through the radio frequency transmission of the child and parent module. Because of the alert system that the parent module has, assurance and confidence for the child's security is established, thus, lessening the guardians worries and drawbacks in letting the child play and benefit from being outside.

To work out solutions to the second problem, "*What device can automatically alert and help the guardian know if the child is near his/her location?,"* the respondents agree that this device is proven to be capable of alerting the guardian whenever the child steps out of the predefined safe zone. In addition, this study has some other advantages. One of which is its role as a preventive measure. Since the predefined safe zone is less than 5 meters, the device's main purpose which is to prevent the loss of the child by alarming the parent is highly possible. Furthermore, the device can be a good a replacement to the old ways of keeping children near such as holding them tightly or tying a cord on their hand.

In the initialization of this study, the researchers aimed to create an application using RF technology that will produce an impact to the community. In doing so, primary data has been obtained through interview to a parent who has a son with special needs. Questionnaires were distributed randomly to different parents and guardians. Secondary resources derived from the internet and other various

publications including books and journals were integrated to support the research.

Radio frequency technology can be integrated into different applications that could be helpful to the community. Based from the surveys and interviews, Child Monitoring using Radio Frequency Technology is ideal to parents who find it hard to monitor their child's behaviour especially in outdoors.

**Recommendations**

After a thorough analysis of data, the following recommendations are hereby made by the proponents:

1. Further and much deeper study to the different elements used in this project.
2. Since the project is locked to one master device and one slave device, the future researchers could link multiple slave devices.
3. Reduce the size of the devices. One suggestion would be replacing the normal sized PIC microcontrollers by its corresponding SMT component.
4. Use Bluetooth module(s) as replacement to the radio frequency modules (receiver and transmitter) when a 10 – meter predefined safe zone is applied.
5. Make the casing more fashionable. Since these devices can be pinned to the belt especially to the child module, it is good to make it more appealing to the eyes.
6. It is better if the alarm is varied with many melodies, like *Happy Birthday* or *Lullaby* aside from the usual beeping sound.
7. In line with the previous recommendation, future researchers may add another function of the parent module which is to make the alarm's volume adjustable.

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# COEINTELLIPARTITION: AUTOMATED FOLDING PARTITION DEVICE THROUGH HAND GESTURE RECOGNITION

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**Abstract**

The design project entitled "CoeIntelliPartition: Automated Folding Partition Device through Hand Gesture Recognition" directly focuses on the creation of a system that has the capability to control target computer application through hand gesture. On our case, we use room partition as the output for the system.

The proponents have come up with this idea as they have observed that the rooms in the PUP College of Engineering, particularly the Department of Computer Engineering often have experiences problem in room availability. The proponents want this scenario to diminish by creating "Automated Folding Partition Device through Hand Gesture Recognition". Using moveable walls you can separate one room into various small rooms and give them brand new functions in the nick of time through simple hand gestural interface.

In this research project, a regular, low-cost web camera is used for image acquisition, and the images from camera are processed by our unique computer vision system, which is the "Vision Lab", to detect user intention either to close or open the partition. It is designed as a real time hand gestural interface that allows both communicative and manipulative gestures to control target computer applications. The system can record and log the captured image of the web camera. It also has the capability to detect an obstruction once it starts moving, because it has sensor attached in the partition.

**Background of the Study**

The evolution of the interaction between computer and human or better known as Human Computer Interaction (HCI) has always been interesting. The first generation computer user interface is text-based interface where users interact by typing the commands through keyboard; the computer will perform relevant actions and inform the user of the outcome.

Then the Graphical User Interface (GUI) came, where the main mediums of interaction are symbolic graphics called icons. Each icon is assigned a specific meaning intended for specific application or certain action. In order to carry out a specific action or to run a specific application, the user can just click on the relevant icon by using a mouse. Text still dominant in this second generation

computer user interface as it is impossible to convert every line command into icon; however, the use of text is minimized or avoided when necessary.

Nevertheless, it was soon realized that no matter how powerful the two kinds of user interface are, they will never able to replace the way human communicate most naturally, through the use of gesture. As applications shift from 2d to 3D and eventually Virtual environment (VE), the use of conventional input devices such as keyboards, mouse, trackball or joystick becomes more awkward and inconvenient than ever. It was then understood that nothing is able to navigate better in such applications than the human gesture itself. The human gesture is not only natural and intuitive to a user; it can also represent motions of high degree of freedom impossible to achieve using other input devices.

Gestures are a dominant means of communication among humans. In fact, gesturing is so deeply rooted in our communication that people often continue gesturing when speaking on the telephone. Hand gestures provide a split complementary modality to speech for expressing ones ideas. Information associated with hand gestures in a conversation is degree, discourse structure, spatial and sequential structure. So, a natural interaction between humans and computing devices can be achieved by using hand gestures for communication between them.

The key problem in gesture interaction is how to make hand gestures understood by computers. The approaches present can be mainly divided into “Data-Glove based” and “Vision Based” approaches. The Data-Glove based methods use sensor devices for digitizing hand and finger motions into multi-parametric data. The extra sensors make it easy to collect hand configuration and movement. However, the devices are quite expensive and bring much unwieldy experience to the users. In contrast, the Vision Based methods require only a camera, thus realizing a natural interaction between humans and computers without the use of any extra devices. These systems tend to complement biological vision by describing artificial vision systems that are implemented in software and/or hardware. This poses a challenging problem as these systems need to be background invariant, lighting insensitive, person and camera independent to achieve real time performance. Moreover, such systems must be optimized to meet the requirements, including accuracy and robustness.

*Hand Posture and Gesture Recognition Technology*

The human hand has a complex anatomical structure consisting of many connected parts and joints, involving complex relations between them providing a total of roughly 27 degrees of freedom (DOFs). User Interface development requires a sound understanding of human hand’s anatomical structure in order to determine what kind of postures and gestures are comfortable to make. Although hand postures and gestures are often considered identical, the distinctions between them need to be cleared. Hand posture is a static hand pose without involvement of movements. For example, making a fist and holding it in a certain position is a hand posture. Whereas, a hand gesture is defined as a dynamic movement referring to a sequence of hand postures connected by continuous motions over a short time span, such as waving good-bye. With this composite property of hand gestures, the problem of gesture recognition can be decoupled into two

levels- the low level hand posture detection and the high level hand gesture recognition.

In vision based hand gesture recognition system, the movement of the hand is recorded by video camera(s). This input video is decomposed into a set of features taking individual frames into account. Some form of filtering may also be performed on the frames to remove the unnecessary data, and highlight necessary components. For example, the hands are isolated from other body parts as well as other background objects. The isolated hands are recognized for different postures. Since, gestures are nothing but a sequence of hand postures connected by continuous motions, a recognizer can be trained against a possible grammar. With this, hand gestures can be specified as building up out of a group of hand postures in various ways of composition, just as phrases are building up by words.

**Statement of the Problem**

Computer Vision is one of the newest innovations in technology that has been widely used in extensive researches. This science, as it improves, has been applied in different systems such as human computer interaction, automation in robots, and interfacing. Yet this new approach has not yet been introduced in researches in our university. It could provide an innovative way for applications that were usually used in the university.

The room 300 of the Computer Engineering Department is planning to be partitioned. This is for a fact that the department needs to maximize accommodation for the regular functions of classrooms and faculty. This room serves as the department's multifunction room where special events such as meetings, audio visual/presentations, project defenses, and lectures are held. On the other hand, it is planned to add another function, to serve as faculty office extension, where receptions for visitors can also be made.

Due to these situations, the research project for the room 300 seeks to answer the following problem:

1. What technique should be used to maximize the space of the room 300?
2. What system/device could hand gesture be applied on the department's need, specifically, on maximizing the room 300?
3. What control system can be used in controlling the automation of the device?

**Significance of the Study**

The "Automated Folding Partition Device through Hand Gesture Recognition" will be developed for the benefit of the following:

*Students*

The folding partition will still allow the students to use the room 300 for their audio-visual presentations, reports and meetings.

*Faculties*

The folding partition will provide a faculty room for the professors.

*System Administrators*

The system will also help for logging specific personnel who used it. These will help in monitoring persons who used the system.

*To the Future Researchers*

The proponents believe that this research project will give huge contribution in innovation and computer technology in the university. This study will help the future researcher because this can be a reference or basis for enhancement and development in order to comply with the continuing technological needs as far as technological aspects are concerned.

**Data Gathering Procedure**

Data is gathered through interviews, reading materials, internet and inputs of our thesis advisers and committee. Summing up all the data collected will provide facts, ideas, comments and suggestions which will be interpreted and studied carefully to provide great help for the project research to be accomplished.

**Fabrication of the Device**

The preliminary process of developing the research project is conducting experiments regarding the technologies to be use. Next is the actual construction of the circuits needed for the research project. After the actual testing of the circuitry, final testing was performed.

After the preparation for the hardware, the next stage is the firmware development. On this stage, as we have seen in PIC16F877, the proponents will prepare the program to be burned-in to the chip through a programming board and test its functionality of the chip in a development board. MPLAB IDE is used in terms of software aspect of this project. It is a professional and powerful visual Integrated Development Environment (IDE) which has been designed especially for the MPLAB compiler. It provides information about the device used the amount of code and data used the version number of the research project. The MPLAB IDE enables you to install and start your preferred programming software from within the development environment. This enables you to compile and then program your microcontroller with just a few mouse clicks (or keyboard stokers, whichever you prefer).Upon further testing, we had achieved the desired output for the development board.

**Detailed Procedure**

Detailed processes and implementations of the system that were used by the proponents are listed below. These steps were followed by the proponents accurately to achieve the desired output.

a. Project Initiation
b. The proponents started to plan about the research project.
c. The proponents conducted several interviews to some professionals to collect data with regard to the materials that we will be used in the research project.
d. Hypothesis was made and several solutions arouse after analyzing all the collected data.
e. Process diagram and flowchart were made to be the basis of the work flow of the system.
f. The proponents reviewed the plans and made some revisions to enhance the work flow of the system.
g. The proponents designed the circuitry, starteddoing the program and constructed the prototype.
h. After doing the circuit, program and prototype, we did the interfacing.
i. To make sure that the system will work smoothly, the proponents did a lot of testing.

**Functionality Testing**

After the system is completed, series of test must be made to ensure its functionality. The testing procedures are the following:

a. The proponents checked if all the devices were properly connected to its proper places. In order to ensure that there will be no damages to the circuit.
b. The proponents test if the software is properly working.
c. The proponents make sure that the partition can be easily driven by the motor despite of the partition's weight. Proper alignment of the rollers and floor guide will really help the partition to move easily and minimize the weight since that partition is hung. The metal string that is attached to the partition needs tension in order for drive the motor to drive the partition easily.
d. The proponents conducted testing and calibration to ensure that the web camera will work well with hand gesture technology. With enough amount of light, hand gesture can be recognized with a range of 1 meter.
e. The proponents tested the long-range sensor if the sensitivity is constant over the range.
   Susceptibility is one of the main issues we had with the motion sensor. The motion sensor is easily triggered even though there is minimal motion along its range/path.
f. The proponents tested the led array for consistent output of room event.
g. The proponents did a lot of testing on the MCU backup.
h. The proponents also ensured that the backup battery is working in case of power interruption.

**Conclusion**

Throughout many months of work, the proponents conclude that upon fulfillment of this research project, partitioning the Room 300 is one of the best techniques to maximize its space. One of the effective control systems that can be used in controlling the room partition is the reversing motor. And also, through this research project, it proved that vision-based system is very effective to do target computer application. The system successfully bestows the ability to track simple hand gestures.

**Recommendation**

While the system that has been developed is quite robust and flexible there is, of course, room for improvement. The proponents highly recommend the forthcoming students of the Design Project to put together the following recommendations for the enhancement of the system:

1. Acquire more position independence for recognition of hand gesture
2. Increase the tolerance for varying lighting conditions and to increase recognition performance with complex backgrounds; and
3. Anything that the future researchers believe that will be helpful to enhance the research project.

# COLLEGE OF ENGINEERING, ARCHITECTURE AND FINE ARTS GARBAGE BIN FOR VOLUME REDUCTION

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**Abstract**

Many nations face a frightening waste management crisis, as their landfills reach full capacity. There were streets littered with thousands of uncollected wastes every day and there were overflowing garbage bins in every corner.

Due to these threatening events, the researchers were able to come up with the College of Engineering, Architecture, and Fine Arts (CEAFA) Garbage Bin for Volume Reduction. The study's primary purpose is to implement a suitable mechanism to reduce the volume of deposited garbage into landfills by compressing garbage in bins to lessen the amount of space occupied by it allowing more garbage to be thrown.

Another purpose of this study is to contribute a better approach and understanding of the proper waste management to the students, faculty members, as well as the maintenance crews to properly dispose their garbage.

The project allows the user to throw garbage without trying to hold the lid since it has an automatic opening or closing of lid. It has two bins, one for the plastics, and the second bin is for Polyethylene terephthalate (PET) bottles from soda and water. There will be a 5x8 LED Matrix indicating if which of the bin is full or if Bin 1 is compacting.

**Background of the Study**

Most local governments and urban agencies in the Philippines have frequently identified solid waste as a major problem. The primary reason is the amount of solid waste generated has increased along with the rapidly rising population and shortage of adequate disposal sites. Indeed, the Philippines produces more than 10,000 tons of wastes daily, wherein Metropolitan Manila is accumulating over 50% of the total wastes.

In the past few years, insufficient solid waste management systems have caused serious health risks and environmental consequences mainly in denser populated communities. For an instance, the closure of the major site in Manila in 2000 together with limited capacity of other disposal sites resulted in disposal of tons of wastes alongside city alleys and empty lots, in aqueducts, and around the city. Some of the disposed wastes contain contagious materials, therefore threatening waste-pickers, sanitation workers, and many more.

In Metro Manila, the household sector is the primary source of solid wastes. Additional significant sources of solid wastes are industries, markets, commercial enterprises, and local institutions such as government offices and schools. These garbage generators placed their trash containers at the designated pick-up points where residents could deposit their recyclables, left over wastes, and composted wastes. Yet, there are still those who dispose their garbage in non-designated drop-of points.

College of Engineering, Architecture and Fine Arts (CEAFA) is one of the garbage generators that rely on garbage collection by the government. Types of garbage commonly gathered in CEAFA are papers/cardboard, plastic bottles, cans, cellophanes/plastics, tetra packs, food wastes, and yard/garden wastes. In CEAFA, it is estimated that the garbage commonly produced are recyclables. However, waste segregation is not widely practiced by the students, which is why the amount of the recycled wastes is minimal.

The proposed project **College of Engineering, Architecture and Fine Arts (CEAFA) Garbage Bin for Volume Reduction** designed by the proponents aims to contribute to all students a better approach and understanding of waste management practices. The study specially analyzes the proper waste segregation and resource recovery. Furthermore, it provides some quantitative measures of garbage that are recovered, recycled, and disposed of. The study also demonstrates the potential economic and health benefits from the implementation of resource recovery practices in school premises.

Proper treating and disposing all of the garbage without harming the environment have become the proponents' major concern. The project's major aim is to deal with the reduction of garbage generated by the school that will have a significant impact on the amount of garbage finally deposited at the dump site. Other things that are also considered in the study are the positioning of the trash bin, its type and size, and how often it is to be serviced.

**Statement of the Problem**

This research aims to develop a **College of Engineering, Architecture and Fine Arts (CEAFA) Garbage Bin for Volume Reduction** that will help maintain a proper waste management.

Specifically, the proponents attempt to solve the following problems:

1. What device can help reduce the volume of garbage deposited to dumpsites?
2. How can the users be encouraged to properly segregate their garbage?

**Significance of the Study**

This research will be of great help in setting up and implementing suitable mechanism to reduce the volume of deposited garbage into landfills. The research also introduces an initiative to separate and recover garbage within establishments such as universities. The research also helps in generating additional income from recycled garbage. This research will be a significant endeavor in improving an individual's conscience regarding problems with waste disposals, thus resulting in the development of one's discipline.

The study will help the students and faculty members of CEAFA in waste disposal and sanitation aspects. They don't need to touch the cover lid of a closed garbage bin in order to throw garbage. And there will be more space for garbage they needed to be disposed. The study will also be beneficial

to the maintenance workers of the said college. The personnel don't need to manually compress garbage and don't have to clean overflowing garbage bins. Everyone must take the steps in implementing the policies and practices in the proper disposal of garbage. By everyone's coordination, this study will be also promoting hygienic environment as a workplace or study area that will give motivation to everyone.

Results of this study will help the garbage truck collector collect more garbage since the garbage in the bag is being compressed and more waste can be put in it.

Furthermore, this study will also be helpful in the community or the local government in informing and educating the citizens about the proper disposal of garbage and recycling materials. It will also serve as a future reference for researchers in improving the ways of proper disposal and segregating garbage.

**Data-Gathering Procedure**

First, the proponents read some books and previous thesis materials, which are related in the study, in the library of different universities including the PUP College of Engineering library.

Secondly, the proponents researched through the internet. Since it is the largest source of information today, the proponents find some topics which are not available in the libraries.

Thirdly, the proponents interrogated the personnel assigned in the solid waste management of CEAFA. The proponents also conducted a survey by giving questionnaires to the respondents of the study. But first, the proponents prepare a request letter to conduct a survey in CEAFA. Then, the proponents provided needed questions that will be answered by the respondents. After that, the questionnaires are given to the respondents of this study. Lastly, the proponents retrieved the survey form and also analyzed the results of the survey.

The proponents mostly researched about the mechanism of garbage compactor through the internet. Mechanical experts are also consulted by the researchers. The information gathered by the proponents is a big help to the development of this study.

**Functionality Testing**

Functionality testing of the prototype is a fundamental tool to ensure that the project is not just working properly but is also safe to use. Testing is a trial on circuits to find out if it works and is appropriate to use for the prototype of the project. Initial testing of circuits in breadboards is highly required to make sure that there would be no errors when it is already in PCB for the final testing.

The functionality of the prototype can be tested to guarantee the quality of the project. The prototype must be properly constructed to avoid damages. In addition, the circuits must work all together for the project to function well. Furthermore, this should meet all the requirements of the project. This project should help to minimize the amount of space occupied by garbage.

**Conclusions**

Lots of wastes are generated everyday making it one of the major problems of the planet. Improper waste disposal can lead to sanitary problems and build up pollution. Due to this, appropriate segregation is deeply needed.

By using garbage compressor, it can help minimize the amount of space

occupied by garbage as well as reducing trash pick-ups. Garbage compactors are one of the necessities at home, in school and any other public or commercial places especially if it produces large amount of garbage. Due to its touch-free feature, throwing of trashes is a lot easier and safer.

**Recommendations**

The College of Engineering Architecture and Fine Arts Garbage Bin for Volume Reduction is a machine used to compress garbage in order to minimize and save space. Additional improvement of the machine would be a great idea like adding more features such as detecting what kind of garbage it is to be thrown, and then automatically segregate it. Furthermore, a solar-powered garbage compressor is highly recommendable for it will not consume high electricity but rather uses a renewable source of energy from the sun. This project can be enhanced by the future researchers who are interested in helping to save the environment from pollutants.

For those researchers who are interested to make this kind of project, it is also suggested that the recyclable materials produced by this trash bin can applied for something more usable for the society.

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# COLLEGE OF ENGINEERING AND ARCHITECTURE PARKING LOT SURVEILLANCE SYSTEM

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**Abstract**

The project aims to build a simple but functional surveillance system that will serve as a security tool at the College of Engineering and Architecture Parking Lot. In essence, CCTV cameras were placed at the guard house and near the student's center to monitor and record what is happening in the parking lot area. Also PIR sensor (Passive InfraRed) was placed near the gate, two (2) meters above the ground to detect if there's a car or a person entering the parking lot. Once the PIR sensor detects a car or a person, CCTV camera will move and face the gate and start to record then it will go back into its original position. A wireless camera was mounted on an RC car to serve as a functional remote surveillance device. It is responsible for motion on land and the viewing of the off – location video were handled by a software program. In this research, Descriptive and Experimental method is used by the researchers. Descriptive method will use survey type of methodologies. While experimental method will use to solve practical problems and maintain or counteract theoretical assumptions. Experimental method will bring out useful solutions on different investigations and problems stated in this study. From the proponents' findings, due to lack of security personnel, remote controlled car would be a great help in adding security and safety. The project has an overall mean of 4.5569 with a corresponding descriptive of Excellent. In consideration with the result, College of Engineering and Architecture Parking Lot Surveillance System will surely be a great help.

**Background of the Study**

Video surveillance has been a popular monitoring tool throughout the year. And thanks to new breakthroughs in technology, security cameras are more effective due to the high amount of useful information that can be extracted from a video sequence; video surveillance has come up as an effective tool to forestall these security problems. Countless end-users depend on the protection provided by video surveillance. The analog Closed Circuit Television (CCTV) systems were once the norm; they can be expensive, requiring complicated installations and constant upkeep. Fortunately, advances in digital technology have made video surveillance systems far more cost-effective, flexible, and simple to operate.

Installing video surveillance cameras in schools is a costly project, and school districts must be sure that this is the right route to deter theft, property damage, and to prevent outsiders from entering the school's property. Even though most school districts that have implemented video surveillance systems have faced privacy concerns from parents, students and civil libertarian groups, school officials assert that cameras provide important sources of

physical evidence when crimes such as theft, trespassing, and school property vandalism etc. do occur.

Since video surveillance exists in other schools, surveillance cameras have been really helpful. The surveillance system will act as an early warning device for our security personnel whenever a crime or mischievous act will likely to happen. Since our school is being managed by the government, we all know our school budget is not enough to sustain our needs when it comes to new technology. Since we're engineering students, why not build something like it to give something back to our university and at the same time, apply our knowledge to something very useful. With this arising problem, we come up with the idea of developing the "College of Engineering and Architecture Parking Lot Surveillance System."

