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Automated Health Monitoring System For Premature Fetus

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Abstract

Our research is about the premature infant Monitoring system based on wireless Technology. A prototype is developed which gives a reliable and efficient baby monitoring system that can play a significant role in providing higher kid care. This system monitor vital parameters such as body Temperature, Pulse rate, Cry Movement ,Blood oxygen level(spo2),heart rate and the physical activity of an infant and using GSM Network .GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHZ and 1900MHZ frequency bands. This information is transferred to their parents. Measurements of these vital parameters can be done and underneath risk, Scenario sent to the parents with SMS alert to intimate the proper control action. So that we can reduce the death of the premature fetus.

1. INTRODUCTION

A device is developed which gives a reliable and efficient baby monitoring system that can play a vital role in providing better infant care. This device monitor vital parameters such as body temperature, heartbeat, cry, movement of an infant and sends SMS alert using wireless technology. Our proposed system aims at monitoring the vital signs of the premature infant such as heartbeat, movement of body, body temperature and cry using wireless technology and sensors which are comfortable for the baby to wear. It is also accurate and precise than other sensors. We also focus on increase the scope of transmitting the information without over the internet in order to provide remote access**.** This system overcomes the drawback of the existing systems which are clumsy, less user friendly and expensive may cause discomfort to the infant. Wireless and wearable sensors provide more convenient and long term monitoring. Sudden Infant Death Syndrome (SIDS) is the unexplained death of an infant below the age of one year. It usually happens without any warning signs during sleep, which is why it is difficult to identify and predict. Therefore our proposed monitoring system would be an effective way to predict the onset of SIDS . Neonatology is a subspecialty of pediatricks that started to develop in the 1940s. After the World War–II the specific needs of sick newborn infants were recognized and new premature nurseries were built. The

term "Neonatology" was first used by Alexander Schaffer in 1960 in the introduction of the first edition of his book. The miniaturization of samples for blood tests, needed for clinical management including electrolytes, bilirubin and blood gases was one of the major advances in the development of Neonatology. In the following decades important progress was achieved in thermoregulation, nutrition, growth, respiratory support, cardiopulmonary support and

infection control.

2. LITERACTURE REVIEW

There are many designs of incubator for infants in the literatures. In recent work, Dive and Kulkarni designed an incubator that can monitor and detect the light inside the incubator, and also audio or voice of the infant . The proposed incubator system can notify doctor and nurse about the infant's condition, as when the infant cries, the alarm will be triggered and the alarm will stop or deactivated only if someone turned it off. The advantage of the work is it helps doctors and nurses to monitor the infant's condition continuously. For future improvement, they recommended adding parameters such as monitoring of Temperature and moisture, developed a newborn incubator that can check the conditions of the incubator environment by utilizing a humidity control system. They concluded that the control of humidity could contribute to the thermos-neutral of the environment, thus improving the premature newborns' quality of life. There are also several infant incubator designs that implement temperature control system. However, following care giving, infant and incubator temperature differed significantly over time by incubator control mode (air mode control or skin temperature mode control) . Therefore, it is necessary to consider the temperature effects of care giving when developing incubators. There are several others unresolved

issues in developing infant incubators such as exposure to high noise levels in NICU, incubator's surrounding light environment and electromagnetic fields (EMFs) impact on infant health to name a few.

Based on the literature review the gaps are identified with the Existing system regarding the Sensors so that we developed proposed system by considering all the draw backs.

3.PROPOSED SYSTEM

4.SYSTEM ARCHITECTURE

The architecture of the system consists of both hardware and software. Block diagram hardware components were assembled according to the block diagram. The code is written in embedded C and is burnt into the ARDUNIO UNO R3

Fig.1. Block Diagram of Proposed System

5.COMPONENTS USED

A.TEMPERATURE SENSOR

Human body needs special type of sensors for reliable readings which led to the choice of using the LM35 temperature sensors in our prototype . It operates at 3 to 5 V and can measure temperature in the range of - 40 C to +125 C which is sufficient for the targeted body temperature range.

B.PIR MOTION SENSOR

A PIR (Passive InfraRed) sensor is a motion detector which detects the heat (infrared) emitted naturally by humans .When a person in the field of vision of the sensor moves, the sensor detects a sudden change in infrared energy and the sensor is triggered (activated).They are commonly used in security lighting and alarm systems in an indoor environment. The PIR sensors have a range of approximately 6 meters, depending on conditions. The sensor adjusts to slowly changing conditions that occur normally within the environment, but shows a high-output response when a sudden change takes place.

