MOBILE APP FOR BETTER INTENSIVE CARE OF NEWBORN BABIES

Anup Singh
Civil department
Thakur College of Engineering and Technology
Mumbai, India
anupms94@gmail.com

Shreyas Rathod
Civil department
Thakur college of Engineeing and Technology
Mumbai, India
aristeinmelroy2580@gmail.com

Gaurav Dhondge
Mechanical department
Maratha Vidya Prasark Samaj's Karmaveer Baurao Ganpatrao Thakare Collage of Engineering
Nashik, India
gauravdhondge062@gmail.com

Tejas Hadole
IT department
Maratha Vidya Prasark Samaj's Karmaveer Baurao Ganpatrao Thakare Collage of Engineering
Nashik, India
im.tejas08@gmail.com

Bhimsen Tiwari
Computer Science department
Thakur Collage of Engoineering And technology
Mumbai, India
bhimsentiwari2008@gmail.com

Purvi Sankhe
Information Technology department
Thakur Collage of Engineering and Technology
Mumbai, India
purvi.sankhe@thakureducation.org

***Abstract*— Proposed system, namely NEST (Neonatal Service Tech.), specifically designed for the better Neonatal intensive care of newborn babies. A variety of operational changes can be done through NEST. Doctors and nurses can interact with NICU (Neonatal Intensive Care Unit) environment through NEST mobile app. It allows user to control the NICU environment, according to baby's behavior and biological changes from giving location. It alerts user in emergencies through messaging. Also, we present an innovative mobile app design and case study to show how NEST can be used for better care of newborn babies.**

Keywords*— *Neonatal, Intensive care, Operational changes.

I. INTRODUCTION

A neonatal intensive care unit or an intensive care nursery is a unit in the care of ill or new-born infants. Newborn babies who need intensive care are often put in this special surveillance of the hospital i.e. NICU (Neonatal Intensive Care Unit) access infants by using the portholes, limited opening of large door as this interferes with maintaining air, temperature. In this paper, we present NEST (Neonatal Service Tech.)-mobile app for better intensive care, an online controller of NICU. Only parents of infants, doctor and hospital management department can use the NEST mobile app. Also, we present innovative mobile app design through NEST. Many mobile interfaces exist between different type of user according to their requirements and service provided by hospital management. Depending on the service, NEST mobile app provides a registration form through which user allows to use this app according to their user type. Parents can be considered as system user as they can access the app by the code given by management. Furthermore, Parents can see their child's environmental condition of NICU through NEST's monitor bar present in app. Moreover, the NEST mobile app provides a control unit through which doctor can control the NICU environment according to infant's condition and need. Hospital management department work as an admin system user and can assign permission and accounts of system users like doctors and parents. The basic structure of the NEST mobile app is given in figure 1.

The rest of the paper is organized as follows. Section 2 gives a detailed description of the NEST mobile app we designed in the intensive care of newborn infants. In section 3 we discuss app design of NEST. And at last we outline, conclusion in section 4.