**Statement of the Problem**

Efficient surveillance plays a key part in successful security, which can be defined as the monitoring behavior in an effort to maintain social control. Many security personnel wish to have the most advanced surveillance systems that can decrease theft, crimes and accidents, a way to investigate environments or situations which might pose risks to human lives. It can also make the work of the security personnel easier. A device can put more eyes on a scene.

**Significance of the Study**

This study will give an immense security of monitoring the PUP – CEA Parking Lot protecting the cars and its owners by monitoring the parking through the use of the surveillance system.

**Faculty Members and Students** will be protected from any hazardous elements that might harm them anytime and will be protected from suspicious persons who will try to trespass the building.

**Security Personnel** will be able to monitor the entire parking lot even at their post, having CCTV cameras to record and monitor and remote controlled car since it can control the surveillance vehicle as to where it will go and it can lessen the load of their work.

**PUP – CEA** will have a ground – breaking and developed way of monitoring the CEA car park.

**Future Researchers** will have an idea to innovate for future development of the project.

**Data Gathering Procedure**

One of the most common techniques in data gathering procedures is surveying. This is done by creating a set of questions and then distributes them to the target respondents. In this case, we could have knowledge on how our target population understands the study. Another good data gathering procedure that we consider is interviewing. This process may take a lot of time and effort but at least we can immediately capture the true feelings and opinions of our respondents. We also consider data mining procedure in gathering information about our study. We simply need to go to a library or a research institution in order to gather data from already tabulated sources. From tables to graphs, we can simply recode these data into our computer to serve as our numerical analysis resource. Internet will be another good source of getting large information but we should be careful because not all information in the internet is true. Different calculations using laws and theories will also be included in our data gathering

procedure. Costs of materials are also included in this section of the document.

**Detailed Procedures**

The following general processes should be accomplished:

1. Research and Data Gathering
2. Analyzing and Planning
3. Circuit Designing and Programming
4. Testing
5. Debugging
6. Implementation

**Research and Data Gathering**

Research of the existing projects is the start to develop a design for the project. The proponents also gathered feedback information from faculty, students and experts.

**Fabrication of the Device**

The proponents used the remote controlled car and modify it. For the project, the proponents constructed a reversing motor circuit to make it possible for the camera to tilt upward and the car to rotate. Reversing IC (BA6208) is used to make the work and circuit easier. It has 9 pins; pins 2 and 3 are input pins while pins 7 and 8 are output pins. The car itself has one (1) PIC developer and Zigbee which are the receiver and remote control for the transmitter.

Necessary, components were then added and linked to the remote control circuitry by designing a PCB Layout using express PCB. The proponents have etched the presensitized board according to the design and drilled holes within the markings. Next is positioning of the components in the board and then solder it to their proper places. No loose contact should appear. It can be done by testing the circuit with a multi – tester.

As for the CCTV cameras, the proponents started to install the UTP and coaxial cables from the student center to the parking lot's guard house. It will then be connected to the circuit that has been made.

**Functionality Testing**

**Testing**

All projects may come across different problems, from the basic up to the complicated one, and functionality testing and debugging from time to time is a good procedure that should be done. The precision of the surveillance vehicle movement and the input and output from the surveillance camera are what the group considers.

Upon creating hardware and software materials, several experiments are attempted to come up with the desired output. And during the trials, we met some problems but still the proponents are managing to consider different situations for it. One of the problems encountered is the part of installing the cables for the fixed cameras and alarm. The group had a problem with the connections of the UTP cable because of many twisted wires involves.

In view of the fact that the portion of the project is directly focused on configuring the CCTV cameras and remote controlled surveillance vehicle, MCU modifications was done on this module.

The project would be considered a success if and only if the expected output was reached considering proper wiring, the working program, the machine and devices.

**Conclusion**

The properties described the use of CCTV cameras and remote controlled surveillance vehicle with wireless camera to solve problems among students, faculties and security personnel being not aware of things that are important in the Computer Engineering Building. As a result of the study, we've come up with a system designed to do specified task and maximize the accuracy and usability of it.

The more cameras are used the more security is afforded, as a larger area comes under scrutiny. Positioning is also important in providing maximum security. The efficient working of these systems is subject to variations. Sometimes the cameras are allowed to do the job as everything will be recorded and particular incidents can be viewed based on the offences that have been perpetrated. At other times surveillance takes place round the clock and the monitored images are viewed constantly by the security guard.

CCTV may not be able to reduce crime or even deter criminals; however it may used effectively to target specific offences at the parking lot. There is no doubt that it is a powerful and innovative weapon. And also it may be employed to other part of the school especially inside the school building.

**Recommendations**

Enhancements must takes into considerations for the improvement of the design project. In this study, the proponents sought some enhancements that can be applied for potential exercises. The researcher offers the following suggestions to improve the project:

1. With the remote controlled surveillance vehicle, only certain limited types of environment are allowable for the surveillance device to access. It would be a good suggestion to think of ways to make those inaccessible routes passable.
2. Upgrade DVR card to 120 frames per second to enhance the recording quality of the system.
3. Additional surveillance cameras should be considered to cover blind spots at the CEA Parking Lot. It will give a lot of help to the security personnel's in-charged.

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# DEVELOPMENT OF INK REFILLING VENDING MACHINE FOR PEN MARKERS AND TECHNICAL PEN

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**Abstract**

This project aimed to develop the previous ink refilling vending machine to provide economical, accessible, and easy to use vending machine that can refill pen markers and technical pen of the engineering students and professors in College of Engineering, Architecture, and Fine Arts (CEAFA) which will acquire knowledge in both hardware and software in making the project. We made use of experimental and descriptive method of study among students and professors who were the primary users and beneficiary of the project.

The proponents made use of an experimental study to build a machine consist of keypad, LCD, coin slot, and several stepper motors which is the main component of the design project that will enable the syringe to pump and refill the markers and technical pen. Afterwards, descriptive method was used to collect data in order to answer questions concerning the current status of the subject of the study. The respondents were 555 all in all which includes 400 engineering students and 88 architecture and fine arts students including 8 faculties on the said department. The survey questionnaires focus more on the needs of the user and development of the project. The proponents used table and graphs to clearly present, interpret, and analyze the accumulated data. Based on the careful assessment, most of the respondents were in favor of the implementation of the project.

Hence, the use of the proposed project will certainly helpful and beneficial to the students, faculty, and the proprietor to gain profits and convenience in the way of learning and teaching.

**Background of the Study**

The idea of creating a vending machine started many years ago. The early inventions for vending machines were invented by the Greek engineer and Mathematician Hero of Alexandria during 215 B.C. These first vending machines were located in Egyptian temples which dispensed holy water. Then it was followed by the coin operated pencil vending machine and a coin operated tobacco boxes which came out in English Taverns during the 1700s. Because of the great impact of it to all people, this gave an idea to the inventors to create and improve more vending machines with different kinds of dispensing material that can be purchased

cheaper and instantly in one machine. Some of these vending machines that have already here in the Philippines are Soda, ticket, sanitary, toy, candy and many more.

Electronic vending machines have become popular in many commercial establishments. We can be reminded that wherever we go, these machines reside in our landscape. In our own communities, we face these machines on a daily basis. We have received convenience from these machines for a long-time. As well, the technology behind the electronic vending machine continues to be a prominent topic for improving the customer experience at the machine.

Basically, Vending Machine is defined as a coin-operated automatic machine that dispenses merchandise. It is located mostly in urban places that allow someone to sell their product when he or she is not present to supervise the sales. Nowadays vending machines are much more popular in Europe and Japan where the kiosks line whole blocks with everything you could imagine other than what we have here in the Philippines such as rice, hot meals, and DVD's. Vending machine gives great addition to any office setting, public places or inside the school premises that make things convenient and accessible. During midnight, the existence of these machines becomes more noticeable for night people because almost all the stores and markets are close.

Behind all these advantages there are still some issues coming out in other country regarding the product that the vending machine dispenses. Because of being well popular of it in many streets parents of the children are questioning the product that their children get from vending machines. In Japan news that centers on the arguments regarding the substance of soft drinks and snacks it contains that affects the health of many children. The governments are also watchful for these machines that sell porn magazines and DVD's as well as alcoholic beverages and cigarettes that are near in school premises.

Therefore constructing a vending machine should focus on the conclusion of what is required and who will benefit on it. What we see today is that technology is adapting to our convenience. Essentially, technology has become the vending machine of the future. Allowing us to dispense with ease at our jobs, school or home, the various time-sensitive tasks we all must do. We may not celebrate these machines at all. In fact, we most likely turn away from recognizing the fact that these machines have been a reliable standby for us. For many years and many more, they will remain a prominent fixture in the urban landscape.

**Significance of the Study**

This study will be a significant effort in promoting a better way of refilling pen markers and technical pen to maximize our time and money instead of buying cheap products with low quality. Moreover, this research will provide recommendations on how to evaluate the performance of a certain output in accordance to its quality.

This study will be helpful to the faculty members in their time management and strategy to have an effective teaching by understanding the needs of their students of having a better view of their lectures. Faculty could easily attain inks without rushing their time and efforts in buying disposable or permanent markers.

In addition, the laboratory of the Computer Engineering Department can benefit from this study. The laboratory head can manage the entire operation of the project. Also, our project will provide

additional income for the laboratory that can be use for their incoming projects, events, or activities.

Furthermore, our study can be utilized by our future researchers who might as well have the same idea. It covers mainly on how a vending machine works with the rapid changes in the technology today; we can say that nothing is impossible considering the availability of the materials around us.

Moreover, our study is design to keep the cleanliness of our mother earth, instead of buying a disposable pen, we recommend you to buy the refillable pen markers to lessen the disposing of solid waste materials.

Lastly, the students wrap up the overall benefits of our study so as a contribution to our colleague, the first thing that they can get out of this study is saving their money, rather than buying a cheaper marker every day, why not buy a refillable pen and try to refill those pen markers and technical pen with our vending machine, the performance can surely last longer compare to cheaper pens. Students in College of Fine Arts and Architecture can refill their technical pen in much cheaper price and when emergency knocks them they can easily refill their technical pen at the computer engineering laboratory.

**Methods of Research**

The researchers study and used series of studies regarding the project to carry out a new system that will help professors as well as the students that will be implemented, observed, reflected, and revised depending on the outcome of the observations. The study described, discovered, and interpreted. In this way the proponents were able to evaluate the outcomes and develop further strategies to present facts in promoting better project.

**Data Gathering Procedure**

The College of Engineering, Architecture and Fine Arts students and faculty members were asked to participate in the questionnaire survey. With the help of the adviser, the questionnaires were given to the respondents. The respondents' were given a time to think and to fill out the questionnaire.

**Fabrication of the Device**

The proposed project uses a stepper motor driven plunger to gradually pump the ink using a syringe in a controlled fashion. The principle of a syringe pump is to use a fine-pitch lead screw to depress the plunger of a syringe, or multiple syringes – this is typically accomplished by using a stepper motor and a microcontroller to keep track of the infused volume. The syringe pump body is constructed out of acrylic plastic in layers by cutting each piece and assembling everything together around a pair of threaded rods as the core structure of the device. As for the actual assembly, 1/4" threaded rods were used for the structural supports and plunger guide and used as the lead screw. A standard sized stepper motor was used to actuate the plunger; however motors of different thicknesses could be employed if more torque or lower power consumption was required. A modification made partway through the project was to place smooth metal tubing over the threaded rod to smooth the motion and prevent binding. The six syringe pump body for the pen markers was connected to each other in circular form and has a conveyor belt below it and contains a pen marker holder with a sensor that will face in front of the syringe nozzle while the remaining one syringe pump for the technical pen is placed in the lower left of the machine.

The syringe pumps together with the circuits and its power supply are enclosed in a customized cast acrylic casing. The LCD where displays the types and color choices, the numeric keypads for the user inputs together with the coin slot is placed in the upper right most of the casing.

**Functionality Testing**

The following procedures are performed to test the functionality of the project:

1. Check if all the hardware is working individually before integrating as one.

2. Check if the power supply is stable and the circuits are well connected.

3. Check if the syringe pump is functioning well: if the motors are working and moving properly, if the syringe is placed exactly in its position, if the needle of the syringe has no leak.

**Conclusion**

Today, we cannot deny that vending machines becomes part of our daily lives. It becomes famous for its accessibility and easy to do instructions for different kinds of user. As we made this Ink Refilling Vending Machine there is always an opportunity to purchase the ink. It will not be difficult for the students and professors to buy for another marker or make an effort to refill their refillable markers. We also consider making up a project that can help in the environment. As a whole, this machine will bring convenience to the College of Engineering, Architecture and Fine Arts students and faculty as well as for the beneficiary that will gain profit for the implementation of this project.

**Recommendations**

Based from our study for a short period of time, we have gathered different recommendations and at the same time a conclusion based on the survey we had conducted so we come-up the following recommendations:

1. Further research regarding the calibration of liquid substances and ideas that will give improvement and enhancement for the machine.

2. Implement set of rules and regulations for the proper mechanics of ink vending machine in the campus.

3. Make sure that all syringe are in proper places and replace the needle if needed.

4. Always keep the machine in a well-ventilated place to avoid dust and to avoid the increasing percentage for the ink to evaporate.

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**Supported Pictures:**

# Digital Cardio – Bike with Burned Calorie Meter for Health Awareness

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**Abstract**

Last year, a recent survey by the Food and Nutrition Research Institute (FNRI) showed that more Filipinos are at-risk for lifestyle-related illness. Results of the recent National Nutrition and Health Survey done by the FNRI found that more Filipinos have hypertension, high blood sugar, and high cholesterol, which are risk factors for cardiovascular diseases, diabetes, and other lifestyle-related illnesses.

The researchers discovered that 5% to 10% reduction in weight through exercise results in a marked reduction in the cardiovascular risk factors such as coronary heart disease, stroke, and other chronic diseases.

Driven by the burden to promote health awareness, the main problem that this study endeavored to solve was to develop a system that is cheap enough to purchase by the average of Filipino people and at the same time, to provide a best exercise which we can do nearly every day, without going to fitness gym which is as effective as the commercially available Cardio-Bike.

After a careful research, a digital cardio- bike with burned calorie meter controlled by Microcontroller and powered by the pedal generator (dynamo) was designed. The heart rate sensor is also used to measure the heart beats per minute and velocity sensor to measure distance which both needed to calculate the burned calorie.

With these findings, a conclusion can be drawn that it is possible to develop a cheap cardio-bike that is equally effective yet less expensive than the stationary cardio bike available on the market.

**Background of the Study**

Lots of people tend to think of exercise as a strenuous workout rather than an enjoyable physical activity. They are not aware and conscious about their health status. Many of them are too busy with their works. They do not have enough time to exercise. This may result in health illness like stress and obesity.

Obesity is a major risk factor for the development of diabetes, hypertension, and coronary disease. Obesity and overweight are linked to the nation's number one killer--heart disease--as well as diabetes and other chronic conditions. A 5% to 10% reduction in weight results in a marked reduction in the cardiovascular risk factors: lower blood glucose and insulin levels, decreases in blood pressure, decreases in bad cholesterol and triglycerides, increases in good cholesterol.

Exercise reduces risk of coronary heart disease, stroke, and other chronic diseases and improves quality of life for people of all ages. The body adjusts its metabolism by making muscles more or less efficient in burning calories. Additionally, regular exercise provides a myriad of health benefits for our health including a more positive mental outlook and increased energy levels. Two things will alter the total calories burned---speed and weight. However, with biking there is wind resistance to add into the mix. Because of this, the faster you bike, the faster you burn not only total calories but calories per mile.

**Statement of the Problem**

What system could be developed to provide a low-cost cardio bike that is as effective as the commercially available Cardio-Bike and cheaper to maintain, at the same time provides a best exercise which we can do nearly every day without going to fitness gym?

**Significance of the Study**

The following are the specific benefactors of this study.

- To the Government – Commuting to bicycles will reduce pollution and therefore helps the government in promoting an environmentally friendly mode of transport. The use of pedal powered generator will also reduce the use of commercial electricity.
- Near to Obesity with cycling hobby – this study helps the near to obesity people to lose weight as results in a marked reduction in their cardiovascular risk factors: lower blood glucose and insulin levels, decreases in blood pressure, decreases in bad cholesterol and triglycerides, increases in good cholesterol.
- Cyclist Group and Hobbyist – this study could have been an added feature in their bicycle as contribute in promoting health awareness.
- To the Faculty – this study is intended to the faculty since they will be our beneficiary of the project. The nature of their work is routinely and somehow not aware of their health habits. This study could help them exercise and be the means of their transportation in reaching their classes from main campus to CEA building.
- To the University – results of this study benefits the University because it promotes the University itself. Knowing that students are able to produce beneficial project, it will greatly influence the public's impression on the university.
- To the Students – with the aid of this project, helpful insights and ideas become available to the students. Not to mention the information they can draw about the particular application paves the way for them to think on researches that would benefit the outside sector and the society at large. Considered as future researchers, it will help them think on improving the project or even developing other thesis.

**Research Design**

The researcher actively tries to change the situation, circumstances or experience of participants (manipulation), which leads to a change in behavior of the participants of the study. The participants are assigned to different conditions, and variables of interest are measured. All other variables are controlled experiments are normally highly fixed before the data collection starts.

Waterfall model

1. Requirements

The Researcher identifies what are the necessary things that is needed to be done in designing the Project. Determining whether the stated requirements are clear, complete, ambiguous, or contradictory, and then resolving these issues. Requirements are also documented.

2. Design

The Researchers consider the aspects of designing the Project.

- Reliability, Durability
- Packaging
- Maintainability
- Usability
- Effectiveness, and accuracy

3. Testing and Implementation

Testing occurs after the requirements have been defined and the process has been completed.

- The Project should work as expected.
- Should meet the business and technical requirements that guided its design and development.
- Can be implemented.

Implementation is the stage where all the planned activities are put into action.

4. Maintenance
    - Effective maintenance is partly the result of regular routines and partly the result of promptly fixing small problems before they become major ones.

**Data Gathering Procedure**

The proponents did not have any procedural steps in gathering the data being used for the study. The data being need to have the study completed is gained research of different areas of the study. The data being needed by these areas are being supplied by the internet, books and especially the professionals being asked about the study being conducted by the proponents. The comments being mentioned by the professionals and the like will be greatly taken into consideration in doing the study; most of these comments will be the finishing points that may be done to further enhance the thesis being conducted. The data being gathered through books and the internet shall be filtered by the proponents to ensure that the data the proponents will be using will be of the most help to accomplish the objectives of the study.

**Detailed Procedure**

The device was created on three phases. The first phase is "Conceptualization". We instigate the creation of the device by conceptualizing how we can create a device that calculates the burned calorie of the user subjected to its formula. The primary objective is to create a device that serve as an exercising tool and health awareness. Having this goal, we use a self designed heart beat sensor, calorie burner and velocity sensor. After researches done, we decided then to use PIC16f877 as a controller, LCD as an output and dynamo as a supply for a device. After

this, the device is ready to be embedded by the circuit that will calculate the burned calories.

The second phase is "Simulation". We proceed on designing the control circuit that will integrate the circuits in the system. It is a circuit composed of a microcontroller with I/O ports, LCD for display, and start/reset switches . We use the software Proteus on simulating and creating the PCB design. During the simulation process, we view the output of the microcontroller on simulation. After few debugging of codes, we perfected the expected output then we proceed on the PCB design process.

The last phase is the "Integration". After building the body of the prototype, we now prepare the PCB and integrate both mentioned circuits finalizing the prototype. At this stage, we fix some errors. Then after the debugging process, the prototype is now ready to be tested to have the findings for the research

**Functionality and Testing**

In order to test the functionality of the system, first of all it is necessary to consider any possible health problems of the selected subject. Prior to this, the amount of calories that will be burned must also be proportional to the average heart rate of the user as mention in the above studies. After following the safety guidelines, the battery must be checked. Then the wiring followed. The wires run through underneath the vehicle all the way to the dashboard where the circuits are placed.

To test the system, a dynamo is used to charge the battery (6v – 12v) that supplies voltage to run the circuits. Making sure that every component is working well, a test run was conducted to check if the sensors and circuits that being used are properly working and having a corresponding output that is delivered in the system.

**Conclusions**

Based on the study, the researchers conclude the following:

- Being consciously aware in health does not need to be expensive. It is possible to develop a burned calorie meter that is equally effective yet less expensive than those of the stationary cardio bike found on a fitness gym.
- The equipment is environment friendly and economical since it uses dynamo as source of electricity in its operation.

**Recommendations**

After a thorough analysis of data, the following recommendations are hereby made for further improvement of the study.

- Ergonomically design is for further research.
- Better circuitry and better design for better stability and accuracy of the device.
- Better packaging of the device and water resistant prototype for more safe application.
- Further testing of the device for the enhancement of the study and for more detailed and accurate result.
- Additional data gathering and behavior observation of the device.
- For future researchers who would like to pursue the study commercially, proper combining and comparison on existing technique must be performed.

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# EVENT VIEWER AND SCHEDULER

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**Abstract**

The project aims to build an event viewer and scheduler system that will serve as an announcement and viewing of schedules or events to the Department of Computer Engineering. The device is place outside the Computer Engineering Department room for students as well as professors to see. Using an array of LED matrix, the system's functionality is to place messages/announcement through the use of detachable keypad, SMS, and Hyperterminal. The keypad can be attached to the device to edit the message being display. The project has a functional SMS module that receives texts messages from authorized user; this is done through changing the device's mode selection. The system's extra feature, the Hyperterminal, is another efficient way to edit the message via computer which has a Windows XP operating system. In this research, Descriptive and Experimental method is used by the researchers. Descriptive method will use survey type of methodologies. While experimental method will use to solve practical problems and maintain or counteract theoretical assumptions. Experimental method will bring out useful solutions on different investigations and problems stated in this study. From the proponents' findings and survey conducted, students and professors found the project a great help in informing on the current events and important announcements. In consideration with the result, the Event Viewer and Scheduler will surely be a great help.