Fig.2. PIR sensor

C. PULSE RATE SENSOR

A Pulse rate sensor is a monitoring device that allows one to measure the infant's heart rate in real time . It provides a simple way to study the heart function. This sensor monitors the flow of blood through the finger and is designed to give digital output of the heartbeat when a finger is placed on it. When the sensor is working, the beat LED flashes in unison with each heartbeat.

D. SOUND DETECTION SENSOR

The sound sensor module provides an easy way to detect sound and is generally used for detecting sound intensity. This module shown as in fig can be used for security, switch, and monitoring applications. Its accuracy can be easily adjusted for the convenience of usage. It uses a microphone which supplies the input to an amplifier, peak detector and buffer. When the sensor detects a sound, it processes an output signal voltage which is sent to a microcontroller then performs necessary processing

IV. ADRUINO UNO R3 BOARD

The Arduino UNO is a widely used open-source microcontroller board based on the Atmega 328P microcontroller and developed by Arduino.cc. [The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits . The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment)

via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.

Fig.6. Arduino UNO R3

4. EXISTING SYSTEM

- Temperature Sensor – Human body needs special types of sensors reliable readings which lead to the choice of using the LM35 temperature sensors in our property.
- Sound Cancelling – Design and Development of a smart baby monitoring system based on raspberry pi and pi camera.
- Hence there are a lot of gaps to rectify about the sensors of Temperature, heart beat and etc.,we developed a latest sensors which gives alaram signals to the parents so that we can take care of babies.

6.RESULT

The system was tested carefully on an infant, the results found to be same as the one's measured by standard instrument . While testing this system on an infant parent's concern was considered. During the execution of the system snapshots of the display were taken. The system being a complete hardware design and the data available on cell phone.

TABLE.I

Serial No	Actual Temp (0C)	Practical Temp(0C)
1	**32**	**36.1**
2	**31**	**35.5**
3	**33**	**37**
4	**35.6**	**36.7**

TABLE.II

Serial No	Actual pulse rate	Practical pulse rate
1	72	78
2	66	72
3	70	76
4	54	60

7.CONCLUSION

There are an increase number of premature babies that, once they achieve some degree of maturity, can be moved at home when their parents can take care of them in a loving environment which most of the times fasten the babies' recovery. For this end, a home based solution is provided, which supports parents in the baby care while keeping babies under the control of clinical staff. The architecture contains two case-based reasoning modules that assess the baby state. Then, the recommendations and alerts obtained are shown in parents' mobile as well as in doctor's device. The proposal of a general and modular architecture enables that this solution can be applied to other use cases within the Moshca platform. Even the reasoning module can be replaced by other module using different artificial intelligent methods according to the current necessities. Moreover, the use of recognized standards worldwide ensures the interoperability

of the proposed architecture. Our future work involves further experimentation including the testing in a real environment and the comparison of results obtained by other techniques. In addition, the influence of context awareness on obtained recommendations should be studied.