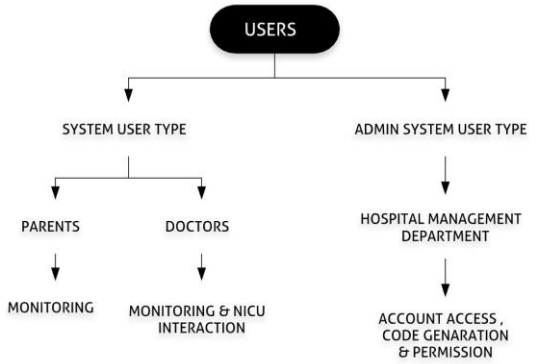

Figure 1: Basic structure of NEST mobile app

II. NEST : A MOBILE APP FOR INTENSIVE CARE

In this paper we present the working of an online mobile app conceived for the intensive care of newborn infants. NEST (Neonatal Intensive Service Tech.) is online mobile app for monitoring newborn infants and to control the NICU environment according to the suitability and condition of infants. Basically, NICU is designed to provide a safe, controlled space for infants to live while their vital organs develop. Unlike a simple bassinet, a NICU provides an environment that can be adjusted to provide the ideal temperature as well as the perfect amount of oxygen, humidity and light. A NICU work on the principal of thermo-electricity. It has a thermostat which maintains a constant temperature by creating a thermal gradient. In addition to climate control, a NICU offers protection from allergens, germs, excessive noises and light levels that might cause harm. A NICU's ability to control humidity also allows it to protect a baby's skin from losing too much water and becoming brittle or creaking. A NICU can include equipment to track a range of things including a baby's temperature and heart rate. This monitoring allows nurses and doctors to constantly track a baby's health status.

NEST app allows parents and doctors to monitor infants and based on that doctor can take required decision. In following discussion, we shall concentrate on the function of

NEST mobile app. Two different user interfaces exit in NEST namely system user, admin system user. Admin system user can create system users, add accounts ,assign permission. In this case Hospital management department is an admin system user, whereas Parents and Doctors can be considered as System user as they can access NEST app by the code provided by Hospital management department. Based on the type of service NEST provides a form through which user can register their name. After the successful registration user allowed to use NEST. User confirmation process be checked by hospital department, as hospital management department is admin system user. NEST mobile app for parents and Doctors is described in section A and section B respectively.

A. Structure of NEST for parents

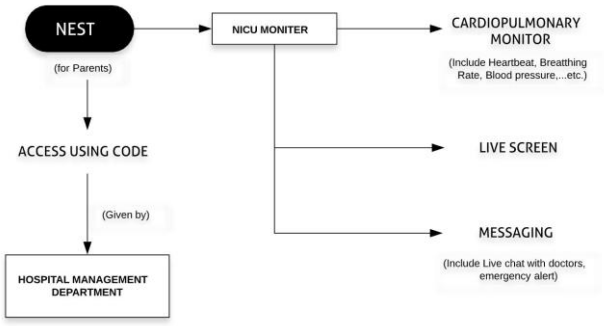

Figure 2: Interface of NEST app for parents

Parents are only allowed to monitor their child. A NICU can include equipment to trace a range of things, including a baby's temperature, humidity, heart rate, pulse rate, NEST app constantly and simultaneously tracks baby's health status and displays information on cardiopulmonary monitor for parents. NEST has a messaging system through which parents can communicate with respective child's doctor and it alert parents in emergency situation of their child. Figure 2 shows the interface of the NEST app for parents.

B. Structure of NEST for Doctors

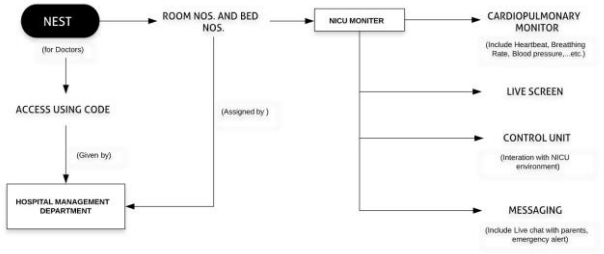

Figure 3: Interface of NEST app for doctors

An NICU's ability to control humidity also allows it to protect a baby's skin from losing too much water and becoming brittle or cracking. A NICU can include equipment to track a range of things, including a baby's temperature and heart rate. Beyond just offering information about a baby's vitals, a NICU will be also either be open on top or have portal holes on the sides that allow it to be used in combination with various medical procedures and interventions. There are different types of NICU is present in the NHS, and they are named depending on the level of specialist care they offer. However, staff will be specially trained to look after parent's baby. Therefore, Doctors and nurses both can use the NEST mobile app. The confirmation process is same as that of parents, explained in section A. Doctor and nurses are assign a specific room no. or bed no. as per the hospital management staff's decision. NEST's monitoring allows nurses and doctors to constantly track a baby's health status. Figure 3 shows the interface of the NEST for doctors. NEST's provides controller through which Doctor and nurses can alter the NICU's temperature, humidity, etc., based on the baby's condition. In addition, NEST provides messaging through which doctors can communicate with respectively baby's parents.