**Background of the Study**

Computer Engineering Department is one of the busiest departments in the College of Engineering. Once in a while visitors come in and out in the department. Important events such as seminars and student/faculty events are always anticipated in which occurs periodically. Daily, students & faculty rely on the announcement posted in the bulletin board. Sometimes, the most important announcement on that day is being unnoticed because of many papers with announcement spreaded on the bulletin board though it is said to be organized, urgent message remains unnoticeable.

Basically, if one of the events has already passed, it must be removed manually. And if in case that the event which has already taken place already is with another announcement printed in the paper, all announcements are supposed to be removed including those are not yet through. If that happens, a new one would be created.

Now a day's every advertisement is going to be digital. The big shops and shopping centers are using the digital

moving displays now. In Railway station and bus stands everything that is ticket information, platform number etc is displaying in digital moving display. But in these displays if they wants to change the message or style they have to go there and connect the display to PC or laptop. This project we can use mainly for everybody involved in Computer Engineering Department. These displays will be connected outside the department where all students can view if they want to display instant messages about something crucial within 5 minute. So keeping in this mind this project is designed for a new display system which can access remotely, we are using the GSM technology to access the display's is one of the new technology in the embedded field to make the communication between microcontroller and mobile. Furthermore, the use of keypad and serial connection is not disregarded. In this project, there are 3 ways of how to display messages effortlessly.

Generally, study aims to provide a convenient way of displaying events and alerting students for urgent announcement through flash message and as well as for permanent display by simply changing the mode.

**Statement of the Problem**

The study aims to develop Event and Announcement viewer that would handle all SMS queries and manage information such as announcement, updates and expected events with the proper SMS recipients.

Specifically it sought to answer the following dilemma:

1. How to help the student attain fast and accurate critical information and updates including security concerns, class suspension announcements and other announcement from school officials via their Mobile Phones?
2. What other ways to help in restoring and modifying the good image of the University and how to ensure that news and updates being circulated has integrity and is reliable and doesn't relay false and wrong information?
3. Why we need to develop a cost-effective and efficient solution in disseminating information?
4. How to create a Event and Announcement Viewer with Keypad functions, Serial Interfacing and using the GSM Network Terminal?
5. How can the faculty members in Computer Engineering Department deliver their urgent announcement remotely?
6. Is it more efficient to have several modes to select in displaying announcement and events?
7. How to eliminate the use of paper based in posting announcement and events?
8. Is it possible to maintain the integrity of data against the deficiency of paper based?

**Significance of the Study**

Technology can certainly be applied in our community with the help of new tool and materials existence. Officials can instantly have a foundation on their deliberations and what sort to deploy to their personnel and make any other plans on the ways how to employ and sustain the objectives of the University based from the transmission of information via system. Students can apply their learning gained from its own institute through this invention that will make more convenient and accurate of data gathering. Researchers can have many applications in this use.

**Polytechnic University of the Philippines.** This study will benefit our school in giving a new technology that will be helpful in providing automated information system for faculties, workers, students and visitors.

**Other Colleges and Departments**. This study will serve as a guide for other Colleges/Departments who also want to provide the same project for their own department/offices.

**Computer Engineering Department and Laboratory.** This study will serve as a tool in accumulating information of events and instant announcement that faculty members could established offers the department a convenient way of viewing and modifying the information displayed.

**Faculty**. This will lessen the time and effort in delivering urgent announcement to the department specifically students involved in the Computer Engineering. It can also support the faculties in giving information into students in case of sudden changes.

**Student.** This study will provide students a fast and reliable information system in viewing urgent announcement and upcoming events.

**Visitor.** This study will benefit visitors coming to the Department of Computer Engineering in such a way that they can be aware of what events are about to occur.

**Future Researcher**. This study will serve as a tool for future researchers in guiding them in formulating related studies of Event Viewer.

**Data Gathering Procedure**

After preparing the questionnaire, it was submitted to the proponents' adviser for corrections and further suggestions. The proponents have been given the permission by the Dean and Department Chairpersons to conduct the study, the questionnaires have been distributed.

The students as part of the study were asked to participate in the questionnaire survey. The proponents have personally distributed the questionnaires to the respondents. The respondents were given to accomplish the questionnaire and choose among the items specified in the checklist manner.

The proponents have conducted data sourcing through researching in the internet and reading printed published and unpublished materials.

**Fabrication of the device**

Hardware Part

1. The first step was designing the circuit of the devices. Intensive research and datasheet analysis were done to create a design that will fit onto the system.
2. PCB designing. This involves etching, drilling and components placement.
   This was done in different module that our system has, namely: LED controller module, Keypad and LCD Controller module and GSM controller module.
3. The interconnection of different module and testing its different functionality was done.
4. System packaging was next. The sizes of each circuit and the acoustic effect of the materials should be considered.
5. Just when all the circuit has been placed on the back of the LED Matrix board and the circuit has been fully functional within the restriction of the created packaging.

Interfacing with the system application, sealing and mounting of the device were the final stage.

Software part

1. The first part was the investigation of the business process of the department. This includes observation and interviews to the members of the entire department.
2. Next is the creation of different diagram in creating the suitable design of the system application. These include the flow chart and block diagram has been created to give a detailed overview of the whole system.
3. After all the system application planning and designing stage, putting the papers to work by actual coding the program, researches about the needed programming libraries and pre-testing of the output were done.
4. First testing is the functionality of the SMS Receiving management capability of the program. Different dummy SIM accounts were created to fully test the capability of the programs to receive SMS. Checking if the messages being received by the system through the GSM module is flashed on the device
5. The second testing is the functionality of the keypad and hyper terminal of the computer. Checking if the messages input by the keypad and hyper terminal was flashed on the device. Deployment of the whole system is the final stage.

**Functionality Testing**

Testing the functionalities of the circuit and its system is divided into three parts in achieving accurate results; the three circuit board part. We ensure first- the Matrix Board- is working properly independently before interfacing it to be each other as one complete system.

After a series of tests by using sample programs and using PIC Parallel Port programmer software, we were able to verify if the PIC Microcontroller will be able to load and delete program in it. With this regards, we can integrate it now to the LED Matrix board and have it interface to the prepared SMS system software application.

Next we tested the matrix part with one of the input part- the keypad circuit board. We've encountered minimal problems that until now we are not able to locate what is the cause of the problem. It happens to be that in the row 2 of column 1 in the LCD module, it is not interfacing well with the keypad. There is no zero character in the keypad, but it can be replaced with capital O. There is an unknown character in every start of the initialization in the keypad, when that character is visible we can now start typing with keypad. But in major functionality, the keypad is ready to go.

Then, GSM module circuit, there is slight problem too, but all in all it's working properly. You just have to text space then your message followed by a space then "#". The "#" acts as terminator. So there mustn't "#" in your text, because it will only show the message before the "#" sign.

Lastly, we test all the functions of the project, the interfacing with keypad and matrix, then GSM with matrix. It works normal as if you we're just typing and texting.

Also the project works in a PC based system, just connect it to hyper terminal if you are using Windows XP then type what your announcement is.

**Recommendation**

The Design Project entitled Event and SMS Viewer for the College of Engineering is highly recommended to be used at the PUP College of Engineering so as to attain seamless way of disseminating information and to further adjust the level of technological advancement in such College to further compliments its mission to be the Center of Excellence in Engineering education.

To the Future Researcher we would like to recommend the following:

- A way on how to include the module of this thesis to the Smart Infoboard or to gain access to other GSM Network so that service replies can be deducted to the requestor's load balance to ease the burden of collecting payment for the maintenance of the Airtime Balance of the System.
- Inclusion or replacement of a Multi-Sim GSM Terminal so to attain more economical way of sending through their different network.
- Upgrade of the LED Matrix Board to a LED Video Board where you can input images and videos via different connection media either wired or wireless (e. g. Bluetooth, Infrared, Wifi)
- Creation or addition of an SMS Poll Type module into the system that would be specially used for the different survey or poll function of the College.
- Integration with the University's SIS to allow students to access their grades and other enrollment details.
- Synchronization of a number of LED Matrix Board within the CEA Premises.

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# ELECTRONIC LOCKER WITH SECURE DIGITAL MEMORY CARD OR MULTIMEDIACARD AS A KEY

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**Abstract**

The design project entitled "ELECTRONIC LOCKER WITH SECURE DIGITAL MEMORY CARD OR MULTIMEDIACARD AS A KEY" directly focuses on the creation of a locker cabinet system equipped with a more effective security device such as SD/MMC reader, controlled by the PIC16F877 microcontroller. The proponents of this of this project have come up with the idea of automating locker cabinets as they have observed that locker users in the College of Engineering, particularly the Department of Computer Engineering often have experiences of lost or misappropriated keys, thus leading them to destroying the locks. The proponents want these scenarios eliminated by integrating these lockers with a device that not only provides convenience but also high level of security.

The proponents conducted the first parts of their research by conducting & survey which involves the entire College of Engineering students and faculties. Questionnaires regarding the student's experiences with the use of their lockers are randomly given to the respondents. The majority of the respondents' replies conveyed that although they don't own or rent a locker, they like the idea of the proposed project and also they want this project to be applicable and attainable especially in the field of computer engineering.

Focusing on the automatic controlling of the locker itself, the proponents decided to use the PIC16F877 microcontroller in the system for they already have knowledge of the functions and features in their subject Microprocessor Systems, as well as the uses of the keypads and LCD screens.

**Background of the Study**

Secure Digital (SD) is a flash memory card format used in portable devices, including digital cameras and handheld computers. SD cards are based on the older Multi Media Card (MMC) format, but most are physically slightly thicker than MMC cards. They also boast higher data transfer rates. DRM features are available but are little-used. SD cards generally measure 32 mm × 24 mm × 2.1 mm, but can be as thin as 1.4 mm, just like MMC cards.

A Locker is a need for college students that bring tools for experiments and Computer Engineering Students are one of them. Not only students need a locker but also a faculty does too. Safekeeping of items inside is the major

task of a locker. We use different types of padlock and keys to store away our valuables thus making the ratio of 1 key: 1 padlock but then robbery and misplacement of the key is a problem that we are aware of. “Where did I put it? Who robbed my locker? I misplaced the key and I got robbed?” are just examples of a typical talk when a robbery scenario takes place.

Passwords protect our identities on websites, discussion groups, e-mail accounts and more. Many family computers with multiple user accounts employ passwords. They are also used for bank transactions and making secure purchases. With all of this sensitive data at stake, creating good password is very important to prevent theft. Passwords are the main defense against computer hackers.

A direct current (DC) motor is a fairly simple electric motor that uses electricity and a magnetic field to produce torque, which turns the motor. At its most simple, a DC motor requires two magnets of opposite polarity and an electric coil, which acts as an electromagnet. The repellent and attractive electromagnetic forces of the magnets provide the torque that causes the DC motor to turn.

If you've ever played with magnets, you know that they are polarized, with a positive and a negative side. The attraction between opposite poles and the repulsion of similar poles can easily be felt, even with relatively weak magnets. A DC motor uses these properties to convert electricity into motion. As the magnets within the DC motor attract and repel one another, the motor turns.

A DC motor requires at least one electromagnet. This electromagnet switches the current flow as the motor turns, changing its polarity to keep the motor running. The other magnet or magnets can either be permanent magnets or other electromagnets. Often, the electromagnet is located in the center of the motor and turns within the permanent magnets, but this arrangement is not necessary.

With this idea the proponents have thought of combining such elements and making an Electronic locker that is Password protected and can be opened by using a distinct SD/MMC as key for a distinct door.

**Statement of the Problem**

Main problem of students and faculty using lockers is the security of their items inside it. Using a padlock offers great risk of theft. Padlocks outside the locker can be a risk because it can be unlock by exerting force on it. Our project can answer that security risk because we will place a lock inside the locker which is electronically controlled by a micro chip. Using SD/MMC as a key, the micro chip will read the data inside it and it will control the lock to open the locker.

SD/MMC and Electronic Locks will use a serial address for unlocking a distinct locker door. As a key for the locker, the SD/MMC can give a new edge in the security system. SD/MMC based security can be the answer for the expensive biometrics technology and can be a less maintained device.

**Objectives of the Study**

To create a locker cabinet, where the user of the system can open his or her specific locker, through the use of SD/MMC as a key, in order to resolve the problem regarding its security and effectiveness.

**Significance of the Study**

**Polytechnic University of the Philippines.** Our school will highly benefit this kind of project. It can be used as a

source of income by means of letting it rent to a faculty or a student.

**Faculties.** To store their important records and things that they use every day at school instead of bringing them at their respective homes every time they leave the campus. To appreciate the use of SD/MMC not only for storage but also as their key.

**Students.** It will help them to have a secure place to leave their things at school campus. It will give them a much comfortable way to go to school not bringing those bulky toolbox and others.

**Data Gathering Procedure**

Surveys are done by creating a set of questions and then distributing them to the target respondents. The faculty and students are randomly selected and asked to participate in answering the questionnaire provided by the proponents. With the Letter of Permission signed, the questionnaires were administered to all the respondents. These respondents were given one day to answer and submit back their answer to the questionnaire. The proponents chose this as one of the data gathering procedure to be able to generate a valid data for the viability of the proposed study.

**Conclusions and Recommendations**

In order to ensure how effective security for the things inside the locker and the expensive use of the biometrics technology are the primary reasons why the proponents had come up with a project named Electronic Locker with Secure Digital (SD) Memory Card or MultiMediaCard (MMC) as a key. This project was considering all the important aspects of circuit designing, software programming and materials used in the system. This project is a big challenge for the proponents because it needs a combination of skills, knowledge and highest attention, and especially critical thinking. With knowledge on the operation and configuration of the main control of the project, the PIC16F877A, made it easier for the proponents to integrate it with other circuits and thus, the desired output is achieved.

In line with the outcome of the study, the researchers conclude that a traditional locker can be improved by providing it with way that has a high level security device that lasts longer than the traditional “lock and key” or “padlocks”.

Also, the proponents conclude that using SD/MMC can be useful not only for data storage but also for a key.

The proponents highly recommend the forthcoming students of Design Project to make more studies about SD/MMC or even to make a revision for the expansion of the lockers that is only limited from 9 lockers to 20 or more lockers to be used also not only for professors but also for students.

Nevertheless, any proposed enhancement or development for this project is highly acceptable.

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# Enhanced Automatic Ventilation System for Computer Engineering Department Classroom

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**Abstract**

Enhanced Automatic Ventilation System for Computer Engineering Department Classroom is a project/system to improve the ventilation system produced by the Computer Engineering Department. The proponents have decided to come up with a better way to solve a problem of the university in terms of poor ventilation of the classrooms. This project aims to help the university to lessen the effort of controlling the fans for those who enter room 316 by automatically controlling of the ventilation equipment of the classroom and decrease heat dissipated during class hours and "peak periods" by ventilating the room when the students enter and turning off the electric fans automatically. This project design is to be implemented in room 316 of the Computer Engineering Department. Microcontrollers are integrated in the system that can display a greeting message, current temperature, current date and time, status of the fans and if there is smoke by using dot matrix display and the controller for the whole system. This project is designed to have a switch for automatic and manual mode. The output of the temperature sensor, motion sensor and smoke detector will enter to the microcontroller to activate the system. There will be also a selection for mist on/mist off for the misting fan.

The proponents conducted a survey in line with their research. The survey is about the students' experiences with the current ventilation system. The majority of the respondents replied and conveyed that they want to control and off the electric fans automatically without moving from their seats or when they enter room 316. The survey also indicates that the students want a better place for learning.

**Background of the Study**

Nowadays, our environment is becoming warmer and warmer as time passes by. The Polytechnic University of the Philippines is a state university, which is mostly funded by a portion of the annual budget allotment of the government for education, so the facilities, ventilation to be specific, provided for each department are marginally substandard unlike in other prominent universities. Moreover, the current situation of the ventilation of Computer Engineering Department non-air-conditioned classrooms is inadequate because students and faculty members alike usually perspire when they are in the room making them uncomfortable for the duration of their stay. Being an outcome of poor ventilation, increase in relative humidity can have a vital impact on human well-being since it contributes to the body's ability to cool itself by evaporation of perspiration. As a result, the occupants of the room may on the least feel uncomfortable, or worse, get a heat disorder.

The global standard for room temperature can range from 20 to 25 degree Celsius ideally, but given the current phenomenon and the terrestrial disposition of our country, we can hardly achieve this ideal value to be maintained in such a poorly ventilated classroom. This may cause the occupants of the room to perform less than what they are expected, especially the students, because the average comfort level of humans with respect to temperature and relative humidity, with the help of the Humidex, ranges from 26 up to 31 degree Celsius.

With this in mind, the proponents have decided to come up with the "Enhanced Automatic Ventilation System for Computer Engineering Department Classroom". It is a ventilation system that detects whether a person has entered the room to activate the mechanical ventilation apparatuses, measures the room temperature, detects smoke, and keeps the temperature to a favorable level according to its measurement by providing proper ventilation. This study is also intended to help the students and the faculty members as well have a convenient and comfortable place for learning by stabilizing the room temperature, removing the stale air and replacing it with clean air, and automating the control of the fans installed in the room.

**Statement of the Problem**

The proponents, as well as the students of the Computer Engineering Department, have all experienced studying with the hot atmosphere of Room 316 of the College of Engineering and Architecture building, and the proponents want to help the university in improving the ventilation system of their classroom by automatically operating the mechanical ventilation equipment. In addition, students want to study and work without losing their focus by moving from their seat to turn the fans on, especially when meeting deadlines. That being said, the proponents have decided to construct a device to decrease excessively high temperature dissipated to a satisfactory level by measuring the temperature, detecting smoke and human presence within Room 316 to automatically control the speed of the fans and vent out the stale air for the clean air to enter the room and stabilize the temperature during class hours and "peak periods".

**Objectives of the Study**

**General Objective**

This study aims to construct a device that automatically controls the fans and decreases high temperature dissipated in Room 316 of the Computer Engineering Department to a satisfactory level during class hours and "peak periods" by adequately ventilating the room when students enter and turning off the fans automatically when there is nobody inside the room.

**Specific Objectives**

- Provide the students and faculty members with a better place for learning by properly ventilating Room 316.
- Automate the control of the fans installed in Room 316.
- Provide a ventilation system that decreases the high temperature dissipated in Room 316 to a satisfactory level.

**Significance of the Study**

**University**

This study aims to help the university make its non-air-conditioned classroom a better place for learning. This

project is an improvement to an existing technology that is applied to ventilation.

**Faculty**

This study aims to help the Computer Engineering Department faculty members have a better place for teaching. The proponents observed that faculty members perspire when staying inside the poorly ventilated Room 316. During and after teaching, the faculty members feel exhausted and/or irritated. In some cases, they are also having rashes, headaches, nausea, exhaustion and dehydration. This study will help prevent the faculty from having heat disorders due to prolonged heat exposure and poor air circulation while teaching in Room 316 by automatically control the fans and ventilate the room.

**Students**

This study aims to help the Computer Engineering students have an appropriate study and work area in Room 316. Some of the students as well as the proponents have been experiencing heat-related disorders such as rashes, headaches, nausea, exhaustion and dehydration. They get easily irritable and pressured due to the ambiance when it gets warmer. Also, when busy working to meet deadlines, students want to turn on the electric fans yet they don't want to lose their concentration by moving to turn it on, and so they would rather not bother to turn it on to hasten their work. This study will prevent the students from having heat-related disorders due to prolonged heat exposure, poor air circulation, and a large number of students confined in a classroom during class hours. This study will also lessen the students' effort of turning the electric fans on or off when they are busy with their work and give the students information about the current temperature of the Room 316 and status of the fans. This study will also make Room 316 a convenient place for the students to study by controlling the speed of the fans using a microcontroller and a temperature sensor.

**Future Researchers**

This project can serve as a reference for future researches and can be subjected for further improvement.

**Research Design**

The researchers decided to conduct action research and experimental method. The method involves observation and identification. The project is more on gathering data and searching for available components. The proponents formulated questions to answer and encountered attempt concerned comments to add and have a desired statistical analysis.

**Data Gathering Procedure**

The respondents were asked to participate in the survey. The proponents have personally distributed the survey forms to the respondents. The respondents were given survey forms to be accomplished.

**Fabrication of the Device**

In the process of formulation, the design and quality of each module, and as well as the design and fabrication of the entire design project, there were series of steps that were done in order to achieve the desired results. The steps were well-arranged to guarantee that the quality of the project would not be compromised.

Step 1: Outlining the chosen design project

– Defining the scope and limitations and all the requirements in the project must be considered. All constraints must be anticipated to minimize errors and

to avoid rushing by going over the same processes. This step in our study includes:

- Considering all the requirements
- Provide backup power for the system
- Display current time and date
- Describing the system
- How it will look like
- Specific functions
- Defining the scope and characteristics of the project
- How many commands the system can recognize
- The extent where the system can be effectively used.

Step 2: The schematic diagrams and circuit design

– The next step is to formulate the schematic diagram of each module of the system. The system is divided into different design modules and each has a function to accomplish the requirements of the system.

Minimizing the size of every circuit board is of great advantage and adds to the fact that the overall packaging of the device can be convenient and well-managed.

