

Sudden Infant Death Monitoring Using Smart Wearable System

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Abstract— Sudden Infant Death Syndrome (SIDS) is one of the major causes of death among infants during their sleep. In this paper, increase the safety of the infants, the different emergent research fields for the development of Baby Night Watch is matched. A mother, with new born baby if needs to be away from baby due to employment, household work, shopping, etc. in that case health status intensifies the stress for mothers. The number of approx. 7,00,000 life births in the world is overshadowed by a large number of infant deaths for various reasons like apparently life threatening events (ALTE) or sudden infants death syndrome (SIDS). Continues monitoring of physiological parameters and notification updates is need of current scenario. Child health status is important aspect and health monitoring system is ultimate solution for that. The new era wearable technologies can be easily adoptable for monitoring systems. Wearable health monitoring system with fully integrated sensors can sense the physiological parameters and accordingly, synchronize the real time data to user application. The mobile application will help user to get real time breathing rate, heartbeat count of the baby. It will also provide health and report analysis as well as emergency notifications.

Index Terms— wearable sensor systems for infants, constant health monitoring, Embedded system, wearable sensor network.

I. INTRODUCTION

The number of infant deaths occur due to improper care taken. Mothers with newly born baby have to stay away from their babies due to various reasons. During such situation, health status of babies is hard to detect. The sudden fall and increase in physiological parameters may cause sudden infants deaths syndrome (SIDS) and may lead to Apparently Life Threatening Events[1].

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The aim of the project is to incorporate sensory functions in the wearable hardware making it capable of measuring the physiological parameters (breathing and heart beats) accomplishing the need of continuous health monitoring.

The microcontroller based hardware includes integrated sensors for the parameters heart rate, breathing rate and position sensor. It will notify for the potential life threatening events, also recognize the development of any disease. The hardware will be able to output the analogue values of sensed data which in turn will be synchronized with cloud server via middleware architecture. Wearable hardware will communicate with middleware architecture through wireless communication. The necessary data processing on the cloud storage will identify the critical conditions as well as will create reports. The final component of the system, i.e. mobile application is featured with real-time notification, alerts in the critical situation. It will show the continuous health status.

II. LITERATURE SURVEY

Baby Night Watch is modify the parameter with their protection of the infant. In Baby Night watch, the various technology such as, wearable device, embedded system, wireless communication, E-Health interfacing and mobile or computer application. To goal of the project user check the data critical or not about infant. Wearable device is control the heart beat, breathing rate and position sensor and detect section of bio-sensor. Infant condition of normal or abnormal heart and breathing rate as follow: for new born baby, normal heart rate is 100-160 and breathing rate is30-50. For 0-5 months baby, normal heart rate is 90-150 and breathing rate is 25-40.

In the last decade, the research community and the industry have been taking special attention to wearable systems. These are designed for a vast range of applications, such as: It is common to find

SWS that are able to monitor multiple vital signs and access if the user is in an emergency situation. Some of the parameters that can be monitored by a SWS are: electrocardiogram signals (ECG); electroencephalogram (EEG); electromyogram (EMG); heart rate; activity of the user; fall; breathing rate; blood pressure; blood glucose; blood oxygen; perspiration (sweating) or skin conductivity; and body or skin temperature. The use of smart textiles like textile electrodes or printed sensors allows the user to have more freedom of movements and comfort in its use, but some of those technologies are still a prototype [1].

Infants should sleep on their stomach due to risk of Asphyxia. Asphyxia is a supply oxygen to the body from abnormal breathing. In other word about asphyxia, it is block the oxygen. For example of asphyxia is choking. Since it maintain or modify the algorithm for heart, breathing and position of the sensor. WBAN is a detect the biological data which used to medical server. WBAN is a wireless communication and it can used remote health application. In WBAN, data send to the server with help of protocol. Sensor is applied to medical server by using PAN/BAN in first tire communication. Watch can reduce the response time of infant.

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The number of data or maximum data is called big data. It easily understand by users. There is large number of data can be stored in open sources i.e. cloud computing. It is define the big data and calculate network data .

In addition, IoT is also starting to impact in the social networks, a clear example is the initiative "Like-Art", where the potential of social networks and the popular "Like it" from Facebook, is combined with the physical interaction through waving your hand (which are read through a sensor connected to Internet). Thereby, visitors are able to indicate that a specific artwork is your favourite in

the cyberworld with a physical interaction. In particular, this work will analyses these interactions and potential from the perspective of the Human Dynamics, the potential of the Big Data and Smart Cities to increase our quantitative and qualitative understanding regarding the human behaviours [3].

Wearable device is development of biosensor and it used for health monitoring. It is maintain the data and provide health monitoring. It can compare different types of bio data, wireless node and it's capability. It is low cost of wearable device solution for continuous data of health monitoring. Health care is changes cost depend upon the increase world population.

Health Monitoring system is improve the biomedical field as well as industrial research based project by the help of smart wearable system. In health Monitoring, minimum cost of health care and it provided various safety product. It can support the various technology i.e. nano-technology, micro-technology, different smart fabrication process and different smart technology depend upon health monitoring. It can provide the individual health care and mange different technology depend their patient with proper protection. It can also check the patient continuously to health current status. To provide the wearable sensor which is used to check status of patient. Because of health monitoring to information about various diseases [4].

Now days, world population automatic health monitoring is require. Health monitoring is measure heart and breathing rate by using E-textile. E-textile is a smart thing, because of E-textile automatic measure the heart and breathing rate. It is electronic device and it use the digital component. Data should be digital form but sensors provide analog data. It must be converted into digital form by using ADC (analog to digital converter) .

