

Design Project Proposal

EECE 401 Senior Design I
Department of Electrical and Computer Engineering
Howard University

MEMORANDUM

10/30/07

TO: Dr. Charles Kim
Instructor

FROM: Adebayo Cornelius

Kenneth Tate

Nnaemeka Amazu

Oluwafemi Akintilo

SUBJECT: Design Project Proposal Submission

Enclosed is our group's design project proposal, Emergency Notification System. This proposal is submitted for partial fulfillment of the Senior Design requirement outlining the plan for the project pursuit through the problem formulation with functional requirement, alternative solution generation with electrical and computer engineering approaches, project management and milestones, and task assignments and deliverables. We understand this proposal, in written report as attached and oral presentation upon scheduled, would undergo a rigorous Proposal Review Panel assessment, and we are willing to accept recommendations from the Panel Review and modify and resubmit for final approval.

Design Project Proposal

Emergency Notification System

Submitted by

Adebayo Cornelius

Kenneth Tate

Nnaemeka Amazu

Oluwafemi Akintilo

Approved by

Proposal Review Panel Representative:

Name

Signature

Date

Senior Design I Instructor:

Name

Signature

Date

EMERGENCY NOTIFICATION SYSTEM

INTRODUCTION:

Emergency situations are a natural occurrence in daily life. They can be caused by natural disasters like hurricanes, Storms, Flood, etc. They can also be accidental, like fires, hazardous chemical spills, or deliberately initiated like shootings, Robberies, Bomb threats, etc.

With the recent events that occurred on college campuses with regards to emergency situations (e.g. Virginia Tech. shooting, Delaware State Uni. Shooting) there is a need for an effective emergency notification system on Howard University's campus. While the newly instituted AlertHU system is in place to notify students in case of potential danger, there are more effective ways to distribute information with regards to emergencies. A major setback in the AlertHU system is the fact that it notifies only people signed up for the service. This leaves out most faculty, non-teaching staff and other individuals present on campus.

We believe this task is feasible and achievable given our individual technical and professional backgrounds. Our team is composed of competent Electrical Engineers with experience and knowledge in Wireless communication, Telecommunications, C++ programming, Public relations, Economics, and Probability derivations. All these courses and acquired experience play vital role in the problem formulation and problem solving.

We intend to create a real-time based Emergency Notification System (E.N.S) that effectively notifies the most individuals on campus at any given instance.

PROBLEM DEFINITION:

We established that as far as performance, our E.N.S should be compatible with different forms of communication media like Public Address systems, Messages, Visual display, Computer feeds. The E.N.S should notify target individuals of dangerous situations within ten to fifteen minutes of occurrence. It should be functional twenty-four hours a day and seven days a week to ensure continuous safety.

We want the E.N.S to require minimum technical know-how so it can be easily used by authorized personnel. In order to enhance the coverage of our E.N.S, we would not be limited to sign-ups to notify the target entities.

We do not have cost estimates for the Emergency Notification System yet. This is due to the complex nature of the problem and the multiple approaches we intend to use to solve it. However, ongoing research into the cost is underway.

ENGINEERING APPROACH:

A major problem in notifying large community's simultaneously is that people are mobile and also respond differently to different forms of notification media. In essence, we expect different population densities in different buildings and locations. We also expect certain key facilities that have internet access to function effectively at different times. We implement multiple approaches to tackle this situation.

Our project is mainly integrating multiple notification media into our Emergency Notification system. This integrated system alerts people about emergencies with regards to the time of the day and the expected population density of the area. This approach is a lot more effective because our posed solutions do not limit potential notification recipients to any one type of media while also covering a large span in area.

One portion of our devised solution would be using an auditory public address system similar to the kind used in a small arena or stadium. This aspect of the E.N.S. would be geared toward informing the individuals who are already on campus locations, but have no electronic means of contact with the outside world. The public address system would repeat a pre-recorded message approximately at five second intervals. The message itself would be brief, concise, and accurately describe the situation with precautions to follow that ensure that an individual's safety is not compromised. For the benefit of individuals who might be a certain distance away from the speakers the output was estimated to broadcast at a power between 300 and 500 watts. Also with a frequency response within the range of 50 to 1800 Hertz it is assured the message is received by anyone who is able to hear in the audible range.