Step 3: Component analysis

– Every component indicated in the schematic diagram must be analyzed. Availability of the component is a great factor that must be considered. In this project, the DS1287 is the key component in the entire system. Aside from the fact that it is the heart of the system, the DS1287 can only be purchased overseas. And in case that a certain component is not available, compatible replacements must also be considered.

Step 4: Drilling and soldering

– By making use of PCB designing software, next would be drilling and putting each component into place. Soldering must be done properly for current to flow properly on each and every soldered component on the circuit.

Step 5: Connection testing

– When all components are now soldered into place, testing of every module must be done to make sure that each is working. If all the board are working properly and in good condition, it could be connected as a whole and then begin the testing for the entire system. This process may also include finding of errors and troubleshooting.

Step 6: Packaging

– The last step is packaging. The first impression on the project is one of the factors that must be considered. The physical appearance of the project must be appealing to the eye and satisfactorily sound to the environment.

**Conclusions and Recommendations**

In order to provide proper ventilation in room 316 by automatically controlling the fans using the temperature sensor, motion sensor and smoke detector in addition of a misting fan and making the room convenient for studying and teaching are the primary reason why the proponents decided to have this project, Enhanced Automatic Ventilation System for Computer Engineering Classroom 316. This project

was done considering all the important aspects of circuit designing, software programming and materials used in the system. It is a big challenge for the researcher for this project needs a combination of skills, knowledge and at most attention and especially critical thinking. With the knowledge on the operation and configuration of the main control of the project, the PIC16F877A, made it easier for the proponents to integrate it with other circuits.

In line with the outcome of the study, the proponents conclude that a ventilation system must be installed properly in a classroom so that the students and teachers can feel the convenience for studying and teaching. In addition, the system was equipped with a device the will control it automatically.

The proponents highly recommend the forthcoming students of Design Project to put together an enhancement or even a revision of this project, Enhanced Automatic Ventilation System for Computer Engineering Classroom 316. Enhancement in using motion sensor should control the speed of fans depending on the number of people inside the room.

Nevertheless, any proposed enhancement or development for this project is highly acceptable.

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MCU-Based Misting Cooling System for PUP College of Engineering and Architecture CEA Building, March 2009

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# FIRE ESCAPE LOCATOR VIA BLUETOOTH

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**Abstract**

Over the years, fire exits have saved millions of lives around the world in different events of accidents whether natural or man-made. Since then, fire exits have been subject to improvements and different rules and standards set by the government. It has been a mandatory part of every infrastructure around the world. However, some buildings implement two or more sets of fire exits to give alternate choices in case one of them is blocked. The researchers thought that it would be helpful if there would be a way to point the users to all available fire exits in the building.

Bluetooth, on the other hand, is an emerging technology regarding wireless communication that is present in most mobile phones nowadays. Creation of software applications for such mobile phones have been made available, ranging from games and leisure apps to business and system applications as well as applications for navigation or location detection. Having stated all of this, the researchers thought that this technology is much suitable for the idea of creating a navigational application to locate multiple fire exits.

The system will serve as a mobile map that will help the user locate the fire exits in the area as well as giving him an idea of where he is at that moment. Since the user views the locator in his handheld, he will be able to move around while looking at the directions given to him thus making him less vulnerable to damages. This research is a step in integrating new technologies to fire exits.

**Background of the Study**

According to the survey conducted by Department of Health entitled Accident and Injuries, accidents are one of the leading causes of death in the world. Primarily, they are caused by people. Equipment may be involved, but people handle the equipment. Most accidents are the result of carelessness, inexperience, and/or wrong attitude. They are unusual and unintended. They come unexpectedly at a particular time and place and leave with marked effects. Fortunately, most accidents are predictable and preventable. They can be avoided. Their effects can be lessened through measures like safety education, and home safety management.

Getting inside a building is an everyday routine for most people. Students go to school, workers go to their workplaces, and some actually live in high structures like condominiums and hotels. However, most people visiting or working in commercial and public buildings give little thought to the structure or security of the building. Though it must be everyone's duty to exhibit safety precautions for their own safety, people nowadays seem to lack knowledge in it. They take for granted

simple safety measures — emergency drills and safety seminars are not the interest of many.

Many disasters that resulted to multiple deaths could have been prevented if people had known where fire escapes were, and if emergency exits had not been blocked. There are several reported cases of people being trapped inside a burning or a collapsing building. Emergency exits have been a critical point of one's survival in these accidents. If people had known the location of these alternative exits, they may have saved their selves from injuries, if not from death.

For example, in the case of Ozone Disco, according to a New York Times article entitled "Disco in Manila, for 35 People, Held 400" (March 20, 1996), the club's emergency exit had been blocked by a new building next door, and that there was no proper fire exit. The front doors, where the people rushed in, measured less than two meters wide and swung inwards; the crowd pushed at the doors, closing them instead of pulling them open. It was also reported that the exit had been locked from the outside by the club's guards, who had thought that a riot had taken place. Likewise, in the September 11, 2001 attacks on the World Trade Center, some of the emergency exits inside the building were inaccessible, while others were locked. In the Stardust Disaster and the 2006 Moscow hospital fire the emergency exits were locked and most windows barred shut. In the case of the Station Nightclub, the premises was over capacity the night fire broke out, the front exit was not well-designed.

Because of these situations, the proponents are motivated to propose the project design Fire Escape Locator via Bluetooth. It aims to help users locate fire escapes in a building, especially on situations where evacuation is needed. It guides the user by feeding him directions to the nearest emergency exit based on his current location.

Since it is the body's natural reaction to enter a flight-or-fight state in emergency situations, sometimes people inside a building tend to rush wherever his feet brings him. This results to people being trapped instead of getting out safely. The project intends to maximize the chance of the user's survival by leading him to the fire escape rather than carelessly taking unsure paths hoping to find a way out.

**Statement of the Problem**

The study intends to help people who are unfamiliar with a certain building on finding the location of emergency exits when an accident occurs and will require them to evacuate that building.

**Significance of the Study**

With the help coming from the Fire Escape Locator, visitors (as well as building occupants) who are not familiar to the architectural structure of the specific building can be assured that he/she can easily navigate his/her way out, through fire exits, by the use of mobile devices that has Bluetooth Capability in case emergency occurs.

It would also eliminate the chance of obtaining wrong information obtained from people who are not sure about the location of the fire exit.

Bluetooth is present in most mobile devices nowadays, making this system available to all users who installed the mobile application within the vicinity of the

Bluetooth transceivers.

This study also highlights the capability of Bluetooth technology for navigational purposes. It could help future researchers to create other systems that utilize Bluetooth for navigation.

**Method of Research**

In this project, descriptive and experimental methods were used by the proponents. Descriptive method involved questionnaires and interviews. Questionnaires were used to know the ideas of the respondents that concerned the project. Interviews were useful as follow-up certain respondents to further investigate their responses. Meanwhile, experimental method was applied to bring out appropriate solutions to different problems that were stated in the study.

**Data Gathering Procedure**

Data is collected through various literatures — reading materials, previous thesis documentations, newspaper clippings, and online articles. Further information is gathered from consultation to thesis advisers, forum discussions and internet tutorials.

The proponents also canvassed for the cheapest materials that will meet the requirements of the system

The questionnaires used by proponents are composed of five questions. Four of these questions are answerable by yes or no.

**Conclusion**

The Fire Escape Locator MCU board acts as transmitter of data in which determines the display image on the cell phone's screen. After the transmission, the Java ME application (Blu Fire) will now receive the data and interpret it for the output. The display image can now be used as guide for buildings.

The range of the EGBT 9830 could be up to 7 meters depending on its position and location, however due to some interference like walls and doors the range of this module has been decreased to 3-5 meter.

**Recommendation**

The design project entitled Fire Escape Locator via Bluetooth is highly recommended to be used as mobile guide application on unfamiliar buildings wherein one might be lost when not guided.

To the future researcher the proponents would like to recommend the following:

- The improvement of quick response time between Java ME application (Blu Fire) and Fire Escape Locator MCU boards.
- The availability of the Java ME application to other Mobile phone brands and units.

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# MCU – BASED MOBILE DUST COLLECTOR AND AIR PURIFIER USING PROXIMITY SENSORS

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**Background of the Study**

Dust inside homes and offices can be a serious problem. Dust often gets into various devices and cause mechanical problems. Too much dust can also darken or damage fabric.

Dust is finely divided solids that become airborne through a fracture process from a larger solid object. Common household dust is mainly composed of decayed skin particles, while industrial dust is commonly generated by sawing, grinding, or polishing of wood, metal, plastic, or masonry type materials.

Dust particles can be as small as a few microns (micrometers) or as large as hundreds of microns in size. The larger and denser particles tend to settle, while the smaller and lighter ones can remain airborne indefinitely.

Dust particles can contain moisture (water or oils), organic material (carbon), various minerals, or various chemicals. All of these can affect the cleanliness of a home and also the health of the users.

Excessive or long-term exposure to harmful respirable dusts may result in a respiratory disease called pneumoconiosis. This disease is caused by the buildup of mineral or metallic dust particles in the lungs and the tissue reaction to their presence. This simply means "dusty lung."

This study focuses on preventing and controlling dust accumulation in a room and also in purifying and ionizing the air. The device will have a dust collector that would clean a room from dust and an air purifier that will filter the air from airborne dust.

The sources of dust can be numerous. When there are lots of papers in a home, paper fibers naturally become airborne as we read books, newspapers and some magazines. Dust from countless outdoor sources will naturally be sucked into any open windows.

Some inexpensive carpets create dust as fibers from the carpet, carpet backing and even some carpet padding become airborne from simple foot traffic across the carpet. Fibers and dust are released from upholstered furniture, clothes, hobby and craft activities and food preparation.

Vacuuming is a common chore that can be automated to help people who are unable or unwilling to clean their homes. A device that is able to maintain a clean floor and clean air is a big help to people by freeing them up to work on many daunting

tasks. The goal of this project was to make a capable air purifier and dust collector mobile that could effectively clean and purify a room. A device that performs household chores such as dust cleaning should be designed as a comprehensive replacement for more traditional methods.

The "MCU – Based Mobile Dust Collector and Air Purifier Using Proximity Sensors" will be a good device for household and human use that would ensure cleanliness and healthy living.

**Statement of the Problem**

Dust inside homes and offices can be a serious problem. Dust often gets into various devices and cause mechanical problems. Too much dust can also darken or damage fabric.

Since dust is partially made of pollen and other things, it can also pose dangers to people with allergies. Dust also causes various lung and respiratory diseases.

Excessive or long-term exposure to harmful respirable dusts may result in a respiratory disease called pneumoconiosis. This disease is caused by the buildup of mineral or metallic dust particles in the lungs and the tissue reaction to their presence. This simply means "dusty lung."

This project will help users in preventing dust from propagating in a room and also to purify the air from dust and other hazardous materials. This study also aims to answer the subsequent questions:

1. Could the air humidifier and dust collector remove dust and litter from the ground and purify the air in a room?
2. Can this device help users in preventing and controlling dust and litter from generating in a room?
3. How effective will the device be when it is put into operation?

**Significance of the Study**

The significance of this study is intended to prevent and control dust from accumulating inside a room and purify the air. This device is designed to aid users who are unable or unwilling to clean their houses and also to help purify the air for a relaxing and calm feeling.

Dust cleaning and air purifying should be done every week or depending to the severity of the presence of dust, everyday. The supposed beneficiaries of this study are:

**Household Individuals.** This study will help them in preventing dust accumulation and maintain the cleanliness of their houses.

**Persons with Respiratory Ailments.** This study will help them filter the air they breathe and also to avoid aggravation of their ailments

**Method of Research**

In this research, Descriptive and Experimental method is being used by the researchers. Descriptive method will use survey type of methodologies. This involves questionnaires and interviews. Having this kind of instrument will be a good way to know the ideas of the respondents. The population, beneficiaries and even not, can interact and give their suggestions and comments regarding the project. Experimental method will be used to solve practical problems and maintain or counteract theoretical assumptions. Experimental method will be using rapid prototyping in constructing the design and the device. This will also bring out useful solutions on different investigations and problems stated in this study.

**Data Gathering Procedures**

The proponents started gathering data through reading materials, internet, surveys and consultations to advisers. The information we collected would be a great help to the study. The proponents also researched on articles related to our study. Preparation of all the documents (questionnaires and letter to carry out a survey) in conducting interviews and surveys to get some new ideas and opinions were also organized by the researchers. Calculation of materials to be used including travel costs were also integrated in gathering our data.

The primary source of data will come from a questionnaire that will be distributed to the respondents that are mostly the beneficiaries of this project. Their cooperation was fervently soughed after and its descriptive analysis was undertaken by the researcher through the descriptive research method that uses observation and surveys.

The respondents are mainly composed of household individuals and persons with respiratory ailments. They can be considered knowledgeable in terms of dust prevention and cleaning for they are more concerned on maintaining the cleanliness and sanitation of their houses and workplaces. The respondents that have been involved in the research can be considered a reliable source since they are primarily the ones that are aware of the disadvantages of dust accumulation in their homes and offices.

*Dust Accumulation Awareness*

The respondents perceive that dust accumulation is harmful to their health and even to their appliances. Dust buildup is one of the causes of respiratory illnesses as 64% of the respondents have said. This result therefore, shows that many households and persons with respiratory ailments have knowledge about the effects of dust accumulation in their homes and offices.

*Dust Cleaning Practices*

About 76% of the respondents give some efforts to maintain the cleanliness of their homes. They know the effects of dust and thus know their responsibilities. However, only 56% of the respondents clean their houses personally and just 32% of them have vacuum cleaners in their disposal. This demonstrates that most of the respondents want to clean their homes but hires and ask for help. This shows that they tend to hire for cleaners than to personally clean their houses and purchase vacuum cleaners.

*Waste Disposal and Dust Cleaning Automation*

Almost all of the respondents want to have a device that would automatically remove dust and dirt from their houses. Merely 12% of them wanted the traditional way, simply because of the extra cost and maintenance. Eighty nine percent of the respondents throw the waste in trash bags but still some of them will just leave the waste as it is. This proves that most people wanted to clean their houses and offices without exerting so much time and energy.

**Conclusions**

Based on the findings of this study, the researchers concluded the following:

1. The device can remove the dust, dirt and litter from the ground. The litter will then be collected to the container.
2. The battery charger must be monitored to ensure that the battery will be full charged.
3. The prototype can only pass through spaces that are larger than its size.

**Recommendations**

We designed the prototype so that it could accommodate all the circuits and parts so that it could perform the tasks performed. We recommend a smaller prototype for the device so that it can reach narrower and smaller spaces. We also suggest a stronger vacuum so that it can collect more dust and dirt.

Our prototype can only gather dry litter, we therefore advise to make the device capable of collecting wet litter. We also recommend adding an emergency buzzer to the mobile so that it can alert the owner whenever it is stuck and unable to move.

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# MCU BASED MULTI-NETWORK MOBILE ELECTRONIC LOADING VENDO

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**Abstract**

The Multi- Network Mobile Electronic Loading Vendo is used for loading mobile phones automatically. Our main objective is to help people to load easily using the machine by inserting a peso coin. It has a Microcontroller unit that controls all the functions of the machine. It has a four line LCD for machine display and a peso coin slot for a money insertion. The machine can change coin into load by choosing the exact network of their sim and type their number and the amount of load they want, if the message sent the user will receive the load according to the amount they type in the machine.

The Multi- Network Mobile Electronic Loading Vendo serves as an automatic loading machine for people that need an electronic load immediately especially when all stores are already closed. This acts as an emergency device to responds the customers need in peak times.

**Background of the Study**

Presently, there has been a world-wide spread use of mobile phones which plays an important role in our daily life. It helps us locate and be in touch with another person in or remote location. Since the Philippines being a developing country and also known as the "Text Capital of the World" for having almost 400 million text message a day and approximately 142 billion text message sent a year.

Then in 2003, telecommunication companies addressed that a problem by launching a nation-wide auto reloading stations through a retailer SIM card that vendors can use to pass an amount of load as specified by the subscriber starting at an appreciable amount of money with an increment of one peso. This new prepaid loading service was introduced to capture the interest of budget minded Filipinos or blue collared employees that prefer to load up in smaller denominations. It is difficult for these people to purchase prepaid loads amounting to hundreds of peso in one transaction.

Most loading stations sells load with the use of a cellphone. The customer dictates his/her phone number while the store owner enters it to the cellphone manually. This common method of loading often produces mistakes such as wrong input of number or load denomination due to miscommunication between the load seller and the customer.

The usual loading stations nowadays offers limited variety of load, some stores offers only one network and

are usually closed by 11pm making the availability of load limited and scarce for the customer's needs. Moreover, people who work at high rise buildings often experience this scarcity and difficulty in purchasing load from loading stations outside. Taking for example the employees of Narra Systems Inc. whose office is situated at the 5th floor of a building. It takes a lot of effort and time wasted in going down the stairs and finding an available loading station outside the company premises.

We then come up of study attempted to solve the need of customer/employees by incorporating the Multi-Network Mobile Electronic Loading Vendo as the solution for the problems and offering it to the market for further implementations specifically to Narra Systems Inc.

**Statement of the Problem**

The study aims to design and develop a coin operated multi-network electronic loading vendo.

- How can we lessen the mistakes committed by the retailers in loading?
- What are the possible solutions when we are in need of load and all the stores are already closed?
- Most convenience stores offer only prepaid cards, how can we make load more affordable?
- How can we make all the networks available in one loading station?

**Specific Objectives**

- To allow consumer/user to personally input their cellphone number in the machine
- To provide a stand-alone loading vendo that will operate 24 hours.
- To offer lower denominations of load that is more affordable than prepaid cards.
- To use a specialty sim that will be able to provide load to all the existing networks.

**Significance of the Study**

This study will aid people who are engaged in the prepaid by automating the conventional method being practiced even as we speak. Included by the features of all networks to be aided by the project, it will help distributors avoid, or even eliminate the tedious task of inputting the mobile phone number and the amount to be reloaded which is, in most cases where the error cause by negligence occurs.

There will be room for franchise expansion since the thesis will then have corresponding hardware, the device made can be placed anywhere. Similar to a vending machine, this device will stand alone prepaid reloading station. It will further expand the horizon of business entrepreneurs by placing this. These will help the customer to provide the load they are wanting for in any time they want.

The study involves integration of the whole system into smaller device that could take up a small area. The study hopes to open a business opportunity in a form of vending machine investment.

**Research Design**

Experimental method is involved in observation and identification of problems. The proponents have formulated questions to answer and encountered additional concerns in the attempt of answering such queries.

**Detailed Procedures**

The following general processes should be accomplished:

1. Research and Data Gathering
2. Analyzing and Planning
3. Circuit designing and Programming
4. Testing
5. Debugging
6. Implementation

**Fabrication of Device**

We evaluate all the existing projects gathered by the researchers. The block diagram and designing different circuitry is then created using an express schematic program. In the process of making the schematic diagram, we must label all the integrated circuits and components used.

The finished schematic diagram is ready to be used for designing the PCB lay-out using PCB express.

**Conclusion**

As an answer to the need of a device that will provide convenience and maximum availability of electronic loading, the project MCU Based Multi-Network Electronic Loading Vendo was conceptualized, developed and materialized.

The prototype was developed with the use of the PIC16F877 as the main controller of the whole system. However, during the development several difficulties were experienced The PIC16F877 was not easy to use. Some commands did not work as expected which made it difficult to debug the algorithm.

The machine was supposed to accept all coin denominations thus the proponents have to combine the three different coin slots. Modifying these coin slots is complicated. The proponents have to go through a lot of research and trial and error testing before the coin slots work accordingly.

The proponents made the prototype with just the right size and not too big by thoroughly planning on the installment of the components inside the machine such as the location of the printer, coin slot, keypad, LCD monitor and income storage to be placed accordingly to lessen space consumption. Future enhancement can still be added by the future searches who would wish to risk the challenges to their shoulders.

The project still attained the standards and goal to help the mobile users/consumers for their loading needs.

**Recommendations**

The researchers raise the following recommendations after a series of experimentation and analysis for the study MCU Based Multi-Network Electronic Loading Vendo

To the Narra Systems Inc. Employees. This project can serve as a solution to the hassle of going down the stairs that wastes both time and energy whenever they are in need of load. The machine will help them to avail the needed load in a more convenient way and will also cater to them when they are working on a night shift when all the loading stations are already closed

To the commercial customers. Alongside with technological services available in the market, if a given competitive opportunity to expose the project in the marketplace arena, it will be beneficial to the convenience stores, malls, airports, call center companies and of those

likely high rise buildings that operates 24 hours. This can be an additional attraction and service that can be given by the said commercial establishments to their customers and will also produce additional income.

To the future researchers. This project can be the foundation of innovative future projects that that will help the current and future computer engineering students to see realms and possibilities beyond the area of technology. They can redesign and redevelop this project so they can be more productive and useful for the greater good of everyone.

# MICROCONTROLLER BASED POWER SOURCE CONTROL AND MONITORING SYSTEM IN COE ROOMS

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**Abstract**

The aim of this thesis is the design and implementation of controlling and monitoring of current usage in a laboratory room to avoid severe electrical problems during experimentation. The research study focused on the use of Microcontroller in automatically control of the device. It consists of an 'electronic box' which includes a powerful board that is used for automation design composed of a microcontroller, current transformer for measurement of electric currents, contactor, ac to dc converter, etc. This helps to monitor the current being used and with the help of the real time basis it can easily control the time on when the supply will be cut off.

**Background of the Study**

Power outlet is important for each COE students who always use it for their computer laboratory experiments and projects. Before, you can always see this students wandering around each and every corner of the third floor and fourth floor busy finishing their works. Where there is power source, COE students can be easily notice.