8.REFERENCES

1. J. Bunker, M. Kejariwal and G. Monlux(Oct 28-31, 1993), "SIDS home monitor with telecommunications capabilities", In Proc. of IEEE EMBS International Conference, pp. 1060–1061.
2. Intelligent Baby Monitoring System 1Savita P.Patil, 2Manisha R. Mhetre, ITSI Transactions on Electrical and Electronics Engineering (ITSI-TEEE) ISSN (PRINT) : 2320 – 8945, Volume -2, Issue -1,2014.
3. J.E.Garcia, R.A.Torres, "Telehealth mobile system ", IEEE Conference publication on Pan American Health Care Exchanges, May 4,2013.
4. Research in Dynamical and Control Systems 9 (2017) 1969.
5. Karthick, R and Sundararajan, M: "Design and Implementation of Low Power Testing Using Advanced Razor Based
7. Karthick, R and Sundararajan, M: "A novel 3-D-IC test architecture-a review," International Journal of Engineering and Technology (UAE)7 (2018) 582.
8. R.Karthick, P Selvaprasanth, A ManojPrabaharan, "Integrated System For Regional Navigator And Seasons.
10. R. Karthick,NSathiyanathan, and M. Eden, "Medical Image Compression Using View Compensated Wavelet Transform"
11. Journal of Global Research in Computer Science 9(9),2018(1-4).
12. Karthick, R and Prabaharan, A.Manoj and Selvaprasanth, P. and Sathiyanathan, N. and Nagaraj, A., High Resolution
13. Image Scaling Using Fuzzy Based FPGA Implementation (March 15, 2019). Asian Journal of Applied Science and Technology (AJAST), Volume 3, Issue 1, Pages 215-221, Jan-March 2019 . Available at SSRN: https://ssrn.com/abstract=3353627
14. Karthick, R and Sundhararajan, M., Hardware Evaluation of Second Round SHA-3 Candidates Using FPGA (April 2, 2014). International Journal of Advanced Research in Computer Science &Technology (IJARCST 2014), Vol. 2, Issue 2, Ver. 3 (April - June 2014). Available at SSRN: https://ssrn.com/abstract=3345417.
15. Karthick, R and and Prabaharan, A.Manoj and Selvaprasanth, P.,Internet of Things based High Security Border Surveillance Strategy (May 24, 2019). Asian Journal of Applied Science and Technology (AJAST), Volume 3, Issue 2, Pages 4-100, Apr-June 2019. Available at SSRN: https://ssrn.com/abstract= 3394082.
17. M. Thangamani, and Jafar Ali Ibrahim. S, "Knowledge Exploration in Image Text Data using Data Hiding Scheme," Lecture Notes in Engineering and Computer Science: Proceedings of The International MultiConference of Engineers and Computer Scientists 2018, 14-16 March, 2018, Hong Kong,pp352-353
18. http://www.iaeng.org/publication/IMECS2018/IMECS2018_pp352-357.pdf
19. C. Narmatha , Dr. M. Thangamani , S. Jafar Ali Ibrahim, " Research Scenario of Medical Data Mining Using Fuzzy and Graph theory", International Journal of Advanced Trends in Computer Science and Engineering, Vol 9, No 1 (2020): 349-355, https://doi.org/10.30534/ijatcse/2020/52912020, https://www.warse.org/IJATCSE/static/pdf/file/ijatcse52912020.pdf
20. Faxin Yu, Zheming Lu, Ha-o Luo, Pinghui wang, "Three dimensional Model analysis and processing", pp.374-378, 2011.

21. Celik Mehmet Utku, Gaurav Sharma, Ahmet Murat Tekalp, Eli Saber, "Lossless Generalized-LSB Data Embedding", IEEE Transactions on Image Processing, vol. 14, no. 2, pp.253-266, Feb. 2005
22. Wien Hong, "Adaptive reversible data hiding method based on error energy control and histogram shifting", Elsevier, Optics Communications, vol. 285, no.2, pp.101-108, 2012.
23. Xiaolong Li, Weiming Zhang, Xinlu Gui, and Bin Yang, "A Novel Reversible Data Hiding Scheme Based on TwoDimensional Difference-Histogram Modification", IEEE Transactions on Information forensics and Security, vol. 8, no.7, pp.1091-1100, July 2013.
24. Keren Wang, Hong Zhao and Hongxia Wang, "Video Steganalysis Against Motion Vector-Based Steganography by Adding or Subtracting One Motion Vector Value", IEEE Transactions on Information Forensics and Security, vol. 9, no. 5, pp. 741-751, May 2014.
25. Gallaiszx A, Hedli T-H, Loscrix V, Mitton N (2019) Denial-of-sleep attacks against IoT networks. In: 6th international conference on control, decision and information technologies
26. Thangamani M., and S. Jafar Ali Ibrahim. Ensemble Based Fuzzy with Particle Swarm Optimization Based Weighted Clustering (Efpso-Wc) and Gene Ontology for Microarray Gene Expression. In Proceedings of the 2018 International Conference on Digital Medicine and Image Processing, ACM pp. 48-55. 2018. *https://dl.acm.org/doi/abs/10.1145/3299852.3299866*
27. Ibrahim, S.jafar Ali and M.Thangamani. Prediction of novel drugs and diseases for hepatocellular carcinoma base of multi-source simulated annealing based random walk, Journal of medical systems,42, no.10 (2018):188. https://doi.org/10.1007/s10916-018-1038-y