Another aspect in our solution is to also implement a visual display that would be placed strategically in areas with a high flux of people. The visual would consist of a flashing text display in which the font size is large enough to attract the audience's attention, but not distracting as to where it could hinder the urgency of the message. This particular solution is geared toward the individual who is also not electronically connected to the outside world but is on campus. Furthermore this individual might be hearing impaired and/or unable to distinguish the other means of communication.

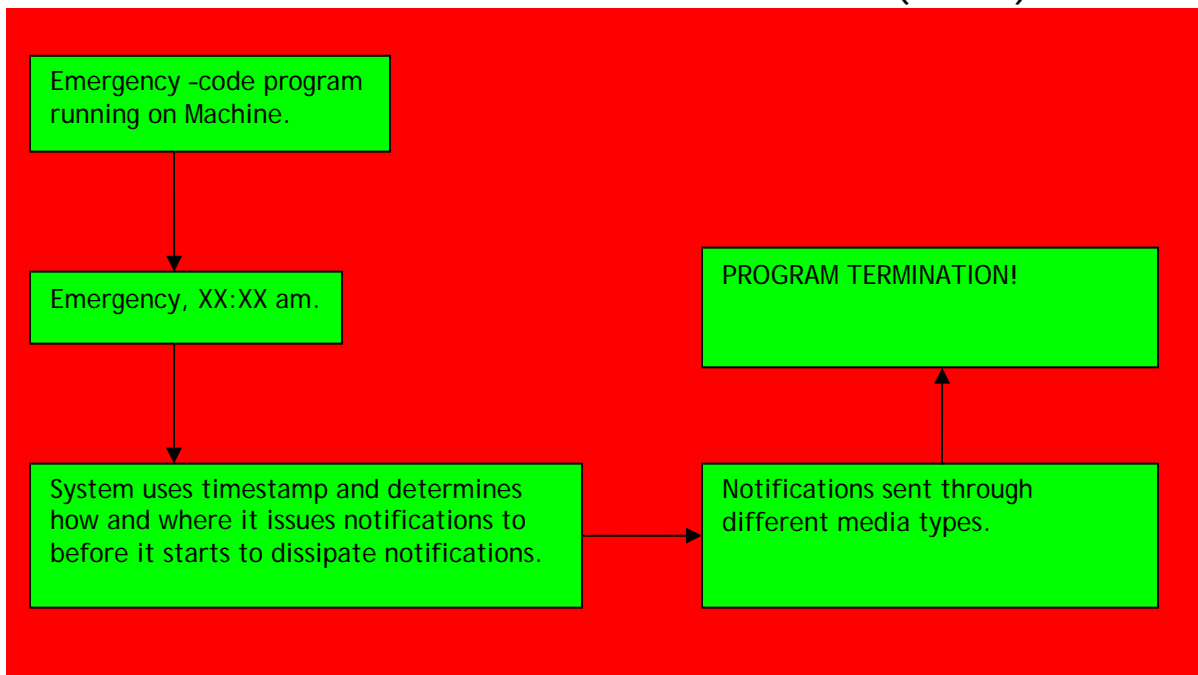
To keep individuals informed who are on campus but engaged in in-class activities and have an active connection to the Howard University server we propose to implement a computer feed similar to a pop-up message. Since all the computers on Howard's campus with internet access are connected to the servers in the ISAS, we can distribute a program through the server that in event of emergency will create an interactive dialogue box displaying a message informing the user of the potential danger. The key would be in making the dialogue box cover the entire screen as well as it having to be interactively removed with an 'ok' button as to assure comprehension of the emergency. As a fail safe the box would reappear until the emergency situation was accurately assessed and handled.

Finally to round out our design we would have the server based text message system similar to that of AlertHU. This component would seemingly cover all individuals who submit there contact information into the database and would be able to alert about 1000 people per

minute. The approximate size of the campus community is around 10,000 students and 1100 faculty so to adhere to our design specifications for a complete campus notification of ten to fifteen minutes the messages should be sent out at this rate.