After a matter of time, few of the students can be seen. Power outlets in front of the COE rooms had been cut out due to problems of overloading. They (COE students) were also prohibited in the area of ECE's to work or use their respective outlets.

Due to this problem, the students choose to stay at the student center. In addition, there are only 4 sockets in the student center in which one is not functioning. Because of this, there is only limited source the students can use in which they also rush to use it with other students.

**Statement of the Problem**

The study aims to develop a "MICROCONTROLLER BASED POWER SOURCE CONTROL AND MONITORING SYSTEM IN COE ROOMS".

Specifically it sought to solve the following problems;

1. No available place and outlet for COE students in doing their laboratory experiments before or after class.
2. Severe electrical problems like overheat or short circuits due to overloading and improper use of outlets.
3. Loss of supply in large area of the department.

4. Unattended electrician in checking and maintaining the power source of the room

By having a control and monitoring system for each table of the Computer Engineering Department we will be able to solve these problems. With the help of the monitoring system the user will know if there's an electrical circuit overload.

**Significance of the Study**

The importance of the study are the following:

*Laboratory Head*- This study will be beneficial for them because they can easily know if there's an overloading and any severe electrical damage that may occur.

*Student*– This study will be beneficial to the student for them because there will be no hassle for them to get available place and outlets. And in case of overloading there's no need for the students to be afraid because it is less dangerous due to installed circuit breakers and with the help of the LCD display that makes them aware that there's an overloading.

*Electrician*- This study will be beneficial for them because there's no need for them to go to power room to troubleshoot an entire electrical problem. And also even if there's an electrical problem appear and there are not around there's no need for them to worry because any user who can read and understand instruction can operate the device.

**Research Design**

The Proponent use experimental research method that aims to investigate the possible cause and effect by manipulating one independent variable to influence the other variable(s) in the experimental group to control the other relevant variables and measure the effects of the manipulation.

The study encompasses six (6) processes: Planning Stage, Schematic Diagram Design, Software Design, Software Test and Debug, Evaluation and Application and Documentation as shown in the flowchart. The study started on the planning stage where the needs and requirements were defined. Hardware requirements were the first subject matter to define before the software. Define the solution in order to meet the needs and requirements and then conceptualize the solution by circuit diagrams and software design. Develop the detailed solution in terms of software development and hardware fabrication. And then the proponents implemented the solution for testing and evaluation and finally documented the study.

**Data Gathering Procedure**

*Data mining/research*-which involves the search for published data from reputable sources. This includes the search of existing and special records related to the said proposed study. The proponents' research instruments are books, journals, report records, related websites and related study from other schools. Reviewing literature and related studies that is similar to the project helps analyze and examine how the design project will make efficient, functional, and useful to the beneficiaries that are affected by the project.

*Interview of knowledgeable persons*- in order to answer the research questions, the proponents seek information from the school electrician namely, Mr. Samuel Santiago. According to him, there are existing connections that is connected to the power room though, it is more

convenient and easier if the source will be coming from the circuit breaker individually installed in each rooms.

**Fabrication of the Device**

The proponents started to conduct a research about microcontroller and what kind of circuit that can be applied for the system. Also research any available components that can be used and also what kind of program can be used for the system. The project composed of PIC developer module, ac to dc converter module, power supply module and the relay module for the contactor that will serve as a switch. b. How the System works.

**Conclusion**

The end product will provide reliable tool for users to control and monitor the power source. The proponents learn that a microcontroller is a computer-on-a-chip used to control electronic devices. It is a type of microprocessor emphasizing self-sufficiency and cost-effectiveness, in contrast to a general-purpose microprocessor, the kind used in a PC. A typical microcontroller contains all the memory, peripherals and input/output interfaces needed, whereas a general purpose microprocessor requires additional chips to provide these functions.

The proponents also state that it is helpful to have a power source control and monitoring system because with the help of this system you can manually set the desired current to be use. The user can also manipulate the time on when the supply should be turn off. So a system like this is more convenient to the user if they really want to save power consumption and to avoid severe electrical problem. The proponents also be knowledgeable about electronics and electrical wiring

**Recommendations**

This design project entitled "Microcontroller Based Power Source Control and Monitoring System for COE Rooms" aims to monitor and control the power source in each table. Furthermore, the proponents recommend the following:

1. It is better if the system has a monitoring of power consumption.
2. The system must have a sensor of indicating what kind of device is being plug in the socket.
3. Instead of using LCD to display output used a large display such as monitor or LED array so that it can easily catch the attention of the students.

# PC-BASED IMAGE SCANNER FOR DIGITALIZATION OF PAPER DOCUMENTS

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**Abstract**

In the rapid development of modern **I**nformation Technology today**,** new innovations and inventions shape the style of the lives of people across the world. Technology is an ever-changing concept, offering fresh breakthroughs and applications frequently**.** These changes will undoubtedly promote human literature information on the production, conservation and use efficiency, and thus a significant impact on social development. . One form of technology that has taken the world by storm is digitalization of paper-based documents.

Whether you call it digitization, imaging, capture, or paperless processing, there's been a sharp uptick in the number of organizations seeking to reduce the amount of paper in their processes. Digitalization process involves using scanning software and high-speed document scanners to convert paper-based documents to digital pictures.

For most organizations that have been in operation for more than 10 years, they have a lot of paper records to contend with. Most paper records are just kept by companies as reference. Digitalizing these paper documents is very essential to an organization's operational efficiency. This is because digital records are indexed and stored in a systematic manner that provides users with the convenient and time saving ability to search through hundreds of scanned documents in a matter of seconds. Also, digital data storage requires significantly less storage space compared to the cabinets, files and shelves often used to store paper records.

**Background of the Study**

The Computer Engineering Department is one of the most dynamic and productive department in the university. Newest yet relevant advancement in technology are used in instruction and practical application. With enough effort from the trained faculty and the students' part adapting to new technologies, the department continuously producing competent BSCOE graduates. Two of the four goals of Computer Engineering are: to develop and produce facilities through the use of adapted technologies and indigenous materials; and to maintain upgrade, and improve facilities through the adaptation of engineering technologies. Thus, there should be enough support from the students and faculty in advancing our college in terms of technology.

Our department has been a center of excellence for more than 25 years. Every year, it has a lot of paper records to contend with. Most of these paper documents are very essential to the department so they just can't dispose it. What they do, is to store those bundle of

papers in a file room where threat of potentially losing and damaging their records and data is still highly visible. This study will help our department to have long-term preservation of vital documents, quick and easy retrieval of files, orderly archiving of documents, and easy storage of data.

**Statement of the Problem**

The design project aims to develop a device that will create digital copy of paper documents in Computer Engineering Department of Polytechnic University of the Philippines. The project must satisfy the following question:

• How does digitization of paper documents be done using the proposed project?
• What will be the difference using the proposed project to existing scanning devices?
• What will be the accuracy of using this alternative device in scanning of paper documents?

**Significance of the Study**

Computer Engineering community produces piles of papers and documents from Completion Forms of the students, Borrower's slips in Micro Laboratory, Grade Sheets, Memorandums and others. Considering that all of these documents are need to be retained and might be referred on the future for some purpose, it can't be disposed but would be dumped in a file room.

For this reason, the proponents believed that scanning these paper documents and converting it into digital form might improve managing these piles of papers. Although, there is an existing technology of automatic document scanner, it is not yet available in our department. The proponents came to idea of creating an alternative document scanner, and chose their own department to be their beneficiary.

The proposed project can scan volume of paper documents with minimal supervision. This will help the said department to digitalize their paper documents and achieve the proponents' objective which is to make it easier for the whole Computer Engineering community to manage, handle, and archive paper documents.

**Methods of Research**

The method of research used is descriptive method. It describes the data and characteristics about what is being studied. Survey questionnaires were used under this method. The results obtained from the survey will identify the details of the problem being studied, and bring out useful solutions of that particular problem.

The researchers also used Interview Method. It involves a face-to-face meeting in which a researcher (interviewer) asks an individual a series of questions. List of interview questions are prepared beforehand. In conducting interviews, completeness, accuracy, bias, and confidentiality should be observed.

**Data Gathering Procedure**

The respondents will be given a survey questionnaire randomly with corresponding options to choose from regarding concepts and purpose as well as the beneficiaries of the project. They are given a chance to write down their answer given that it is not included in the options. Also, they can suggest or leave comments for the design project in case they have suggestions that will help to improve the project. Sharing their observations and

remarks on how paper document management is done in the said department is encouraged.

**Functionality Testing**

Testing the functionality of the project is done after we ensure that the hardware and software part are working properly. This is the most crucial part in this project. We had encountered several errors and made adjustments both in the program and the mechanism of the system.

After a series of tests, we were able to interface the hardware part of the system to the program. With this regard, the user can now set the location of the scanned images, input the number of pages to be scanned, set the prefix or keyword for its effective indexing, and set the desired quality of the image output. The paper feeder can now feed the paper one at a time using the printer, the camera captures image once the paper document have passed the proximity sensor. Lastly, image enhancement can be done.

**Conclusion**

PC-Based Image Scanner for Digitalization of Paper Documents able to scan any kind of paper documents from Computer Engineering Department. The paper feeder feeds the document one at a time. Then, the camera will scan the paper document and the program will save the file to the specified location with JPEG as its default format. Compared to existing Automatic Document Feeders, the proposed project has lower cost. In terms of speed, it can scan 10-15 pages per minute.

The quality of the output varies on the quality of print does a paper document has.

**Recommendation**

The design project entitled PC-Based Image Scanner for Digitization of Paper Documents can be useful at the Computer Engineering Department so as to make it easier for the whole Computer Engineering community to manage, handle, and archive paper documents.

To the future researcher we would like to recommend the following:

- Use a digital camera with higher resolution; the higher the resolution of the image scanner, results to better quality of the image.
- Parallel ports are no longer available to some unit of computers nowadays, using USB or Firewire in interfacing is recommended.
- Make use of Document Management System which involves indexing and storing the electronic records in a systematic manner that provides users with the convenient and time saving ability to search through hundreds of scanned documents in a matter of seconds.

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# PET COLLAR IDENTIFICATION SYSTEM FOR PAWS

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**Abstract**

Animal identification methods have been used by individuals for more than a century. Early records show hot iron branding was used as a means of identifying valuable animals like horses of different country. As early times, identification was important to disease monitoring by means of ink tattoos. Even as far back early century certificates of safety and origin accompanied animal products during outbreaks of disease. Animal identification, no matter its medium, can be defined as “the combination and linking of the identification and registration of an animal individually, with a unique identifier, or collectively by its epidemiological unit or group, with a unique group identifier” (Bowling, 2008).

Over the centuries, animal identification has used several mediums. These mediums include ear tags, back tags, tattoos, and face brands. Recent methods of identification remain the same with some additional mediums; neck chains, tail tags, freeze brands, paint marks, and leg brands (APHIS, 2009a). This provides rough procedure and harmed and caused death to some animals. At that point the issue of animal cruelty arises and many people and organizations worldwide made an effort to protect animals from cruelty and neglect. It was not too long after that, that the animal Identification system was implemented for use in domestic pets such as dogs and cats. This time, neglecting the old harsh methods and just simply putting id tags and the like. But most animal tags are visible and prone to damaged and alteration. This causes duplication, error, and confusion of animal's identity.

So as to be able to identify animals with high integrity reliable data and neglecting cruelty, the proponents come up to the thesis entitled "Pet Collar Identification System for Philippine Animal Welfare Society or (PAWS)." This uses RFID Technology.

The Philippine Animal Welfare Society (PAWS) is a non-government institution situated at Aurora Blvd., Katipunan Valley, Loyola Heights, Quezon City. Its advocacies focus on the different issues concerning animal rights and welfare. PAWS is currently active, spreading its advocacies to the people by engaging in different rallies, bringing up massive campaigns to different companies and institutions, giving stray animals a new home, and organizing different activities like formal dinners for fund-raising. All of PAWS activities are for the welfare of both farm, and domestic animals.

**Background of the Study**

The notion of animal tagging is nothing new. In early days, the various cattle farms and ranches used methods like branding irons, to label the name or symbol of the ranch to which an animal belonged. A red hot branding iron, having the proprietary mark of the farmer or rancher, was used on the poor animal to etch out a mark on its hide. This is actually the origin of the term brand for an item.*(Sam Polniak, 2007)*

Thus, if the animals grazed in a common area, the cowboys or shepherds could identify their animals because of the branding. There were obvious disadvantages to this system, one of them being that it was a painful process for the animal itself. After branding, the actual identification of the animals was done manually. The only advantage was that there was little room for dispute with another animal owner or ranch owner about the rightful ownership of a particular animal.*(Sam Polniak, 2007)*

Branding gave way to physical plastic tags mounted on the animals in holes made in their ears, specifically for this purpose. Identification was still done manually though. This is the situation for cattle and other commercially raised animals. There was no system however for pets. Therefore, pet owners always had problems when it came to identifying lost pets. Usually they had to rely on some birth mark or the animal's response to a name when called out, or the animal's affectionate reaction to the owner.*(Sam Polniak, 2007)*

With the advent of Radio Frequency Identification (RFID) technology, the plastic dumb tags began to be replaced with RFID tags. They were still mounted in the same fashion, but now there were several more advantages. The first was that the tags were read easily from a distance, with a hand held reader. The tags themselves were just a number, but this number pointed to a large amount of data in a remote database, which contained other information about the animal like, age vaccination and medication record. This made record keeping easy and efficient without becoming a pain for the ranch owner. It also satisfied emerging requirements about traceability and food safety, especially after the mad cow disease and similar scares.*(Sam Polniak, 2007)*

As part of this study, the Philippine Animal Welfare Society (PAWS) is chosen as the beneficiary. PAWS is a volunteer-based non-government organization whose goal is to prevent animal cruelty through education, animal sheltering and advocacy. This institution believes that the creation of a more peaceful society starts with the widening of mankind's circle of compassion which includes animals, thereby envisions a nation that respects animals, practices responsible pet ownership and protects wildlife.

The PAWS Animal Rehabilitation Center (PARC) serves as a temporary shelter for dogs, cats, and other animals rescued from cruelty or neglect with the ultimate goal of rehabilitation them and placing them in loving homes. Part of PAWS' life-saving work at PARC is empowering people by providing volunteer opportunities to help animals so that everyone can do their own share in making the world a better place for all.
*(http://www.paws.org.ph/site/1/default.aspx)*

**Statement of the Problem**

Specifically, this study sought to solve the following problem:

- Traditional animal tagging *(branding)* provides rough

procedure and could cause death to some animals.

- Most animal tags are visible and prone to damaged and alteration.
- Duplication, error, and confusion in using traditional animal tagging.
- Traditional animal tagging could not easily maintain records of vaccination, medication, health check-ups, etc.

**Significance of the Study**

The project would benefit PAWS for easy management of records of each pets rescued every day. RFID animal tagging would be of convenience. Since the traditional animal tagging could harm animal, RFID totally slashed out animal maltreatment. Also, RFID provides a unique number for every animal which drive down identity redundancy.

**Data Gathering Procedure**

The researchers provided intention letter addressed to the concerned person on a target University Library and different Institutions like Department of Science and Technology (DOST), Philippine Veterinary Medical Association (PVMA) and Philippine Animal Welfare Society (PAWS). It is noted and signed by the Department Chair and College Dean. It served as the pass key for the researchers to avail necessary resources for the development of the study. The researchers do library literature search, which involved reviewing all readily available materials. Those materials include internal study information, relevant trade publications, newspapers, magazines, on-line data bases, and any other published materials. After, Literature searches were done over the web. This is the fastest way of gathering relevant data, specifically foreign related studies and literature. Also, conducting surveys and interviews for fact gathering, verification of information gathered elsewhere and confirmation of information gathered.

Since PAWS is the center of our study, the researchers made an appointment to conduct an interview with the Management. Interviews are conducted with a small group. The researchers gathered specific information and asked follow-up questions to get more detail on concern of particular study. Before the set date of the interview the researchers wrote down the questions. Deciding beforehand on how we would want to document the information gathers. The person being interviewed was put at ease by telling the purpose of the interview and how the given information will be used. Also, assuring that whatever they said will be kept confidential. Since PAWS is an organization, they maintain records and system. A review of some of these records provided valuable information to substantiate the performance deficiencies under consideration and lead to potential causes. Through searcher's proposed study, it is one of the challenges to determine which data are relevant and which part of the system should modify and retained. Additionally, the researchers observed the current system that PAWS is using on identifying and tagging of their animals. Through this, the researchers formulated and built the idea on how to have an impact on implementing new system. Same procedure with the interview with animal practitioners which are the members of Philippine Veterinary Medical Association.

Lastly, the researchers analyzed and understand how the gathered information be used for the development of the study. Identifying current from outdated data is also done. Outdated data could be more harmful than no data at all.

**Functionality Testing**

All projects may come across different problems, from the basic up to the complicated one, and functionality testing and debugging from time to time is a good procedure that should be done. The precision of the vehicle movement and the input and output from surveillance camera are what the group considers.

Upon creating hardware and software materials, several experiments are attempted to come up with the desired output. And during the trials, we met some problems but still the proponents are managing to consider different situations for it. One of the problems that proponents encountered is the part where… INSERT MORE PARAGRAPH HERE

The project would be considered a success if and only if the expected output was reached considering proper interfacing, a working database program, readers, and devices.

**Fabrication of the Device**

The Radio Tag

The proponents use the pet collar and modified it by placing the tag exactly on the body of the collar. It has two major components—the RF antenna and the microchip. The RF antenna operates under low frequency of 125 kHz to 134 kHz. It contains a small, power-efficient, 5 micro-watt, read-only microchip that houses the unique ID of the tag.

The proponents struggled since the tag available in the country was in the size of typical credit card (95mm X 64.4mm). Since the RF tag is to be located on a spot on the collar, the proponents needs a smaller RF tag of size 40mm X 25-30mm approximately.

As a solution, RF coil and the microchip inside the *card* must be modified by size.

**Conclusions**

The earlier chapters of this study described and explained the use of pet collar animal identification system to solve existing problems amongst veterinarians, pet shelters, and even pet owners. As a result of the research, the proponents come up with a system, custom-designed to do specified task that assures functionality to maximize the accuracy of the data, and usability of the today's technology.

Not to mention, some animal identification system includes injecting RF tags into animal skin. And since PAWS' goal is to prevent animal cruelty, the institution does not practice such. The institution believes that the creation of a more peaceful society starts with the widening of mankind's circle of compassion which includes animals, thereby envisions a nation that respects animals.

By providing a cost-effective solution to PAWS in a way of scrutinizing the traditional way of tagging animal, the proponents are doomed to make this study possible.

In consideration with the data gathered from the evaluation, library researches, and developmental method of research, the following conclusions were formulated:

- The system was successfully developed a pet collar animal identification.
- The whole unit was successfully developed a stand-alone device that will allow an organized repository of data to pass out a unique record from an external component such as a RF tag.

Assembling them to form a system that transmits wirelessly.

- Approximate range of frequency for cats and dogs are 45-65,000 Hz, and 67-45,000Hz respectively. A frequency greater than the aforementioned value would cause the pet deafness.

**Recommendations**

Enhancements must take into considerations for the improvement of the design project. In this study, the proponents sought some enhancements that can be applied for potential exercises. The researcher offers the following suggestions to improve the project:

1. The government or other statutory authorities may mandate that ALL animals should be tagged, whether pets, cattle, livestock, or endangered wild species. Pet tagging would have the records of pet health easily available including vaccinations for, say, the rabies vaccine, which is normally given to pet dogs. Livestock tagging would enable government monitoring of the food chain.
2. It is recommended that further research on Internet controlled devices be conducted other than stand-alone offline software programs.
3. This study has the intention of tracking animals through UHF technology. The UHF technology functions as a ground for connecting all the devices wirelessly. It is recommended to use UHF as a tracking device for animals.
4. Consider the use of injectable radio tags. Although the institution firmly disagrees with the type of tagging, it is still best if the purpose of identifying that animal is from temporary to permanent.
5. Endangered species tagging can enable environmental agencies to monitor the numbers of particular species for example tigers in a particular nature reserve. Radio tagging is present being used, but not on a large scale. Many places still use crude methods like looking for the animals droppings, spotting them from the air, etc. Due to this only estimates numbers are available, never the actual numbers. Also, there is now way to have a census or to know if poachers have killed any of the animals.
6. With this project we were designated with simply being able to run a stand-alone, multifunction device that transmits data wirelessly for less than 100 meters. It would be a good suggestion to try controlling the device over the network by making use of TCP/IP that would allow an internetwork communication.
7. This project provides *only* in-house organization of data. It is best recommended if the RF tag used is for universal means (ISO standard tag). Thus, once the pet migrated, it would be read by, of course, a universal reader.

# PHILIPPINE NATIONAL RAILWAYS TICKET VENDING MACHINE W/ REAL TIME AND NEXT TRIP TIME DISPLAY

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**Abstract**

Rice Grain Vending Machine Located at GSIS Metro Homes is a project used to improve the system of selling rice by our beneficiary Mrs. Baby Helen delos Santos. The proponents have decided to come up with a better way to solve the problem of selling rice especially during night time. This project aims to apply the growing technology in terms of using the vending machine in selling products. Not like in the store which only operates in morning and night time, it makes available in anytime of the day. The machine can generate profit and less maintenance. This project is perfectly designed to be implemented in the store of our beneficiary located in the GSIS Metro Homes, in front of the PUP CEA building. It has four containers for the customer to have an option on what type of rice they're going to buy. Microcontrollers are integrated in this machine which controls the major function of the whole system. The machine can generate inventory and set the price of rice grain per pack. Mechanical part of the project is on the dispensing of the rice. It dispenses packed rice grain. This project is design to have a bill acceptor which only accepts P20, P50, and P100 and also a coin acceptor which accepts a denomination of P1, P5, and P10. It is also design to dispense change using coin hopper. A dark activated circuit which activates light only during night time.

