Maestría en Ingeniería en Automatización de Procesos Industriales

Title

System SCADA for medical devices interoperability

in neonatal intensive care

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1. Introduction

Medical devices are essential to the practice of modern medicine and are very important in intensive care environments. Clinical measurements such as blood pressure and temperature, administration of intravenous medications, and support of critical life functions all require medical devices. However, despite our reliance on sophisticated medical equipment, most devices are not designed to interconnect with other device. This characteristic is called "lack of interoperability". Therefore, it is difficult to connect individual devices into integrated medical systems to improve patient care, avoid unnecessary accidents, and obtain comprehensive data to personalize care delivery.

According to the above problem, a platform were designed to obtain medical measurements of three medical devices utilized in neonatal intensive care.
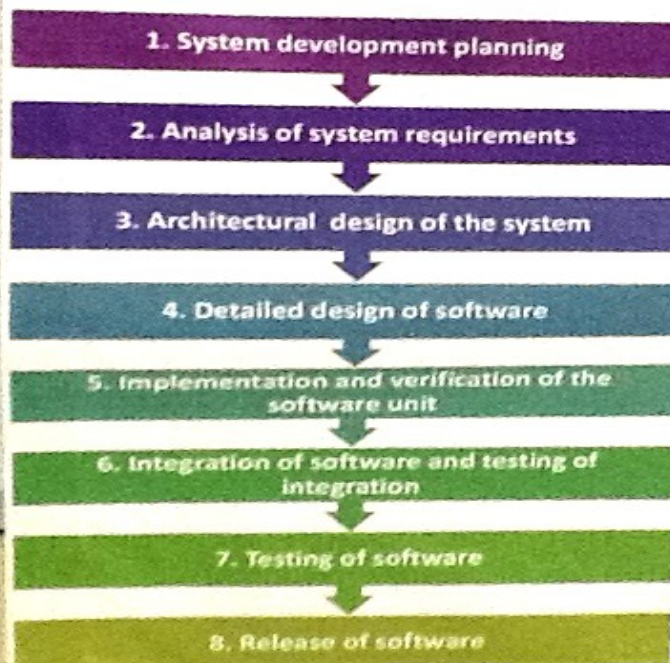
2. Objectives

2.1. General objective

To implement a SCADA system with the architecture of a clinical open research platform in collaboration with the Arroba company to achieve interoperability and event control of the variables measured in three medical devices.

2.2. Specific objectives

➢ To develop the data model of an oximeter, a monitor of vital signs and the infusion pump for further treatment.
➢ To develop the functional architecture of the system in SysML.
➢ To implement an interface that allows you to monitor the variables obtained from each of the medical devices in real time.

3. Method

1. System development planning

2. Analysis of system requirements

3. Architectural design of the system

4. Detailed design of software

5. Implementation and verification of the software unit

6. Integration of software and testing of integration

7. Testing of software

8. Release of software

4. Completed activities

1. The project work plan was developed, starting with the search of the state of art.

2. The system requirements were analyzed including the standards that should be used and the data model that should be implemented. The diagrams of requirements that were designed in SysML are shown later in this document.
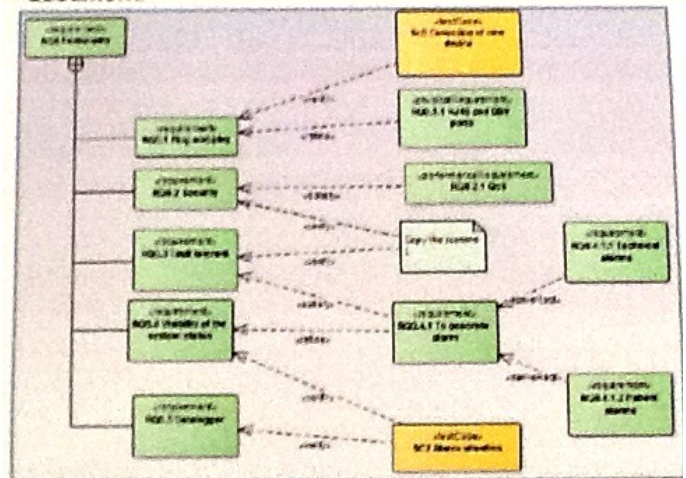

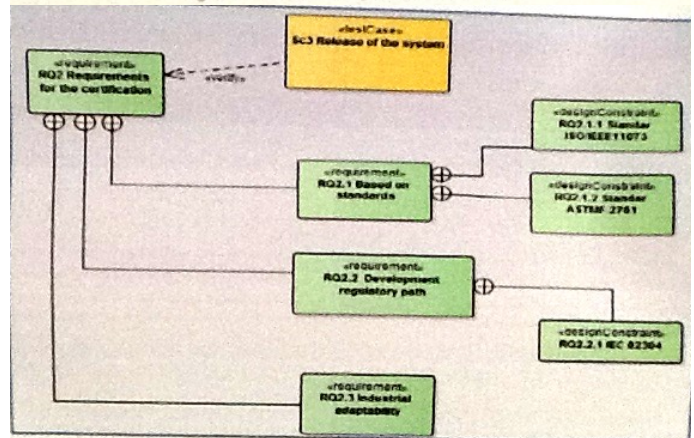*Figure 1. Functional requirements diagram*

