FINAL REPORT

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OUTLINE

- Introduction
- Objectives
- Project Management
- Modules
- Hardware
- Software
- Testing
- Budget
- Future work
INTRODUCTION

- Cardiopulmonary resuscitation (CPR)
  - Unconscious victims
  - Heart stops beating
- It consists of a series of steps
  - Rescue breaths
  - Compressing the victim's chest
INTRODUCTION (CONT.)

- In order to improve the techniques of teaching:
  - Realistic way to perform the practical exam.
    - CPR eTAM
  - Mannequin monitored and controlled by
    - Sensors
    - Microprocessor
    - Computer software
OBJECTIVES

Create a tool to facilitate the job of the instructors
  • Monitoring students practicing CPR
  • Two months

Provide the hardware and software to:
  • Identify when a student is not following the correct procedure
  • Display the data provided from the real time situation
  • Present the results in tabulated form

CPR standards met
PROJECT MANAGEMENT

- Project time
  - February 12 to May 5
- Cost
  - Refer to budget analysis
- Resources
  - 2 Computer Engineers (Hardware)
  - 3 Computer Engineers (Software)
MODULES OF CPR eTAM

Module 1: How to (Tutorial)

- Introductive.
- The features for this part are:
  - Tutorial session of the software,
  - Tutorial session of the CPR using the mannequin
MODULE 1: HOW TO (TUTORIAL)

Welcome to the tutorial for performing CPR.

DISCLAIMER: Before we get started, please keep in mind that this tutorial does not intend to replace formal CPR training. Completing this tutorial does not mean that you are certified to perform this procedure, but will help in obtaining a certification. In the probable case that you are a CPR instructor, the purpose of this tutorial is to see how the program will determine whether or not a student is performing the steps correctly.

Images courtesy of the Association of First Aiders (AoFA). For more information please visit www.AoFA.org.

To continue on to the next part of the tutorial, click Next. If you need to go back for some reason, click Back. If at any time you wish to quit the tutorial and return to the main page, click Quit. Now that we have that out of the way, let's begin.

Tutorial for adding courses & students

The first step in adding a course and students is to log into your account. Of course if you don't have an account you will need to create one. The steps for creating an account are fairly straightforward, and therefore not covered in this tutorial.

To log in, simply click the File menu strip item, and select Log in. A new window will pop up, asking for your username and password. Enter them into the appropriate field, and select OK. If you entered the information correctly, the program goes back to the main window, and the status strip should read 'Logged on: Yes'.

Settings: Configure this program to...
MODULES OF CPR eTAM

- **Module 2: Training**
  - Main part of the project.
  - Provides feedback displaying CPR steps being done on mannequin in real time
  - The features of this phase are:
    - The training software.
    - Grading processing of the training session.
MODULE 2: TRAINING
Module 3: Report and configuration

- The report is an important feature of our product.
- It provides the results of the students of each session divided by sections and courses.
- This software has several options to configure like the port and the evaluation grades.
Evaluation report for
EDFI 3645 - 070

Below is the evaluation summary for the specified section. To view a detailed report of a particular student, click his or her name.

<table>
<thead>
<tr>
<th>Student name</th>
<th>Student number</th>
<th>Avg</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>Juanma Feliciano</td>
<td>802-03-1061</td>
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<td>Jerry Seinfeld</td>
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<td>Elaine Benes</td>
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</tr>
<tr>
<td>Cosmo Kramer</td>
<td>987-65-4321</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Click on a student’s name to jump to his or her detailed report.

Session number 2
Grade 32/100
Passing grade for this session 80/100

First cycle
- Consciousness check: √
- Head-tilt, chin-lift: ✗
- Nose pinch: ✗
- First rescue breath: √
- Second rescue breath: ✗
- Pulse check: ✗
- Chest compressions: ✗
- Head-tilt, chin-lift: ✗
- Nose pinch: ✗
- First rescue breath: √
- Second rescue breath: ✗

Second cycle
- Head-tilt, chin-lift: ✗
- Nose pinch: ✗
- First rescue breath: √
- Second rescue breath: √
- Chest compressions: ✗
- Head-tilt, chin-lift: ✗
- Nose pinch: ✗
- First rescue breath: √
- Second rescue breath: √

Third cycle
- Head-tilt, chin-lift: ✗
- Nose pinch: ✗
- First rescue breath: √
- Second rescue breath: √
- Chest compressions: ✗
- Head-tilt, chin-lift: ✗
- Nose pinch: ✗
- First rescue breath: √
- Second rescue breath: √
SYSTEM DESIGN
**HARDWARE**

- **Mannequin:**
  - We bought a CPR Prompt® TMAN1 Adult/Child CPR training mannequin.
Hardware (cont)

- **Microcontroller:**
  - 8051F340 development kit
    - Silabs Company
    - 2 ADC
    - 4 ports, from which we use 2 of them

- **Sensors:**
  - Sound detector sensor, for consciousness check
  - Force sensor

- **Communication:**
  - Wireless Zigbee module
HARDWARE
SOFTWARE

- Microcontroller
  - C language
  - Sensor polling.
- GUI
  - Developed in C#
- Database
  - Server
  - MySQL support.
**Testing**

- **Unit Testing**
  - Verified and qualified software
  - NUnit Framework

- **Stress Testing**
  - Stress testing was applied to the mannequin to see if the sensor placement was durable and in the right position.

- **Test Cases**
  - 12 test cases.
  - Identify bugs to fix
  - Software and hardware
Budget Analysis

Estimated Cost: $394.76
Total Cost: $387.50
WORKED HOURS
**Future Work**

- **Software**
  - Patches that will add functionality to the program.
    - Manual grading added
    - Mannequin recognition and the connection wizard

- **Hardware**
  - Sensors with better accuracy in the output (a more reliable detector)
  - Microprocessor with more ADC’s
  - More realistic experience using tactile sensors instead of push buttons.
THANKS TO:

- Professor Mendoza
- Professor Nayda Santiago, Manuel Rodriguez, and Fernando Vega
- Silicon labs (donation)
- María Pena
- TA’s of Capstone course
- José Rodriguez (Dices)
- Pablo Rebollo
- José Bermejo
- Our families & friends 😊
REFERENCES