The proponents conducted a survey in line with their research. The respondents of the survey are the tenant of the GSIS building Metro Homes. The survey is all about respondents' experience on availability of rice especially during night time and the type of rice they usually buy. Majority of the respondents replied that it will greatly help if the said machine will be installed in their compound.

**Background of the Study**

The Philippines is one of the few countries in Asia to use the first train system. Train systems connect different cities and provinces in the country. One of the largest and oldest train systems is the Philippine National Railways.

The Philippine National Railways (PNR) is a state-owned railway operator in the Philippines, operating an extensive railway line in the island of Luzon. As of 2010, it operates two commuter rail services in Metro Manila and the Bicol Region. The commuter line in Metro Manila is part of

the Strong Republic Transit System and was referred to as the Orange Line.

For more than 100 years, the PNR has given transportation service to the Filipino people. Continuous improvements and innovations have been made to create a better service. Although enough has been made, other systems still use the old process, one is the ticketing system.

Today, the PNR uses a manual ticketing system where ticket vendors are located in every station and inside the train. Commuters buy a piece of paper as their ticket. These papers are already printed and stamped with necessary information like the date, destination, and train number when sold. The main office prints the tickets and distributes them to stations every morning. The ticket vendors will sell them to commuters for the trips of the day. When the last trip passes, the vendors give the sales together with the sales report to the main office. Efficiency and reliability of ticket vending and sales auditing is very low due to manual system.

**Statement of the Problem**

This design project aims to develop a machine that will enable a passenger to drop coins into it and then release tickets according to passenger needs. The machine must be able to print all required information into the ticket. This project must satisfy the following questions:

- How to make a machine that will accept coins and then release a needed ticket?
- How to make the machine print the required information for the trip?
- How to enable the machine to display real time and next trip time?
- How to enable the machine to produce a sales report together with passenger count?

**Significance of the Study**

This project will help lessen errors in sales reporting and accounting. This project can also help in making statistical studies of commuters. This will also help create a systematic and organized ticket distribution among commuters

The target beneficiary of this project is the Philippine National Railways. The department concerned with sales auditing and reporting will benefit from the efficient auditing and recording of the machine. Students and researchers that also intend to create studies regarding PNR passengers will benefit from the statistical reports produced by the machine. PNR Ticket Vendors can benefit from the additional help of this machine and lessening the commuters buying tickets from them. Commuters may also find this machine beneficial as an alternative ticket vendor especially if they are to pay exact fare.

**Research Design**

Providing answers and data, as we the researcher seek and gather data regarding with the study, the researcher used some method of research. Within the process, the researcher used Descriptive Method, were it summarizes or describes the important character of a known set of data. We classified our level of measurement for data as Nominal Level that characterize the data as names or categories.

The Indirect or Questionnaire Method is fit in the way how we collect data relatively for the study. Survey questionnaire were used under this method then were the main goal is to describe the data and characteristics about the subject. It is also to determine the status effect or impact for them of the problem being

studied with this research and to provide appropriate solution as main output of this study.

Direct or Interview Method is also applied as we done some interview with PNR's staff about train system, process on ticket distribution and audit and even their opinion about the thesis concept.

During this study, another method of research used is experimental method. In all research and development, it is necessary to conduct series of test to verify that all the possible components used in this project are working properly. It possible, lots of exploration within the field is needed to be able to understand every single process in the research and the study subject as well. With this method, the researchers have the opportunity to familiarize the every component will be used and its function as the final output is will be tested.

**Data Gathering Procedure**

In survey process, the respondents are provided with a survey questionnaire each randomly. The questionnaire paper has a series of questions design to provide needed information for the development of this research. The respondents have their free will to choose to the given choices with each question that corresponds with their options regarding concepts and their idea with the design project, as well their opinion and views with the possible benefits of this research to them in the industry and to the development of mass transportation. The respondents were also asked about any comments and suggestion for the design project that may somehow greatly help with the development of the design project.

In addition to this, we also conducted several interviews with PNR's staff to gather needed data and ask their opinion about the concept of this study.

**Fabrication of the Device**

After finishing the design of our machine, we created the PCB design of our circuit. Due to so many connections of the design, we had to use a double-sided PCB to minimize jumper wires which might cause instability of our machine. The PCBs were then drilled precisely and components were placed accordingly.

Our machine was made from aluminum framings and Galvanized-Iron Sheets. Interfaced devices such as 7-segment displays, LED array displays, push buttons, LCD display, and printer are then positioned in the machine accordingly.

After positioning the circuits and devices, the machine is ready for programming and testing.

**Functionality Testing**

The programming part is one of the hardest parts in creating our machine. We had to test if our created design and circuit was functional and efficient.

We started creating a program that will enable our devices to operate the way they should. There were so much devices and displays in our machine. The first thing that we had to do was to study how these devices work. We studied what these devices needed so that they will produce outputs that we needed.

Parts of our design were gathered from previous projects so we had to study those design projects. Although these circuits already work, they only run independently and we had to make them run as a whole. Controlling these circuits from a master microcontroller was a hard

job. We also had to reprogram those circuit's programs so that they will accept data from our master microcontroller.

**Conclusion**

Therefore we conclude that the implementation of the Train Ticketing Vending Machine with Real Time and Next Trip Time Display will help a train operation in their operations, especially in the ticket selling and distribution. The train company will also benefit from the automatic sales and passenger count that the machine will print upon request.

The machine will be beneficial to the passengers since the ticket for the next train will be available from the ticket vending machine. They will also be aware of the current time and the time of the next train from the displays of the machine.

**Recommendation**

To any interested train companies: We recommend that this machine be tested and evaluated. This may help in further improvement of operations even as a starting concept for future developments.
To the future researchers: We recommend improving this machine to whatever other applications this may fit. We hope that the prototype be improved for actual commercial purposes. The circuitry may also be developed for additional features.

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# RFID-CONTROLLED DOOR ACCESS FOR BRGY. SANTOLAN SESSION HALL

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**Background of the Study**

Automation has increased the speed of our living and provides lots of possibilities that contribute for our own convenience. Studies conducted the disadvantages of using door-knobs, or alike. Radio-frequency identification (RFID) is the use of an object applied to or incorporated into a product, animal, or person for the purpose of identification and tracking by the use of radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. RFID offers numerous possible applications. A common one is the use of tags for Identification and authentication purposes.

In such case, we come up on the idea of incorporating RFID into an automatic locking mechanism in which will be used for granting authorized individual to access or unlock the door and enter the premise. In looking for a beneficiary or stakeholder for our project, we considered the possibility that they already had glass door since it is too expensive for us to shoulder it along with other electronic components needed. We considered Brgy. Santolan Session Hall to be our stakeholder because we believe that our project is applicable and can be beneficial to them.

According to the *rfidjournal*, the disadvantage of mechanical locking systems is that keys can be lost or stolen and used by unauthorized people, necessitating that the locks be changed. Also, the session hall itself has a guideline that only authorized individual must enter in which their recent system couldn't comply with it.

In addition, *Chula Vista, CA Residential Reduction Project* asserts that 87% of break-ins occur to those victims who use manual door locks. The intruders defeated looked doors with tools such as screwdrivers or crowbars. In this case, their door locks despite of costs and quality wasn't a help for them.

Meanwhile to know whether we can continue in pursuing our project to the said brgy., we approached the Brgy. Chairman, Mr. Wilfredo F. Sityar, to ask for his approval. Upon our meeting, we had a verbal agreement for the implementation of our project since he was convinced by the benefits that this thesis application withholds.

Furthermore about the project, radio frequency along with a PIC16F877A microcontroller is used to automatically control the door locks and grants access to the authorized persons to enter the premise. The council members will have their own RF tags that are placed in their identification cards or alike which contains a coil and a transmitter. Technically, when

the coil is placed in high frequency electromagnetic waves, it is energized and provides supply to the transmitter which transmits a code unique to the tag. This code is received and identified by the receiver. If the tag is valid, door access will be granted and the door will be unlocked; otherwise the LCD will prompt a denying message and the door will remain unlocked. However, if the employee forgot or lost his/her identification card, manual ID number keying-in will be done since each RF tags have its own card or identification number.

To simplify the proposed new method, the RFID will allow authorized persons to enter the Session Hall using their assigned RFID tag.

**Statement of the Problem**

We, as the proponents through the use of RFID want to solve the following dilemmas:

- How to improve the existing door system of the Brgy. Santolan Session Hall's door that is favorable and acceptable to the stakeholders?
- How to prevent, if not, minimize unauthorized entry and access of files inside the session hall with an accurate and efficient control using AIDC method specifically RFID?
- How to improve the security of the Session Hall?
- How to orient the stakeholders to cope with the implementation of the new security system on the Brgy. Santolan Session Hall?

**Objectives**

**General Objective**

To create a well-secured and effective automatic door locking system for Brgy. Santolan Session hall using an AIDC technology specifically RFID.

**Specific Objectives**

- To improve the existing door locking system of Brgy. Santolan Session Hall using RFID technology.
- To provide unique IDs with RFID tags (to be scanned by RFID Reader) for each authorized individuals in which they will use to gain access to enter the Session Hall.
- To implement a well-secured door locking system for Brgy Santolan Session Hall.
- To conduct seminar and orientation for stakeholders to help them cope with the new system.

**Significance of the Study**

The RFID-Door Controlled Access will improve the conventional door access system which involves the use of keys, knobs, and locks. In addition, our project will not only simplify the method but, provides further security as well. The Brgy.Santolan session hall is for council meetings, regular sessions and payroll. Aside from that, there are important documents and/or records stored inside the hall. During sessions of council, unauthorized persons will be prohibited in entering and interfering.

Our project will automate the door system using RFID. Since each council member will be provided with an ID with RF tags and uniquely identified password, the

RF reader will verify it to grant them an access in entering the premises. In terms of convenience, this procedure is hassle-free compared to the conventional system.In implementing our project, this will probably be the beginning of automation to the barangay itself. Our project will potentially lead into the advancement and compliance of Brgy. Santolan technology in terms of their system.

**Research Design**

In our study we utilize descriptive methodology. In this method, information about the present existing condition is gathered. The emphasis is on describing rather than on judging or interpreting. The aim of descriptive research is to verify formulated hypotheses that refer to the present situation in order to elucidate it. Moreover, this method allows a flexible approach, thus, when important new issues and questions arise during the duration of the study, further investigation may be conducted.

In this study, the descriptive research method was employed so as to identify the significance of using the RFID-Controlled Door Accessfor privacy and security purposes during the time of research. The researcher opted to use this research method considering the objective to obtain first hand data from the respondents. The descriptive method is advantageous for the researchers due to its flexibility; this method can use either qualitative or quantitative data or both, giving the researchers greater options in selecting the instrument for data-gathering.

The aim of the research is to determine whether the proposed project will be a great use to Barangay employees of Santolan; the descriptive method is then appropriate for this research since this method is used for gathering prevailing conditions.

**Data-Gathering Procedure**

**Surveying**

To gain information and to know whether our proposed project is feasible and acceptable or not we interviewed the Brgy Chairman of the Bgy. Santolan; which he discussed to us about the use of session hall to them. He elaborated that the meetings, regular sessions, and payroll is done inside the premise.

**Conclusion**

Upon finishing and implementing our project, we therefore conclude that the RFID Controlled Door Access for Brgy. Santolan Session Hall will improve its existing door lock system. It is more is more favorable, effective and well-secured for our stakeholders. This will strengthen the security by preventing, if not, minimize the unauthorized entry and access of files and items stored inside the Session Hall.

With the use of RFID system, the authorized employees will have an accurate and efficient control of entry. It will improve the security in such case that without the RF Card and the password, the system will not unlock the door. Entry logs are saved in the memory card which can be viewed and generated by the operator. In case something went wrong, the logs will show the card which will then trace the owner that pass through and the date and time it occurred. Furthermore, attendance during Session Hall may no longer be done manually since their arrival will be logged automatically.

Since the RFID system has a back-up power source, in case of electric failure, the system can still be used. After the power

went back, the battery will continuously charge which indicates that there will always be a back-up though it is not enough to supply the power needed by the system for a long period of time.

During the orientation, we received positive feedbacks and appreciation from the employees of Brgy. Santolan. They were easily trained on how to adapt with the new system. An assessment survey was made after to determine whether they find our project beneficial or not. As a result to it, all of the feedback was good. Therefore, they believe and we believe that the system is truly beneficial and effective to them.

**Recommendation**

Place the circuit and other components such as the LCD, keypad, battery, etc. in a secured chassis. Make sure that they are properly attached to prevent electric, hardware and other problems. Before locking it up double check the connections to avoid future problems regarding wires, loose connections, or short circuit

Compute the needed voltage and current by the system. Use another power source if necessary. Place an indicator which will show whenever the system is in battery or in AC mode. This will avoid confusion. Allow modification of date and time. Errors regarding system date and time may be encountered.

For door access purposes, use only low frequency RF cards or something that is suitable for the requirement. In our case, we only used a 125 kHz RF Card to avoid unnecessary card detections. The card will be scanned if it is up to 6in away from the controller.

Upon entry of multiple employees, wait for a few, (approx. 5sec.) seconds before scanning your RF Card. There are times that it may not be accepted abruptly since the circuit has cycles to undergo to.

The operator must keep a list of authorized employees with their card number so that the numbers can be retrieved promptly if the employee forgot his/her RF card or password.

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# RFID PATIENT IDENTIFIER WITH INFORMATION VIEWER

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**Abstract**

The project RFID Patient Identifier with Information Viewer is a device that identifies a patient through an RFID tag also displays pertinent information about him. We used RFID because we want a simple wireless means to store small amount of information on things and we can change the information dynamically. RFID tags usually contain 96-512 bits of information on them and each tag can be read in less than 5 ms or 5 thousandths of a second. RFID tags are very versatile. The project is an MCU-based prototype which uses a PIC16F877A with a 20x4 LCD display. We decided to use the PIC to control the display on our screen because we it more easy to program and control. Liquid Crystal Display (LCD)s can be set to use either 8 or 4 of the data pins to communicate with the host controller that is driving it. The 4x20 LCD that we use have both 4 pins and 8 pins interface. The prototype is powered by rechargeable Lithium batteries and contains a wireless Transceiver in order to send and receive information from a remote computer database. The main objective of this project is to lessen the misidentification cases in patients and to integrate the technology in improving the identification system in the healthcare industry.

## Background of the Study

To address the need for providing an efficient identification system for the hospitals, there should be automatic identification procedures. In recent years automatic identification procedures (Auto ID) have become very popular in many service industries, purchasing and distribution logistics, industry, manufacturing companies and material flow systems. Automatic identification procedures exist to provide information about people, animals, goods and products.

The omnipresent barcode labels that triggered a revolution in identification systems some considerable time ago are being found to be inadequate in an increasing number of cases. Barcodes may be extremely cheap, but their stumbling block is their low storage capacity and the fact that they cannot be reprogrammed. The technically optimal solution would be the storage of data in a silicon chip. The most common form of electronic data carrying device in use in everyday life is the chip card based upon a contact field (telephone chip card, bank cards). However, the mechanical contact used in the chip

card is often impractical. A contactless transfer of data between the data carrying device and its reader is far more flexible. In the ideal case, the power required to operate the electronic data carrying device would also be transferred from the reader using contactless technology. Because of the procedures used for the transfer of power and data, contactless ID systems are called RFID systems (Radio Frequency Identification).

Hence we have decided to integrate the RFID system which will be more practical and convenient to use rather than a barcode system.

**Statement of the Problem:**

The study will develop a patient identifier with information viewer.

Specifically, the research aims to answer the following questions:

- How will it help the health professionals to administer the correct medications to the right patients?
- How will the system elevate the efficiency of the medical personnel through correct identification of the patients?

**Significance of the Study:**

- *To the patients*

  Proper identification of the patient will guarantee that the patient will be given the correct drug, medication and procedures. Through this device, accurate patient information can be displayed.

- *To the medical staff/ caregivers*

  Correct identification of a patient will lessen their errors like giving a diagnosis to the wrong person and giving a patient the wrong treatment. It would also save them time like double checking the patient's name before a procedure because it can be done easily through the RFID device. Through this project, the medical staff's job will be easier and they can keep track of the patient's record effortlessly through the information viewer and through the actual database of the patients.

- *To the Medical Institution*

  Upon the use of the RFID patient identifier, cases of patient misidentification will lessen and staff proficiency will be practiced. Errors caused by misidentification can be prevented. Through this project, not only can these problems be prevented, the hospital and its staff will be of high effectiveness. The use of the device will also improve the access and retrieval of patient information.

- *To the future researchers*

  The problem of patient misidentification can be further studied and this project can be the start in revolutionizing the system of identification in healthcare. Through this project, the problem of patient misidentification is seen in a new light for as we go on with the research, we have learned that it can be prevented. This can help the future researchers to partake in solving this issue and make this project a reference and a guide in doing so.

**Method of Research**

As method of research, the researchers used the Descriptive method. Survey questionnaire were used under this method. The main goal of this type is to describe the data and characteristics about the subject being studied, which is the use of RFID in patient identification. The results obtained from the survey will define the details of the problem being studied and carry out the solutions of that particular problem.

The proponents also used the experimental research, where certain variables were manipulated, controlled and measured any change that occurs in them. The researchers experimented on the RFID tag and at what values will it work. The handheld device was also experimented on in determining the range of the device to the tag id for it to communicate seamlessly.

**Data Gathering Procedure**

Data were gathered through reading materials such as articles and studies conducted by different organizations regarding RFID use in the medical field. The researchers also consulted several individuals to assist them in choosing the appropriate components and materials to be used for the prototype.

As for the survey, the respondents will be given a survey questionnaire randomly with corresponding options to choose from regarding the concepts and purpose, as well as the beneficiaries of the project.

**Conclusions**

Through the course of our study and fabrication of the device, we have concluded that the use of wireless networks, combined with the use of clinical information systems, adequate training of medical personnel, IT and network support, and the use of wireless handheld devices could provide the ability to improve the quality and delivery of healthcare in hospitals. Using wireless connectivity in a medical environment can greatly improve the productivity of care providers and the accuracy of diagnoses and treatment by facilitating the retrieval of patient related clinical information by physicians. However, several open issues such as security, data privacy, wireless interference, and wireless network maintenance must be addressed accordingly in order to successfully deploy and use the technology in hospitals. Similarly, another important issue that remains prevalent is the limited operational time of handheld devices.

**Recommendations**

For the future development of the patient identification prototype, the researchers recommend the use of a wireless network to communicate with the handheld device and the hospital information system. The presence of wireless communication would then give the option to implement the system through a web-based application, thus bringing more security and reliability to the whole system.

As future work, alternative components to re-design the RFID tags should be considered. It is suggested to be smaller and more compact, so that it could be worn with less difficulty.

The proponents recommend that the device should also give the privilege to write information onto the database itself. It would enhance the reliability, the independence from the manual system of tracking records, and lastly the guarantee of the privacy of the patient's information.

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# RICE GRAIN VENDING MACHINE LOCATED AT GSIS METRO HOMES

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**Abstract**

Rice Grain Vending Machine Located at GSIS Metro Homes is a project used to improve the system of selling rice by our beneficiary Mrs. Baby Helen delos Santos. The proponents have decided to come up with a better way to solve the problem of selling rice especially during night time. This project aims to apply the growing technology in terms of using the vending machine in selling products. Not like in the store which only operates in morning and night time, it makes available in anytime of the day. The machine can generate profit and less maintenance. This project is perfectly designed to be implemented in the store of our beneficiary located in the GSIS Metro Homes, in front of the PUP CEA building. It has four containers for the customer to have an option on what type of rice they're going to buy. Microcontrollers are integrated in this machine which controls the major function of the whole system. The machine can generate inventory and set the price of rice grain per pack. Mechanical part of the project is on the dispensing of the rice. It dispenses packed rice grain. This project is design to have a bill acceptor which only accepts P20, P50, and P100 and also a coin acceptor which accepts a denomination of P1, P5, and P10. It is also design to dispense change using coin hopper. A dark activated circuit which activates light only during night time.

The proponents conducted a survey in line with their research. The respondents of the survey are the tenant of the GSIS building Metro Homes. The survey is all about respondents' experience on availability of rice especially during night time and the type of rice they usually buy. Majority of the respondents replied that it will greatly help if the said machine will be installed in their compound.

**Background of the Study**

Rice is the seed of the monocot plant Oryza sativa. As a cereal grain, it is the most important staple food for a large part of the world's human population, especially in East and South Asia, the Middle East, Latin America, and the West Indies. It is the grain with the second-highest worldwide production, after maize (corn).

Since a large portion of maize crops are grown for purposes other than human consumption, rice is the most important grain with regard to human nutrition and caloric intake, providing more than one fifth of the calories consumed worldwide by the human species.

Rice production in the Philippines is important to the food supply in the country and economy. Rice is the most important

food crop, a staple food in most of the country. It is produced extensively in Luzon, the Western Visayas, Southern Mindanao, and Central Mindanao.

There are many varieties of rice; for many purposes the main distinction is between long- and medium-grain rice. The grains of long-grain rice (high amylose) tend to remain intact after cooking; medium-grain rice (high amylopectin) becomes more sticky**.** Medium-grain rice is used for sweet dishes, for risotto in Italy and many arrossos -as arròs negre, etc. in Spain. Here in the Philippines, there are many dealers offer different kinds of rice including US Premium, US Gold Cup, Jasmine, Denorado, Sinandomeng, Super Angelica, Angelica Ordinary, Pinoy Wonder, Liberty, Golden, NFA, etc. Consumers have choices for the type of rice they want to eat and they also based on the price of grain.