III. DESIGN OF NEST MOBILE APP

The deliverables produced by UX designers vary according to their role in the design team and also depending on the methods and tools used by each role. A UX design process typically follows something similar to a design thinking approach, which consists of basic phases listed below:

A. Emphathize with the users (Learning about the audience)

Birth of an infant is challenging for all parents. Intense emotions and particularly acute when an infant is born prematurely or with health problems and admitted to a NICU. According to the survey on parents proposed by Sydney Local Health District, we came up with conclusion to create our prototype by considering all their responses.

B. Ideate (Genarating ideas for design)

The product and its feature gain significance when users interact with them. The basic idea behind the NEST app design was to create an environment such that it includes both pre and postnatal care. Basic design generation is given in figure 4. Therefore, we our team have decided to include messaging and control units of NICU in NEST mobile app.

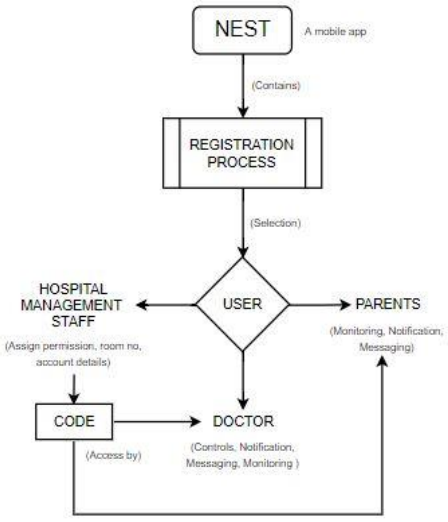

Figure 4: Basic design generation of NEST

C. *Protoyping and looks*

A finished prototype must focus on function, structure, process and provides the simplest elements and a framework of the app. Prototype of NEST mobile app is prepared by using a browser-based UI and UX design application called figma, which support team working on every phase of design process. Design of NEST is given in the figure below:

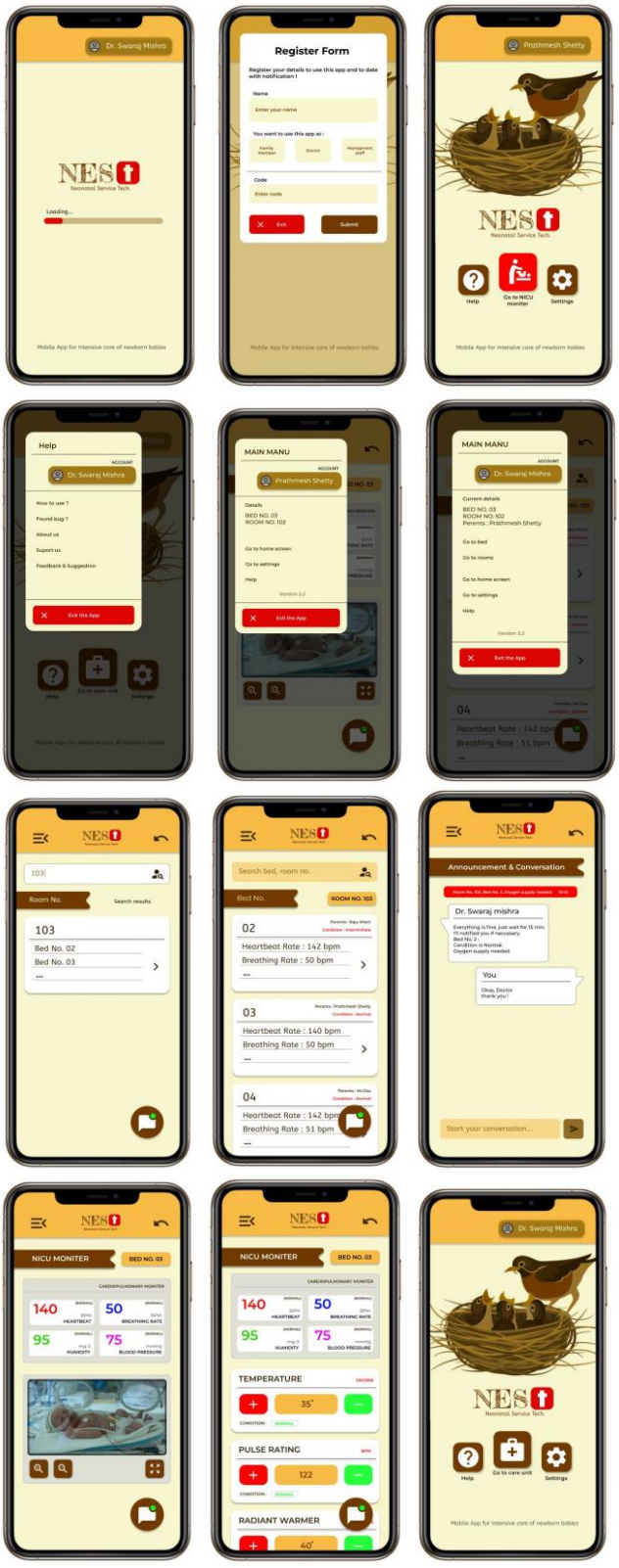

Figure 5: Design of NEST mobile app

IV. CONCLUSION

This paper presents the working and design of a NICU controller (NEST mobile app) conceived for intensive care of newborn infants. The NEST mobile app offers unprecedented flexibility and impact for delivering critical messages through NEST'S messaging system. Nest offers unparalleled visual impact for empowering users. Its intuitive graphics enhance the message, while its architecture easily integrates with NICU's technology. NICU monitor in NEST app simply displays Heartbeat, humidity, pulse rate, breathing rate. The condition of NICU'S can be controlled by doctors from anywhere as per need and can be given an update to parents as per condition by a doctor. Parents can ask their query as well.

ACKNOWLEDGMENT

We would like to thank Thakur Collage of Engineering and Technology for giving us opportunity to work on this project work. We would also want to thank NDMVP's KBTCOE for participating in our project and our mentor of workshop track Purvi Sankhe and Dr. Magharani Patil for guiding and helping us throughout this project work.

REFERENCES

[1] Shneiderman, B., Plaisant, C., 2010. Designing the User Interface : Strategies for Effective Human-Computer Interaction, 5 ed. Addison-Wesley, London.

[2] Ericsson, K.A., Simon, H.A., 1993. Protocol Analysis: Verbal Reports as Data. MIT Press, Cambridge, MA.

[3] https://www.slhd.nsw.gov.au/survey_forms/default_simple_responsive.cfm?survey=RPAnicu2016

[4] https://www.healthline.com/health/baby/incubator-baby

[5] https://kidshealth.org/en/parents/nicu-caring.html

[6] https://www.academia.edu/44343113/Learner_and_User_Experience_Research_An_Introduction_for_the_Field_of_Learning_Design_and_Technology

[7] Antonucci R, Porcella A, Fanos V. The infant incubator in the neonatal intensive care unit: unresolved issues and future developments. J Perinat Med 2009; 37: 587–598.

[8] Marshall-Baker A. Human and environmental health: Sustainable design for the NICU. J Perinatol 2006; 27: S31–S33.

[9] Norman DA, Draper SW. User Centered System Design; New Perspectives on HumanComputer Interaction. Lawrence Erlbaum Associates: Hillsdale, NJ, 1986.

[10] MLA. Krug, Steve author. Don't Make Me Think, Revisited : a Common Sense Approach to Web Usability. [Berkeley, Calif.] :New Riders, 2014.

[11] Garrett, J. J. (2011). The elements of user experience: User-centered design for the Web and beyond.

[12] Norman, D. A. (1990). The design of everyday things. New York: Doubleday.