With the research method of surveying, probability and statistical derivations, computer program writing, we shall have know people’s varying campus locations during the day, the different responses to different communication media and the concentration of students in various areas at certain times the E.N.S. should be able to give the best available warning of potential danger on campus.

EMERGENCY NOTIFICATION SYSTEM SCHEMATIC (ROUGH)



TASKS AND DELIVERABLES

In order for the emergency notification system to notify the maximum amount of individuals on Howard’s campus, there must be an accurate count of students and their locations at any given time. Two sources will be used in order to derive this information. The main source that will be used is Bison Web. Bison Web will be use to see where classes are offered, the times they are offered, and how many students are in each class. The second source that will be used is surveys. The emergency notification system must know if students are gathered in a particular place at a certain time. This information is not available on Bison Web, therefore, surveys will be given to students incase students have certain traditions which are not recorded in Bison Web and where they take place. For example, there are a good number of students that gather on the yard at 12pm each Friday. The emergency notification system would take this information into consideration when determining the best method to inform individuals of the emergency.

One method of notifying individuals on Howard’s campus will be through a public address system. The public address system will be integrated in every class in every building on Howard’s main campus, every dormitory, and all open areas where students gather,

including but not limited to, the football field, the yard, the valley, and all parking lots. Works that are to be completed in order to make the public address system the most efficient includes finding the square footage of the open areas in order to determine which public address system to use and determining the number of rooms in each of the dormitories and in the buildings on the main campus. Once this information is collected, the wattage and the frequency response range can be determined.

Two other methods of notifying individuals on Howard's campus will be through computer feeds and visual displays. The computer feeds will be integrated in every computer lab on Howard's main campus including the computer labs of the individual schools. Visual displays will be displayed on television screens in all buildings on Howard's campus. Works that are to be completed in order to make the computer feeds the most efficient includes determining the total amount of computer labs and where they are located, researching computer feeds and how they work, and researching Howard's policy on computer feeds. Works that are to be completed in order to make the visual displays the most efficient includes determining which buildings that have television screens available. Once this information and research is collected, the best way to integrate the emergency notification system's computer feeds and visual displays on Howard's campus can be determined.

Another method of notifying individuals on Howard's campus will be through text messages. Since Howard's existing emergency notification system already includes a text messages method, improving the efficiency of the text message method by broadening the coverage of campus individuals to be notified through text messages will be the plan to make the emergency notification system as efficient as possible. Works that are to be completed in order to make this possible will be to research SMS messaging and to determine which method to use to output at least 1000 text messages per minute.

PROJECT MANAGEMENT

We have spread the project over a period of time to allow for optimal research, design, testing and implementation as follows:

- September 2007 - Needs
- October 2007 - Topic
Problem formulation
- November 2007 - Problem solving
Alternative designs
- December 2007 - Best design
Implementation plan
Evaluation plan
- January 2008 - Solution implementation
Back to problem solving
- February 2008 - Solution implementation

Evaluation

March 2008 - Test
Evaluation
Final report
Presentation preparation

With division of labor, each member of the group has been given specific tasks to ensure the job is done efficiently and in good time. The leader coordinates each task and makes sure division of labor is fully utilized.

Amazu Nnaemeka- Facilitator/ Team Leader/ Chief Programmer: Responsible for writing programs and computer codes needed for the project.

Adebayo Cornelius- Research Personnel: Responsible for formulation of questionnaires for survey purpose.

Akintilo Oluwafemi- Scribe/ Historian/ Research Personnel: Carry out market research and cost analysis in terms of sourcing for our materials and equipments.

Kayson Palmer- Research Personnel: Research into the existing ENS system in other campuses where emergency cases have been recorded in the past, he would study the failure in the system and submit a report that we would work on to make sure corrections are included in our design. He would also help Ms Akintilo in the research for prices and market rates.

Kenneth Tate- Technical Personnel: Head of technical duties in this group, from wire connections to assembling, to writing codes he is the man to hold down.