**Statement of the Problem**

Instances of unavailability of rice at home are others concern. Not every one of us, have stocks of rice. Tenants of the GSIS building have experience problem in purchasing rice grain especially when the stores are closed or when the rice is not available. There are few stores who offer 24-hour service. Convenient store such as 7-11, CMART, Mini-stop, Mercury Drug, etc. are of those 24-hour stores. Those mentioned store don't sell rice. There are selected stores who sell rice but most of them don't sell in "tinge-tinge" or in retail way.

**Significance of the Study**

***Beneficiary***

This study aims to help Mrs. Baby Helen Delos Santos in her way of selling rice to her customers. She is an institution business woman located in GSIS Metro Homes known for her product; the rice grain. Automating the old way of selling rice can lessen the man power. With this machine, she can sell rice grain any time of the day and with that it will add to her normal income per day.

***Tenants of GSIS Metro Homes***

This project will help all the tenants of the GSIS Metro Homes, especially those students who doesn't have stock of rice in their unit. They can buy rice any time of the day.

***Future Researchers***

This study aims to help the future researchers who are in line with this kind of project. This may serve as their reference for studying and can be subjected for further improvement.

**Research Design**

In this particular design project, the proponents used the descriptive or the survey method.

Descriptive or survey method has been done using questionnaires answered randomly by the respondents. The results of the survey give the information and will serve as the basis of the study. And because of them we will able to know their opinions about our project.

**Data Gathering Procedure**

Listed below are several resources helped the researchers in conducting this study:

- Internet
  It provides information that can't be access within the place such as the foreign literature, foreign studies and datasheets.
- Interview
  A conversation between the interviewer and the interviewee gives accurate and reliable

information that helped the proponents.

- Library
  It helps the proponents in searching the related studies in local literature. It also gives additional information that will enhance the research project.
- Conducting Surveys
  The questionnaires are done to give additional information that helped the researchers evaluate and give accurate solution about the present situation in the department.

**Fabrication of the Device**

In the process of formulation, the design and quality of each module, and as well as the design and fabrication of the entire design project, there were series of steps that were done in order to achieve the desired results. The steps were well-arranged to guarantee that the quality of the project would not be compromised.

Step 1:

Outlining the chosen design project – Defining the scope and limitations and all the requirements in the project must be considered. All constraints must be anticipated to minimize errors and to avoid rushing by going over the same processes.

This step in our study includes:

- Defining the mechanism of the project
- Considering all the requirements
- Describing the system
  - How it will look like
  - Specific functions
- Defining the scope and characteristics of the project
  - How many commands the system can recognize
  - The extent where the system can be effectively used.

Step 2:

The schematic diagrams and circuit design – The next step is to formulate the schematic diagram of each module of the system. The system is divided into different design modules and each has a function to accomplish the requirements of the system.

Minimizing the size of every circuit board is of great advantage and adds to the fact that the overall packaging of the device can be convenient and well-managed.

Step 3:

Component analysis – Every component indicated in the schematic diagram must be analyzed. Availability of the component is a great factor that must be considered. In this project, the PIC 16F877A is the key component in the entire system.

Step 4:

Drilling and soldering – By making use of PCB designing software, next would be drilling and putting each component into place. Soldering must be done properly for current to flow properly on each and every soldered component on the circuit

.

Step 5:

Connection testing – When all components are now soldered into place, testing of every module must be done to make sure that each is working. If all the board are

working properly and in good condition, it could be connected as a whole and then begin the testing for the entire system. This process may also include finding of errors and troubleshooting.

Step 6:

Packaging – The last step is packaging. The first impression on the project is one of the factors that must be considered. The physical appearance of the project must be appealing to the eye and satisfactorily sound to the environment.

**Conclusion**

Vending machines can have all sorts of items to sell and different purchasing mechanisms but one characteristic every vending machine has its instantaneous mess. As an answer to the need of a machine that will provide rice grain 24-hour service, the project Rice Grain Vending Machine was conceptualized, develop and then materialized.

The prototyped was developed to the use of the PIC 16F877A as the main controller of the whole system. However, during the development several difficulties were experienced.

Although the objectives were met, the study was not perfect and needs further improvement. One area that should be improved is the accuracy of the bill acceptor. Future enhancement can still be added by future researchers who would wish to rest the challenges to their shoulders.

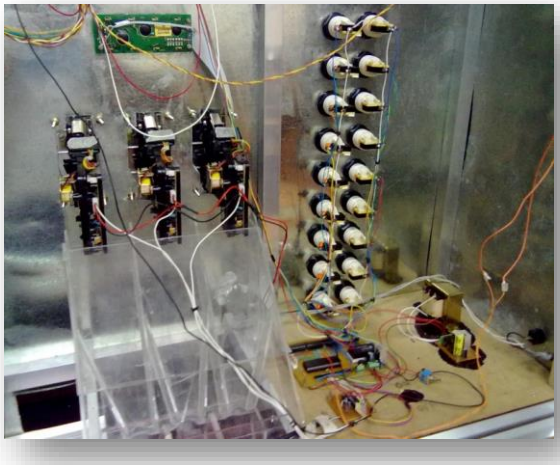
**Recommendations**

Researchers raise the following recommendations after a series of experimentation and analysis for the study Rice Grain Vending Machine located at GSIS Building Metro Homes.

1. It is recommended that the future researchers would utilize a metal casing as with commercial vending machines.
2. The proponents recommend that the future researchers would improve the accuracy of bill acceptor.
3. For the one who will take over for the project, we recommend the everyday maintenance for the efficiency and functionality.

**Supporting Picture**






# SPEECH RECOGNITION CONTROLLED WHEELCHAIR FOR PERSON WITH DISABILITY

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**Abstract**

Wheelchairs has been widely used by many people worldwide in terms of mobility assistance. It can be seen in hospitals, typically used by patients who cannot walk normally because of different medical conditions. Aside from the hospitals, wheelchairs can be seen indoor, outdoor and everywhere. As the name implies, a wheelchair is a simple chair with wheels that can be controlled by spinning or pushing in able to move and get into a certain location. It is typically used by less privileged individuals who cannot use their legs and feet for specific reasons. The type of wheelchairs differs on the condition of the person who will be using it.

**Background of the Study**

Advancements in today's technology has greatly affected the life of average people during the past decade, but unfortunately wheelchair users around the world have seen little to no improvement on the commercially available wheelchair controllers.

The number of wheelchair users is growing faster than the general population. Serious cases conforms the use of wheelchair to minimize the effect of being handicapped and at the same, to reduce the need for assistance intervention.

Persons with disability or those who are unable to use their legs or any other part of their body in everyday living are one of the most common infirmities that exist. It can be caused by diseases and accidents; may also be acquired upon birth and sometimes, it can also be hereditary.

A motorized wheelchair has been released in the market for the better use in severe cases. Users are able to operate a joystick or a keypad to control the wheelchair, however many more severely handicapped users need some other means of controlling the wheelchair. The aim of this work is to implement an interesting application using small vocabulary word recognition processor on a smart system. The adopted model is based on grouping a microcontroller with a new voice recognition module (using HM2007) for isolated word and speaker dependent. The resulting design is used to control a wheelchair for a handicapped individuals based on a voice commands. In order to gain in time design, experiments have shown that the best way is to choose a speech recognition module and to adapt it to the application. The input of the system are a set of five English words used to control the movement of an electric

wheelchair, a vector of information on the context given by a set of sensors and a joystick for security actions; The output is a corresponding command and a set of indicator LED (Light Emitting Diodes). The system is developed in order to be installed on the wheelchair. Therefore it should be easy to carry, easy to operate and with low power consumption.

**Statement of the Problem**

Wheelchairs nowadays do exist and it can be used even with those less fortunate people. But still it requires full access and navigation upon using. Due to some distinct health problems, not all people can use the wheelchair alone. Here are some problems that simulate the need for improving the typical wheelchair.

1. Lack of independence. Users or most commonly known as the patients (pertaining to the disabled people) should always be accompanied by somebody to help them through knowing the fact that they cannot control the typical wheelchair alone.

2. In the absence of people around them, handicapped people were prone to accidents and catastrophe even if they were already sitting on their wheelchair. Sometimes the wheels keep on turning and direct the patient to somewhere they don't desire to go to.

3. The feeling of self-pity and withdrawal from the normal world are sometimes experienced by a person using the wheelchair. Because of the fact that they cannot stand alone without the help from other person, emotional discomfort like this cannot be evaded.

4. Productivity rate of those less privileged individuals are low due to their limited capabilities in terms of mobility.

**Significance of the Study**

Few months from now, we, Fifth year Computer engineering students were about to attain a degree under the category being a so-called engineers. Engineers were said to be born to continuously build something that will improve human life and should contribute efficiency in our community. As Computer Engineering students, the aid of computers specifically with the presence of technology brings out distinction into those things that we are capable of doing.

This Speech Recognition Controlled Wheelchair device clearly implies how computerization and technology can help improving human life, thus contribute a lot on the community. By enhancing some features of the motorized wheelchair, not only the users people can benefit from it but also those people around them who tend to look after them at all times.

The proponents have chosen Tahanang Walang Hagdanan Incorporated to become the beneficiary of this project. TWHI is an institution located at Cainta, Rizal known for their number one product; wheelchairs.

**Method of Research**

In this design project, the combination of survey method, structural analysis and historical method was conceptualized in formulating an efficient research. A secondary research relying on the previous facts and studies related to the topic and can be considered qualitative in such manner that all the ideas that have been formulated before were conceptualized forming new and improved ideas.

Since a survey method is a non-experimental descriptive research method,

groups of people from an institution were asked to share their point of view regarding the topic Speech Recognition Controlled Wheelchair. Questions were asked in a form of a survey conveying the respondent's opinion.

On the other hand, structural analysis was also utilized to be able to compare in terms of structural manner, the previous works related to the idea of speech recognition and how these ideas can be put together in such a way that improvements and minimal errors take place.

The historical reviews were also considered in the collaboration of data where the progress from year after year can be seen. From the previous works, the people behind them, the kind of approach they carry out in making the project and the problems that they encountered upon making the project. Its history shows how the problems were lessened and greater improvements have been made. All the listed facts will surely help in the development of the succeeding projects related to the study.

**Data Gathering Procedure**

In collecting necessary facts, figures or any kind of information needed in a research, proper sequence of task to be accomplished should be considered in order to have a justifiable result. The following steps or procedure was made and followed upon initiating the research process.

1. Conceptualizing topics that should be included in the research.

2. List these topics and the corresponding approach on dealing with each one.

3. Preliminary data gathering over the largest most accessible source, the World Wide Web or the internet.

4. Preparation of research materials such as survey forms, interview questions and list of people or places to visit.

5. Choosing the population for the sampling technique to be used.

6. Conducting survey in the chosen population.

7. Conducting interviews with concerned individuals.

8. Tabulating the survey results as well as the interview results.

9. Making the final draft for data gathering results.

10. Finalizing the results. Repeat the process if required.

In the process of formulating the design and quality of each module as well as the design and fabrication of the entire design project, there are series of steps that has been done in order to achieve satisfying results. The steps are well-arranged in such a way that the quality of project will be rest assured.

Step 1:

Delineating the chosen design project – In this stage, defining the scope and all the requirements in the project must be considered. All the things and constraints must be anticipated to minimize errors and avoiding rush by going over the same process. This step may include:

- Describing the system
  - How it looks like
  - Specific Function
- Defining the scope and characteristics of the project

- How many commands the system can recognize
- The distance where the system can be effectively used.
- The convenience of the wheelchair

- Considering all the requirements
  - Portable device that can be transferred to any wheelchair
  - Audible indicator for low battery warning

Step 2:

The Schematic Diagrams and Circuit Design – Upon setting all the required field, the next step that must follow is formulating effective circuit design and the schematic diagram. Nowadays, technology has taken much effect on circuit design and schematics. Easy way of searching and downloading can be easily done over the internet as long as you have a strong connection.

In this design project, Speech Recognition Controlled Wheelchair, some of the schematic and circuit design has been downloaded from the internet, except from the Microcontroller Board and the Power Supply.

As much as possible, minimizing the size for every board by locating components on their proper positions may be of great help, the fact that the over-all packaging of the device can be made convenient and well-managed.

There are four circuit boards in this system:

- HM2007 circuit board
- Microcontroller circuit board
- Power supply
- Opto-Isolator

Step 3:

Component Analysis – Each and every component listed in the schematic diagram must be analyzed. Availability is the most important f factor that must be considered. In this project, HM2007 is the most valuable chip in the entire system, aside from the fact that this is the heart of the system; HM2007 can only be purchased abroad. And in case that a certain component is not available, replacement must also be considered.

Step 4:

Etch, Drill and Solder– By the use of PCB express ( a software used in making PCB design) and presensitizing the circuit board itself, the next step would be drilling and allocating each components into it's proper position. When all the components has been situated on it's every, the best way to make sure that all the connection are working is through soldering process. Soldering must be done properly, enough for the current to flow directly on each and every soldered component on the circuit.

Step 5:

Connection Testing – When all the circuit are ready, testing of every module and board must be done to make sure that each of those are working. If all the board are working properly and in good condition, it could be connected as a whole and then begin the testing for the entire system. This process may also include finding of errors and troubleshooting.

Step 6:

Final Packaging – The last step is the final packaging. The first impression on the project is one of the factors that must be considered. The physical appearance of the project must be appealing and satisfying.

**Conclusion**

In this design project, Speech Recognition Controlled Wheelchair, the entire system has been design to meet the needs of persons with disability especially those in severe cases such as quadriplegic and cerebral palsy. This device will allow these people to exercise their independence in such a way that the need for companion can be lessened and they will be able to help themselves in their own way.

The entire system uses RF transmitter to enable the transfer of data that has been received by the system to the actual controller which is the motorized wheelchair.

In addition to this, the use of wired microphone allows crystal clear speech recognition. In a way, the system will no longer spend a hard time in recognizing voice commands received by the microphone itself.

For ease of use and convenience, the Speech Recognition Device is manageably designed portable which means it can be attached to other motorized wheelchair. . The device is wireless and user-friendly.

**Recommendations**

1. Use high quality wireless microphone for more convenient use and neat physical outlook.

2. Compressed circuit design to minimize the sizes of the circuit boards, thus making the entire packaging more manageable and small.

3. Minimize time delay for every command.

4. Use the type of motor that has the capability of running at a low speed and can still be controlled by the system.

# VEHICLE IDENTIFICATION SYSTEM FOR SUBDIVISION

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**Abstract**

Security has been one of the top reasons why people tend to develop the current technology. People are more concerned about security issue with their properties and/or possessions, and for this reason they had tried to implement the technological development on it. With regards to this, the researchers was able to come up with a topic concerning on the security-enhancement being implemented on subdivisions, as well as on how they can automate the existing manual checking done by the in-charged security personnel. This study had also considered the efficiency and the convenience that is being required to have an organized and systematic checking on every vehicle entering the premises of a subdivision.

With all the gathered information from the conducted interviews from the security personnel, unpublished thesis and other related document, the researchers were able to come up on applying the RFID technology on the said project. The application of this technology with database management system had established a higher level of security for every vehicle owned by the residents and the visitors entering a gated-community. The entry, as well as the exit of every vehicle has been recorded automatically with this thesis project. The required level of convenience and efficiency to both security personnel and to those owners of the vehicles was also acquired.

Furthermore, the designed project is both an enabling system and an application. The deployment of the system in various fields is feasible and has the potential to facilitate other applications that can bring significant remuneration to its stakeholders.

Background of the Study

With the development of science and technology, security is the top most priority for everybody. The newest models of cars have security alarm, people have security system installed in their houses, and all of these ensure safety and reduces the risk of being robbed. Nowadays people are more carefree than they were before because of the advent of the latest technology that provides us with complete security. One thing that is common in every person is the sense of security. Today people are finding ways to secure their properties or/and possessions.

In the Philippines, home robbery, carjacking and other crimes related to lack of proper security is increasingly alarming. In some subdivision, security personnel are having a hard time monitoring and identify vehicles entering the subdivision's premise. The commonly used system on gate security of subdivisions is by having the guard/s open and close the barrier manually

using a lever, chain, rope or simply lifting the barrier by the hand after checking whether the passing vehicles are residents or outsiders. The only means in identifying vehicles is by attaching an exclusive sticker in it. In that case, the security personnel can then verify if the vehicle can enter or not. In case of visitors that want to enter the premises, a resident must be informed by the guard if the visitor is an acquaintance or the resident inviting someone should inform the guard earlier that a visitor will come. Upon entering, an ID must be surrendered, preferably Driver's License, to trade with a Visitor's Pass ID from the guard house. Stickers are given to residents only and are required for their convenience as the rules excludes nobody. Regular visitors were given the privilege of obtaining a sticker for their convenience of entry. When a vehicle will exit the subdivision, those with stickers can pass easily. Only visitors that have their 2 ID surrendered is asked by the guards to stop for them to claim their surrendered ID in exchange for the Visitor's Pass ID.

The subdivisions stick with the conventional way but it seems the scenario causes interruption and difficulty in identifying the vehicle especially at night wherein there's minimal presence of light.

From the current situation, the proponents decided to develop a system that would help verify and identify automobiles owned by a resident living in a subdivision. From then, the group collaborated to design an RFID based project that would provide basic identification of a certain vehicle.

**Statement of the Problem**

The study aims to develop a Vehicle Identification System for Subdivision. It sought to solve the following problems:

- Barriers are opened / closed manually by moving a lever.
- Guard/s having difficulties in opening/closing the barrier due to its weight and eventually causes delay.
- Guard/s must always check the sticker of passing vehicles to allow or restrict entry of the vehicle.
- Delay in validation of entry for vehicles whether it is a resident or outsider.
- Difficulties in checking the stickers at night.
- Some vehicles pass by unnoticed by the guard/s.

**Objectives**

To create a device that can retrieve information of a vehicle for validation

- To electronically open / close the barrier.
- To lessen waiting time caused by manual control of heavy barrier.
- To aid the security personnel in checking instead of always looking at the vehicle.
- To make validation of vehicles whether a resident or outsider much faster.
- To reduce difficulties regarding visibility.
- To prevent unwanted entry of unauthorized vehicles.

**Significance of the Study**

As the technology further develops, the trends with regards to the implementation of the different gadgets involved in making things more accessible particularly on the efficient data retrieval from the database is the best way of coping the requirement for accuracy and convenience . Since the primary consideration of the thesis project is in lined with the fast and convenient retrieval of the vehicle's records and information, the researchers‟ primary focus is to develop a device that will be useful for the security personnel in charged with the gate access in a given subdivision. The thesis project will

provide an enhanced level of security every time that a certain vehicle has to enter a given subdivision. With this implementation of RFID, unregistered vehicles cannot easily enter the subdivision and ensures that only the residents are only allowed to drive through the gated community. It will also provide an accurate checking of the vehicle's information as well as its owner which is done electronically, totally eliminating the use of conventional vehicle stickers.

Aside from the fact that the system can do automatic verification of the vehicle's registration, the time needed allotted by the residents owning the vehicle, in waiting will be reduced since they don't have to wait that long for the security personnel to do the manual verification of the vehicle. It will provide convenience for the homeowners since the system can do the verification of their vehicles in just seconds allowing them to enter the gates entry point as soon as they arrived.

The study will also give credit for further researches and studies related on this particular technology. Moreover, the study can also provide necessary information for future studies that will be conducted in relation with the implementation of RFID technology.

**Research Design**

The research method used in this study is descriptive method. Descriptive method is also called Statistical Research. The main objective of this type of research is to describe the data and characteristics about what is being studied. (Martyn Shuttleworth, *DESCRIPTIVE RESEARCH DESIGN*, http://www.experiment-resources.com/descriptive-research-design.html) The idea behind this type of research is to study frequencies, averages, and other statistical calculations. This method is highly accurate. The aim of the descriptive method is to describe the nature of situation as it exists at the time of the study and to explore the causes of a particular phenomenon. Descriptive method can involve collecting qualitative information. It can describe categories of qualitative information such as patterns of interaction when using technology in the classroom. This research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data. So the researcher used description as a toll to organize data into pattern that emerge during analysis and used graphs and charts to aid the reader.

The descriptive method is advantageous for the researcher for the reason that it is flexible. This method can used quantitative or qualitative and this give the researcher more options about the research instrument to use.

To accomplish this study, series of experiments should be performed to be able to predict the necessary phenomenon in this study. So this will focus more on experimental method. Experimental research is a collection of research designs which use manipulation and controlled 27 testing to understand causal processes. Generally, one or more variables are manipulated to determine their effect on a dependent variable.

After the implementation of the thesis, a developmental research should be conducted also to assess the changes over a period of time. Developmental research was needed to evaluate the effect of the study to the people using this gadget.

**Data Gathering Procedure**

In order for the researchers to obtain necessary information for the thesis project, two specific data gathering procedures are done specifically, by internet browsing and by interview.
Internet browsing has been one of the fastest and easy data gathering procedures being done by the researchers for this study. This particular data gathering procedure has provided the researchers facts and ideas and even past studies conducted from the different parts of the world which are related with their thesis project. The researchers allotted much of their time in surfing some related websites that also provided necessary information for them to better understand the concept of their proposed thesis project.

The researchers did a site visit to some villages and subdivisions located within the area of Pasig to conduct an interview regarding with their existing manual security system for the subdivision. But before the researchers were able to conduct the site visit, a letter of permission for their thesis adviser was submitted by them informing him regarding with their plan and to 29 sign the letter for his approval. With the letter signed by the thesis adviser and by themselves, the proponents headed to the selected subdivision which was already using an electronic barrier controlled by a push button.