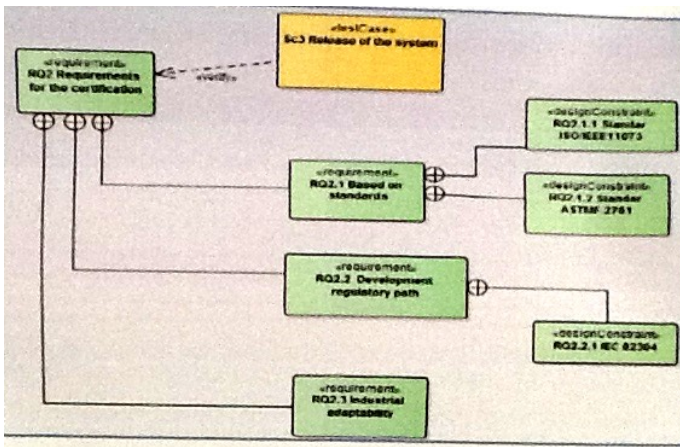*Figure 2. Certification requirements diagram*

Figure 2. Certification requirements diagram

3. The system architecture diagram was designed placing the pieces that make it up.
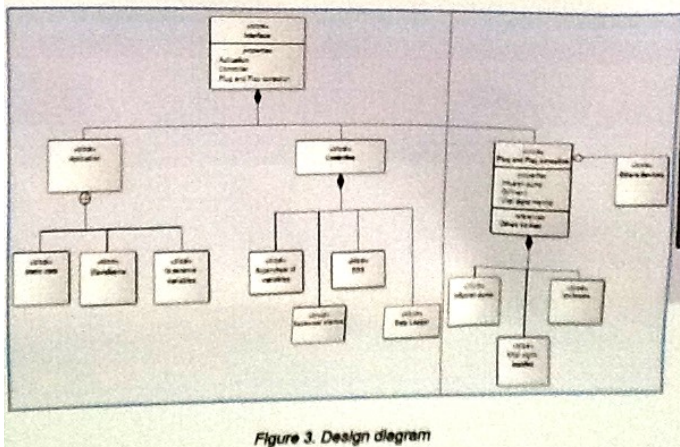

Figure 3. Design diagram

4. The possible interactions between hardware and software were analyzed , and the design of the use case diagrams were obtained with their sequence diagrams, specifying the activities corresponding to each object of study .

5. Readings were obtained from the device called "oximeter" and these data were processed to be graphed later.

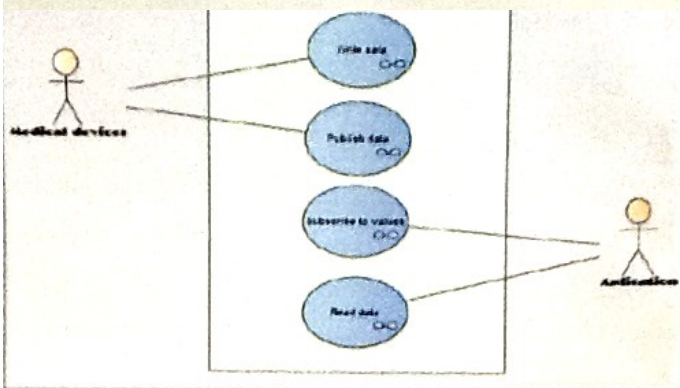6. The interface was implemented integrating the device and drawing the graphs of the data.

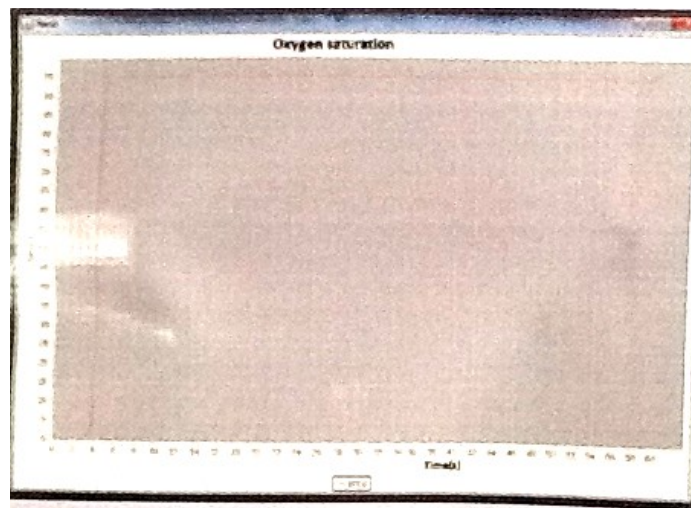
Figure 4. Use case diagram (1/4).
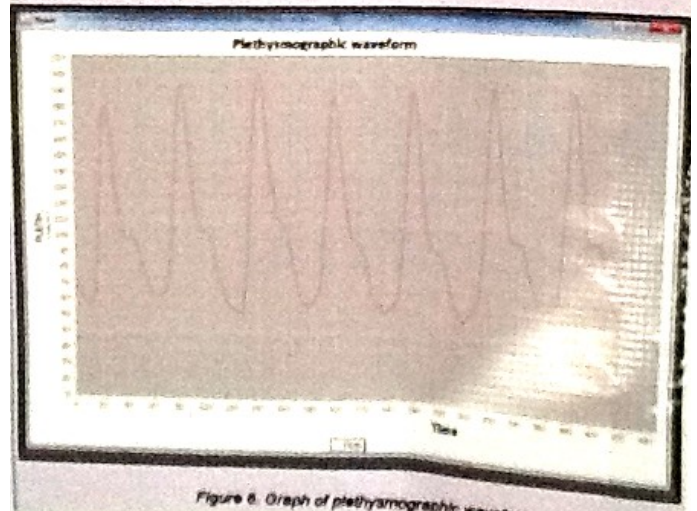

Figure 5. Graph of oxygen saturation.

Figure 6. Graph of plethysmographic waveform.

6. Conclusion

According to the completed activities a progress of 70% was obtained. The diagrams from the system were made in SysML for a better design. With regard to the data extracted from the medical device, they were read correctly and they were graphed properly.

Acknowledgements

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