Please note that the ENS team believes highly in team work and any task given to any individual does not mean a team member can not help in that area to get some experience for himself or herself too.

Budget

Research is still going on as regards to the budget. We know very well that we need speakers around campus, microphones, Visual display screens, especially. In due course, we will give full account of our budget and projected expenditure.

Safety concerns and ethics

We are anathema to plagiarism and unethical conduct. We intend to provide all sources, if any, and provide information about any existing systems we incorporate in our design.

CONCLUSION:

There is need for a more efficient means of notifying people on Howard University's campus of emergency situations. A setback in the existing 'HUAAlert' system is that it is based on information collected via sign-ups only, and it does not factor in the fact that not everyone has texts. Furthermore, even the people that have texts don't always have access to their phone. The benefit of developing an effective notification system is that in case of emergency the Howard community would be much more informed therefore able to act accordingly and swiftly. Our team intends to create a system which notifies the maximum number of individuals, of emergency situations, effectively at any given time on Howard's campus. To do this we plan to integrate multiple media outlets that would be efficient during a crisis such as a Public address system, computer feed, text message and visual display.

So far, we do not have cost estimates. This does not mean the cost of implementing the system is unimportant to us. We are currently researching for optimum cost figures. We have a strict timeline to adhere to. By November, we delve deeper into the problem solving aspect of this project. Here, we evaluate our solution and approach to the notification problem. By December, we cement our design choice after successful evaluation. In January, we move into implementing our solution. If we don't get desired results, we revert back to the problem solving phase in which we look for better ways to solve the notification problem. If we get desired results, we move on to Solution implementation evaluation. By now, we should be in February. We continue thorough evaluation and testing of our design till it meets our goals and get it ready for presentation.

We recognize that there can be differences in the way we plan this project and suggestions by the review board. All suggestions are welcome as we plan to incorporate constructive feedback into our design for better results.

Attachment:

Team E.N.S	<h2 style="margin: 0;">REQUIREMENT LIST FOR EMERGENCY NOTIFICATION SYSTEM</h2>	2 nd Version: 10/22/2007
Ms. Akintilo, O. Mr. Adebayo, C. Mr. Amazu, N. Mr. Tate, K. Mr. Palmer, K.		This replaces 1 st Version of 10/19/2007
DATE UPDATE	REQUIREMENTS	SOURCES
	<i>Overall Function: Notify maximum number of individuals, of emergency situations, effectively at any given time on Howard campus</i>	
10/19/2007	<p>PERFORMANCE</p> <ul style="list-style-type: none"> • The system should be compatible with different communication media • The system should notify people of dangerous situations within 10-15 minutes of occurrence 	Adebayo, Amazu, Tate
10/22/2007	<ul style="list-style-type: none"> • Must notify both campus individuals and emergency personnel • The E.N.S should be functional 24/7 	
10/19/2007	<p>OPERATION, COST AND MAINTENANCE</p> <ul style="list-style-type: none"> • System operation must require minimum technical know-how 	TEAM ENS
10/22/2007	<ul style="list-style-type: none"> • Estimated cost values are still in research • Students do not have to sign up to get notifications 	
10/25/2007	<p>PUBLIC ADDRESS SYSTEM</p> <ul style="list-style-type: none"> • It should produce an output of between 300 and 500 watts • The frequency response should be within the range of 50Hz - 18kHz • Information should be repeated every 5 seconds until emergency is under control 	TEAM ENS
10/25/2007	<p>VISUAL DISPLAY</p> <ul style="list-style-type: none"> • There should be flashing text display on screen • Font of the text should be large enough to catch audience attention <p>COMPUTER FEEDS</p>	TEAM ENS

10/25/2007	<ul style="list-style-type: none">• A dialogue box that will cover the whole computer screen and notify user of the emergency• Must enforce user interaction• Must be server based (ISAS)	TEAM ENS
10/25/2007	<p>TEXT MESSAGING</p> <ul style="list-style-type: none">• Should be able to send text messages to a minimum of 1000 students per minute	TEAM ENS