The researchers went to six subdivisions namely Pasig Green Park Village, Vermont Royale, Vista Valley Executive Village, Christine Village, City Land Inc. and Manggahan Village. They asked the security personnel with concern on the policies applied with regards to the gate access for the vehicle upon entering or leaving a given subdivision. The researchers were also able to talk with the Board Secretary of Pasig Green Park Village through telephone. They were also given a chance to ask him with some relevant questions which are related on their proposed project.

**Fabrication of Device**

As the pre-testing and troubleshooting goes, the prototype is being designed and constructed simultaneously. Since this project includes several circuit boards being interfaced together, plastic casings were designed for the circuit boards‟ protection. Proper measurements were finalized for every enclosures based from the sizes of every circuit boards. After the designs and the desired measurements were obtained, the enclosures were built from acrylic sheets cut into defined measurements. The proponents had attached them together by the acrylic glue.

The LED array was also built by the proponents, and is made up of 200 pieces of 0.5mm red LEDs (with 40 columns and 7 rows). The LEDs were positioned with equal distance from one another and were mounted together properly. Later, the LED array was then enclosed inside the plastic enclosure together with the PIC development board and its driver circuit.
The poles for the RFID readers and for the LED array were also constructed. These poles are made from plastic tubes with enough corresponding heights required for the drivers inside the vehicle to tap the RFID tags on it. In order to attain the desired stability of these poles, their base is cemented for support.

The metal stand and enclosure for the DC motor was also designed by the proponents. The metal pole was also cemented on its base in order to attain stability and support. Meanwhile, the proponents had to seek help from a welder

to attach the metal enclosure for the motor to the metal stand and to add some metal supports on it.

**Functionality and Testing**

Here are some factors that must be considered under functionality testing:

**Simplicity and Accuracy of the Program**

The program‟s graphical user interface of the system was intentionally developed simple and includes the instructions and other shortcut keys in performing specific command. Since the expected end-users of the system are security guards, the program was developed simple in order to suite the basic computer skills of its end-users.

**Electricity Instability**

This condition must be well tested to avoid problems during the operation of the system. Occurrence of this situation may result to malfunctioning of the circuits and hardware devices, insufficient voltage for the DC motor to rotate, parallel port interfacing problems, unidentified tags and many more.

**Depreciation of the Different Parts of the Unit**

Almost everything undergoes depreciation or downgrading most especially electronic materials. Since this project includes several circuit boards with different electronic components, it cannot be avoided that they tend to generate heat and cause some of these components to malfunction.

**Conclusion**

The project “Vehicle identification System for Subdivision” had come a long way in providing extra security, peace of mind and convenience. The system could be referred as a vehicle identification registration, authentication and control solution for a certain subdivision or organization. The implementation of the new project together with its state of the art technology further improves the vehicle identification process avoiding too much delay and access of parking facilities is limited to only authorized vehicles. With the deployment of the system, the security personnel could easily monitor vehicles going in and out of the premises. The system also provides enhanced security system by allowing only authorized vehicles to enter the premises. With regards to this, vehicle crime could also be reduced.

The system implementation had undergone deep study, research and experimentation for the success of the design project. The proponents make sure that the project “Vehicle Identification System for Subdivision” integrates all of the necessary software and hardware components to operate effectively.

The designed project is both an enabling system and an application. The deployment of the system in various fields is feasible and has the potential to facilitate other applications that can bring significant remuneration to its stakeholders. 87

**Recommendation**

The project would be very beneficial to its stakeholders if conserved and properly handled. The proponents wish to recommend handling the whole system with utmost care and supervision.

The proponents highly recommend the future students of Design Project to put together an enhancement of the system for it to provide more security and to function efficiently. The proponents recommend the following enhancement for the system:

- Utilization of Ultra-High Frequency (UHF) RFID Scanner for longer and more effective range of reading RFID tags.
- Larger storage capacity of computer's hard disk drive for better video recording and image quality.
- High torque motor for faster opening and closing of gate barrier.
- Plate number of the vehicle to be displayed in the LED array once the tag is being verified.

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# VOICE BASED CANE FOR THE BLIND AND VISUALLY IMPAIRED PERSONS WITH GPS

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**Abstract**

The primary purpose of this paper is to enhance the white cane to increase the mobility of the blind people by offering new sensing abilities. This paper focused on helping the blind people to travel by themselves using ultrasonic sensors mounted on the cane. Whenever an obstacle is found, a pre-recorded voice message gets activated and the message is conveyed through the earphones via FM transmitter. This helps in locating the static in their path as they move. This assistive device can be helpful to the blind in spatial sensing by supplying information during his movement if any obstacle is found. Another technology used for the enhancement was the Global Positioning System (GPS), which is used to know the user's location.

**Background of the Study**

Blind people run the risk of colliding with an obstacle only when they are in movement relatively to their environment, we find that the usual companion that a blind man has is his white cane this helps in locating the static object in their path, thereby helping the blind user to travel by their selves. This tool cannot detect hanging objects because the sensors are mounted on the lower part of the white cane which can detect objects at ground level. User can be alerted of closed obstacles in range while travelling in their environment.

The project we propose detects the nearest obstacle via an Ultrasonic sensor. The system aims at increasing the mobility of visually impaired people by offering new sensing abilities. Whenever an obstacle is found, a pre-recorded voice message gets activated and the message is conveyed through the earphones. This tool can be helpful to blind people in spatial sensing by supplying information during his movement if any obstacle is found. Furthermore this device has a GPS navigating system, which will tell the location of the user when he is lost or is in danger. This is less complicated, simple, portable as it is mounted on the cane and there is lesser time lag between the signal transmitted and reception.

**Statement of the Problem**

The project results from observing the need of huge number of people who are visually impaired, every moment of their lives they need support to successfully finish an activity. One major problem for the blind people is what device can the blind and visually impaired people use to do such activities in public places where they are not familiar with and there is no one to assist them?
In places like these, they are more prone to accidents, as they may fall down and injure themselves, although a white cane can be useful it doesn't guarantee to protect them from all levels of obstacles. Thus, a white

cane for visually impaired using ultrasonic sensor can be a great use.

**Significance of the Study**

For an efficient reintegration of the disabled people in the family and society, it is strongly needful to assist their diminished functions or to replace the totally lost functions. Many people with visual impairments can travel independently, using a wide range of tools and techniques. Blind people are faced with many problems such as independent and graceful travel. A long cane is used to extend the user's range of touch sensation. It is usually swung in a low sweeping motion, across the intended path of travel, to detect obstacles. However, techniques for cane travel can vary depending on the user and/It is well known that visually impaired people use their hearing sense to compensate for their reduced eyesight. For instance; they can recognize sound sources, thus the development of this project.

The one who will benefit from this project are the visually impaired people or those that are totally blinded. All blind people use guide cane to find the obstacles in their path but this cannot help them sense an incoming obstacle and provide any precautions to be done.

**Research Design**

This study will use the descriptive – normative – interview approach obtaining the data needed or variable status. The main purpose of descriptive research method is to describe events, phenomena, situations, practices and trends developing through the use of measurement or quantification of events or variables under the study. The research became descriptive by profiling the information of the respondents through the use of questions.

Personal interviews are a way to get in-depth and comprehensive information. Our target is to improve the object of study or to create a new, better state of the device. The interview will try to ascertain the effectiveness of the electronic assistive device for the blind offered by the researchers to the community especially for the blind and visually impaired people.

**Data Gathering Procedure**

In gathering data, the proponents constructed questions covering almost the key concept to bring about lucid results. They will answer it for the proponents to draw out the needed data and to profile the information gathered. The gathered data will be interpreted and tallied with accordance to the questions answered by each individual.

**Detailed Procedure**

In the process of formulating the design and quality of each module in addition to the design and fabrication of the entire design project, there are series of steps that has been done in order to achieve satisfying results. The steps are well-arranged in such a way that the quality of project will be rest assured.

Step 1: Delineating the chosen design project

– In this stage, defining the scope and all the requirements in the project must be considered. All the things and constraints must be anticipated to minimize errors and in order to visualize the output and the design of the project. This step may include:

- Describing the system
- How it looks like
- Specific Function
- Defining the scope, characteristics, and limitation of the project.
- How many and what type of voice the circuit will output.

- The distance where the sensor can be effectively used.
- The convenience of the cane for the users.
- What will be the power source of the device?

Step 2: The Schematic Diagrams and Circuit Design

– Next step is making the effective schematic diagram and design for the circuit. We used the software called "Proteus" to design all the circuit in our design project. First to make is the microchip circuit and second is the voice notification circuit. The designing of the microchip circuit is very hard to do so we've made some testing and brainstorming on how to effectively design one and with some help via internet, we've managed to finish it. After finishing the design for the microchip, next part is the voice circuit design, we based our design from a thesis made by the group of Ms. Jellica Cruz entitled "Automobile Blind Spot Monitoring Device". Other parts of the circuit includes

- FM Transmitter
- Ultrasonic Sensors
- Mp4 player
- GPS

** The Fm transmitter, ultrasonic sensors, mp4 player and the GPS are all bought.*

Step 3: Component Analysis

– Each and every component needed for the circuit must all be analyzed. What type and kind of component to be used should be determined well in each circuit? Availability of the item is the most important factor to be considered. For example we had a hard time looking for the right ultrasonic sensor to be used, since we need to order it online and had to be ship to our country.

Step 4: Etch, Drill and Solder

– After we've finished the analyzation of all the components, etching, drilling and soldering is the next step. The design will be printed in the acetate transparency paper, and then it will be place on the PCB, to be exposed in sunlight or spotlight. After a minute or two, the PCB will be wash on the developer solution. Once the design is attached to the PCB, it will now be ready to be immersed in the ferric chloride. Next step is drilling and allocating each component to the PCB, then it should be properly solder, just make sure all connections are well made and no short circuit will occur.

Step 5: Coding

– Coding of the PIC is the most difficult part we've encountered. We used MPLAB in coding the whole program. The main idea of the code is when the ultrasonic sensors sensed an obstruction it will be send to the PIC, then to the voice notification circuit to be passed to the mp4 player.

Step 6: Connection Testing

– When all the circuit is made, testing of every module and board must be done to make sure that each of those is working. If the entire module are working properly and in good condition, it could be connected as a whole and then begin the testing for the entire system. This process may also include finding of errors and troubleshooting.

Step 7: Final Packaging

– The last step is the final packaging. The first impression on the project is one of the factors that must be considered. The physical appearance of the project must be appealing, satisfying and easy to be used.

**Conclusions**

In this design project, Voice based cane for visually impaired persons with GPS, the system has been design to meet the needs of blind or visually impaired people. This device will allow these people to lessen their worries of travelling alone especially on those unfamiliar places and to experience the essence of technology being applied on their traditional tool the walking stick or white cane.

The system uses ultrasonic sensors for better sensing ability and Fm transmitter and receiver for the voice response upon sensing obstacles. For ease of use and convenience, we use the traditional white cane or walking stick and added the GPS technology for locating purposes.

**Recommendations**

To the students who plan to venture into developing a better voice-based cane for the visually impaired person with GPS, the following are the researchers' recommendations:

1. Since the Ultrasonic is mounted outside the white cane, we recommend using a waterproof ultrasonic sensor.
2. Minimized the size of the circuit by compressing the design of the circuit boards making it more handy and manageable and use 9 volts rechargeable batteries to minimize space on the battery holders. Use high quality wireless earpiece for convenient use.
3. Seek for guidance/help from professionals who have the full knowledge about the conditions of the blinds even before setting up your concept for your project.

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# WATER PARAMETER MAINTENANCE SYSTEM FOR TILAPIA CULTURE OF BFAR-NATIONAL INLAND FRESHWATER TECHNOLOGY CENTER

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**Abstract**

The design in this project showcases the implementation of a microcontroller based water parameter maintenance system for Tilapia culture. The system automatically monitors and acquires important water parameters namely: the Temperature and Potential Hydrogen (pH) level. Here, the optimal levels or desired readings needed of each parameter is set, thus if levels have been exceeded for the temperature the cooling system would be activated else if levels have been lower the heating system would be activated. And for the pH reading, once the reading is not within the specified range, the system would set an alarm.

The design incorporates an energy supply that power – up the entire system for maintaining and monitoring the water parameter. The system operates with the aid of the microcontroller, sensor, probe, LCD and relays, components which are connected to perform one specific function. The design project will also benefit those who are into Tilapia culturing and most especially the BFAR – National Inland Freshwater Technology Center which is the beneficiary of this design project.

**Background of the Study**

The Department of Agriculture, Bureau of Fisheries and Aquatic Resources - National Inland Fisheries Technology Center (BFAR-NIFTC) said that water parameter of the fishes are needed to frequently monitor and maintain. The bureau has several techniques and methods to tests the water parameter of their fishes.

In monitoring the ammonia content of the water, NIFTC used sampling of water. Water sampling is a method to measure the water quality monitoring. NIFTC usually get sample of water then placed to the test tube and put a specific reagents or chemical that reacts to the water. This reaction can identify the total ammonia nitrogen present to the water. Also, they make calculations to know the ammonia content. They calculate the amount of ammonia present by multiplying the Total Ammonia Nitrogen to the appropriate factor from the table they used and also using the measures of pH and temperature from your water sample. If they detect that the water has ammonia, they put an aerator to make ammonia in a harmless one.

There are two ways in which the NIFTC test the pH concentration of the water, litmus paper testing and water sampling. Litmus paper has the property of changing its color to red when the water is acidic and blue if the water is basic On the

other hand, water sampling works same with that of the ammonia testing. Small amount of water will be contained in a test tube and a reagent will be place then the color will change. The color corresponds to whether the water is acidic or basic.

**Statement of the Problem**

The main problem that the design seeks an answer is how to monitor and maintain specific water parameters such as ammonia content, pH level and temperature to retain the health of the fishes and to stabilize the growth of our fishes.

Specifically, the study seeks to answer the following;

1. How to maintain the water parameter needed by the fish without even frequently looking at it?
2. How to lessen the manual testing of the water parameters?
3. What device can help in giving more accurate readings for the maintenance of water for Tilapia Culture?

**Significance of the Study**

This study aims to establish a device which is constructed to be utilized to enhance the maintenance of water parameter and will lessen the breeders' manpower, time and operation expenses. This study is expected to provide substantial benefits to the following:

- BFAR – National Inland Freshwater Technology Center. With the reconstitution of BFAR as a line bureau, the station was designated as the national center for carp production, research and culture of freshwater fishes. They will be the ultimate beneficiaries of this study. The output of this study will help them in maintaining water parameter especially in breeding fishes.
- Fisher folks. Worries about the monitoring and maintenance of water parameter such as the temperature and pH level will be lessened, therefore breeders will not bother that much anymore. Utilization of this device will ensure that the water is properly maintained and dying of fish will be prevented.
- To the community. Aside from helping to ensure the maintenance, it will also guarantee the growth and survival of fishes. Thus, producing more supply that would be available to the market.

**Research Design**

The proponents consider research as one way of discovering, interpreting and developing methods and systems for the advancement of human and giving solutions to problems. In order to achieve the main goal for a research, different method should be utilized. Such methodology will serve as an outlook on research. They set out an image for what the research is and how it should be carried out.

In this study, the proponents use constructive and exploratory method of research. Constructive research helps to develop solutions to a problem. This type of approach demands a form of validation that doesn't need to be quite as empirical. This may involve evaluating the construct or new model, software or framework being developed analytically against some

predefined criteria or performing some standard tests with the prototype.

Another type of research method is the exploratory research, where it provides the proponents an insight and makes comprehension of an issue or situation. It should draw definitive conclusions only with extreme caution.

Exploratory research helps determine the best research design, data collection method and selection of subjects. As what the exploratory research is, the proponents often relies on secondary research such as reviewing available literature and/or data, or qualitative approaches such as informal discussions with experts, beneficiaries, stakeholders, and more formal approaches through in-depth interviews, projective methods, case studies or pilot studies.

**Data-Gathering Procedure**

The proponents' type of data to collect is categorical or continuous data. It can be coded ordinal or can be counted and measured. In choosing what fish to be conduct in our research, we used the categorical data. We choose the highest freshwater fish that produced in the Philippines which is tilapia (see Table1). Also, we can use the continuous type of data in identifying the water temperature and pH level because these variables can be measured. The proponents believed that we can use this technique when we implement and tests the design project to the fishes.

In evaluating the data, we will use the Pearson Test because it compares the data of two or more group associates with different variables on it. Simply, we will compare the data that evaluates when the fish have the device and when the fish without the device. Also, we will compare the data of two fish cages with the device installed and see if the consistency of the project accomplished. This will help us to know if our project is well functioned and efficient.

**Detailed Procedure**

A specific course of action was executed though out the construction of the system. From the planning of the design project to the deployment of the system and experimentation, there are series of steps that has been done in order to achieve a satisfying result. The steps are well – arranged in such a way that the quality of the project will be rest assured.

First step includes the planning and conceptualizing the design project. A very essential stage where in all the requirements are being considered, the scope of the project is being defined and a concrete concept on how things will be done is constructed. Further, all constraints must be anticipate to minimize errors and avoid rush by going over the same process.

After the planning comes the development of the system. This stage includes the construction of the hardware part and integration of software programs. To ensure that the schematic diagram will work in the actual circuitry, it is first establish in a simulator. If simulation is successful, there will be a higher possibility that the circuitry will work. At this moment, the circuit design can now be transferred into PCB layout. The device is composed of three circuit boards: power supply board, PIC

microcontroller board and the driver board.

Another key to ensure the success of the system is the selection of the materials and the component needed. Every component listed in the schematic diagram must be analyzed and a great help would be a datasheet which contains vital information about such component.

Moving forward, after finishing the design and layout next step would be the etching. The PCB layout will be transferred to the pre - sensitized board and will be submerged into ferric chloride until the design become visible onto the board. This will be followed by the drilling and allocating each component into its proper position. Then, the component should be soldered for it to be connected. Careful though, for cold solder may lead to unwanted outputs.

Since the system is controlled by the PIC microcontroller, there is a need for a program that basically includes the commands for the functionality of each module. Set of codes and instruction is programmed into the PIC16F877. This will serve as the brain of the system for it controls the functionality of the device.

When all the circuits are ready, each module must be test to make sure that it behaves the way it should be. It is better to troubleshoot each module to minimize possible bigger errors. If all boards are in good condition and working properly, connect it one by one then test the entire system. Test whether the system is functioning well. Troubleshoot all errors found.
Last but not least, the final packaging. The physical appearance of the project must also be considered. Thus, it must be well – arranged and satisfying. If there's no further errors found and every things is properly set up, the system can now be deployed. Experimentation may be started (includes the day to day monitoring of the water parameter and growth of Tilapia).

**Fabrication of the Device**

The design project aims to construct e a system that would provide benefits especially to those who are into fish culture. Devices like digital thermometer, ph kits and other equipments in maintaining fish tank are readily available in the market. However these equipments can be purchased separately and some are manually operated. Therefore, the proponents came up of a design project which includes water parameter (such as temperature and ph level) reading. The device has a specific parameter range and if the reading is lower or if it exceeds the specified range, it will activate either a buzzer or the heating/cooling system.

**Conclusion**

pH is one of the most important factors in the survival of aquatic life. In general, fish can live in pH ranges from 6.0 to 9.0, but their quality of life is best between a pH range of 7.0 and 8.0. Changing the pH suddenly, even by a small amount, is a chemical change that can be more stressful to fish than one would think. Two aspects of pH are important. First of all, providing stability is a must. Rapid changes in pH do cause stress to fish and should be avoided. If pH changes more than 0.3 units per day, it can send the fish into pH shock. This means one must keep the pH of

their tank constant and stable. Second, fish have adapted to surviving in a certain pH range. Be sure that the tank's pH matches the requirements of the fish being kept.

Water Temperature is another essential parameter in maintaining a good environment. Too high or too low could cause fatality in the fish culture farming specially on the newly hatched. High water temperatures stress aquatic ecosystems by reducing the ability of water to hold essential dissolved gasses like oxygen. Often summer head can cause fish kills in ponds because high temperatures reduce available oxygen in the water. In a country like the Philippines, which is known to experience a hot season almost the whole year; an unbalanced temperature could always lead to fatality. The fishes often die because of the temperature that the newly hatched could not tolerate.

Water Parameter Maintenance System is a comprehensive monitoring and maintenance system to boost the productivity of the aquaculture industry. Monitoring entails the accurate measurement of water parameters such as pH and temperature that is crucial to the growth of tilapia. By automating the maintenance of temperature and pH, the desired level is properly maintained in such a way that the quality of growth will be rest assured without much human intervention. Thus, the fishes are more active and demonstrate a significant difference between size and weight than the fishes at the tank of manual process. The system also lessens the water replacement because the tank that has fabricated device is much cleaner than the manual process. Because the system is maintenance of water parameters, the ease of adaptation in the fishes to the environment and climate is also meet and lessen the stress condition to the fishes. Water Parameter Maintenance System will also be a way to infuse technology to the aquaculture industry. It will also promote as a robust alternative to other forms of fishery.

**Recommendation**

For future work of the same or similar system, the proponents recommend the following improvement:

1. You might want to try using a Qterm LCD with attached numeric keypad. This project design is limited to the temperature and pH level that is set upon the program. With the use of the Qterm LCD with attached numeric keypad, the user may be able to preset the optimal levels or desired readings he needs for each water parameter.
2. You might want to consider adding a dissolved oxygen meter. The system only includes water temperature and ph level monitoring; it is best if you could find a dissolved oxygen meter and incorporate it, since dissolved oxygen is essential to the growth and survival of the fish.

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