At present time, considering the ageing of the modern societies' populations, the interest for ubiquitous, continuous and automatic health monitoring has been growing intensely. One of the technologies that have captured some attention in this context is the integration of sensors and systems into textiles. Textiles are excellent interfaces for biological signal sensing. They are

flexible, conformable and are used by everyone on a daily basis. There are many types of textile conductive yarns available on the market that can be processed by conventional textile production techniques [5].

III. PROPOSED SYSTEM

In these project, different technology used in Baby Night watch i.e. embedded system, bio-sensor, wireless communication, cloud computing and mobile application. The goal of the project to continues monitoring of infant during their sleep and to avoid the power consumption. Smart wearable system provide the wearable device, E-Health hardware. The hardware device is the detect to each bio-sensor, and it is capability for continuous measure the body the heart and breath rates and position.

Different wearable sensor used in sudden infant death monitoring with proper protection and measuring of quality of the sleep. It is reduce the time management of sudden infant death monitoring. Different alarm technique used in smart wearable system. It is more reliable system. It require biological sensor of baby such as Heart rate, Position and breathing , to protect baby and apply data to the cloud.

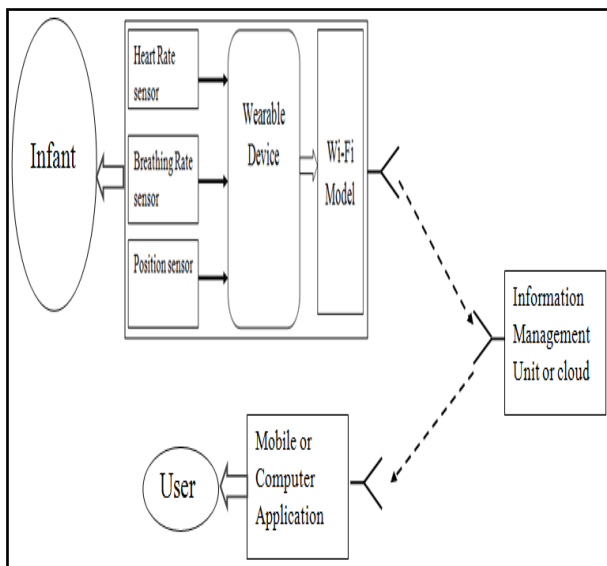


Figure 1. System's Architecture.

These system architectures to show the various device or technology to protect of baby during sleep condition. These system work in smart device and the data send continuous in cloud section which number of data can stored. These

project hardware and software implement is followed by: (1) there is various data to detect by using biological device which used in baby health care, (2) these information stored in cloud area and parent or doctor can easily check the data by using mobile network and (3) a cloud area is collect the data continuous from wearable device which measuring the status in graphical form. Figure 1 shows the main system's architecture. The convey the information between arduino and cloud section through wi-fi module using IoT. These system also used baby's parent in their home. Because of these system parent also continuous check health status of baby. Figure 2 shows the system flow chart.

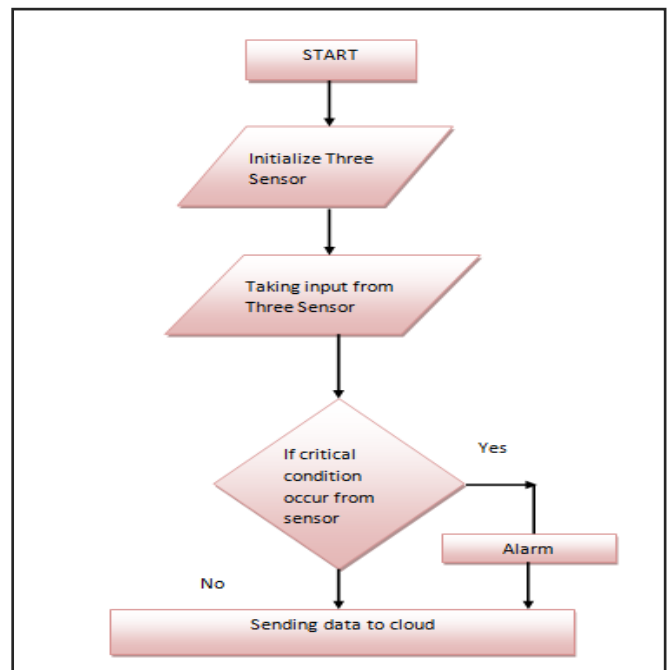


Figure 2. System Flow Chart

The main application flow consists of the monitoring objects sampling the data gathered by the sensors, sending it to the information management unit that process and stores the information gathered, and publishes it on a Web site. The Web site uses Google's Open Id as the way to login. This information can be accessed through any web browser in case you do not have your phone but the main flow will use a phone so that if an alert is triggered the phone capabilities are used to alert the parent.

IV. CONCLUSION

The Baby Night Watch is capable of detecting unexpected events and registering several physiological parameters, making it a powerful medical tool to understand SIDS, and a reliable real-time monitor of infants. In this paper, it proved that with a small amount of hardware a huge number of parameters can be measured, improving the users experience and safety of the infant. The data rate produced by the Wearable Device is in the order of 35 bytes per minute, easily supported by Wi-Fi. In the future some changes must be made to improve this SWS: placing the Cloud Storage Center into a web server, allowing the users to retrieve information without having to be connected to the wearable device.

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