



## 2. Literature Review

### A. Smart Patient Care System (SPaCS).

In the year 2011, The 'Smart Patient Care System (SPaCS)' developed by the MTM LTD. The Ministry of Knowledge Economy of Korea helped them for this [6]. Healthcare system SPaCS that comprised of two applications that is PCS (Personal Care Service) and PRM (Patient Record Monitoring & Feedback System) in respect to handle health of the individual by using smartphones. The expected system is to be launched in 2012. In Korea Pukyong University designed the 'Wearable ECG module which does not require electrodes on bare skin [3]. This module can be possible in the form of t-shirts that individuals can normally put on and take off any time, and results can be monitored and transferred wirelessly in real-time.

The system is based using commodity hardware, comprised of an authorized Bluetooth home blood pressure monitor, a mobile device to receive and transfer of data, a centralized Server for data transformation, a fax reply report to physician and ECG alerting device.[7]

### B. About Android

In android framework Figure 1 (Android System Architecture) there are four layers which are Application layer, Application Framework layer, Libraries, Android Runtime layer and kernel layer. The first which is at top of the framework is Application layer. The application which gets complete are compiled and run in this layer. The second layer is Application Framework layer, It is a type of toolkit that is used by all the applications, ones which all comes with mobile device gadgets such as Contacts or SMS box, or some of the applications that are already developed by Google and some of the Android developer. The next layer is library and runtime layer where a set of libraries written in C/C++, that are responsible for static performance of different components and in runtime layer where the important component Dalvik Virtual Machine is set. It was developed particularly for Android running in specific area, where the limited power backup, CPU, memory and data storage are the major concern. The final layer is Kernel layer provides developer to manage the security issue, memory management of the device, process management of the CPU, network stack and some other related important problems [20]



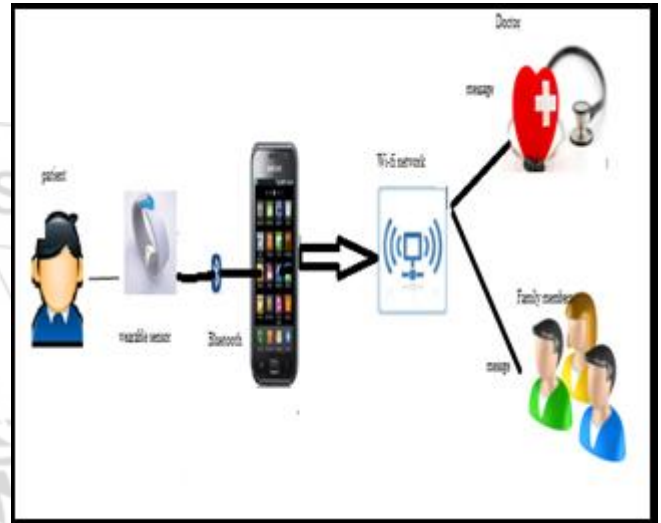
**Figure 1:** Android System Architecture

### C. Bluetooth

Bluetooth is a wireless communication protocol that is used at 2.4 GHz, with client-server architecture, it is suitable for a private networks. It is designed for the devices which have low power for example-mobile phone [4][5].

Initially Bluetooth was used by the Ericsson for a purpose of cable replacement technology and also for the adhoc personal network. Together with Intel, IBM, Nokia and Toshiba, they formed the Bluetooth Special Interest Group (SIG) in May 1998. [21].

## 3. System Architecture



**Figure 2:** System Architecture

In the couple of years the technology has changes at every moment. Smart monitoring device to detect human body with the help of technology like Wearable sensor band, Wireless network. This system consist a wearable sensor which is connected to the patient body to continuously monitor the blood pressure of the elderly patient with the help of the sensing nodes. Sensing nodes are the nodes which is used for sending signals of the measured blood pressure.

The signal which will be received from the sensor will send to the senior family member smartphone which has the android application, that android application will be connected to the wearable sensor with the help of the Bluetooth device. In case of problem or emergency is detected then the android application will automatically send an alert message or warning message to the doctor and the family member. The blood pressure of the oldage people is measured by considering the further figure 3. With this figure we come to Know about the systolic means top number and diastolic that is bottom number in the blood pressure measuring device. There are four levels for measuring blood pressure which are:-

- 1) Low Blood Pressure:- when the systolic BP range is 70-90 and diastolic BP range is 40-60 than the old person is in the low BP condition.

- 2) Ideal Blood Pressure:- when the systolic BP range is 90-110 and diastolic BP range is 60-80 than the old person is in the ideal BP condition.
- 3) Pre High Blood Pressure:- when the systolic BP range is 90-110 and diastolic BP range is 60-80 than the old person is in the Pre high BP condition.
- 4) High Blood Pressure:- when the systolic BP range is 90-110 and diastolic BP range is 60-80 than the old person is in the High BP condition.

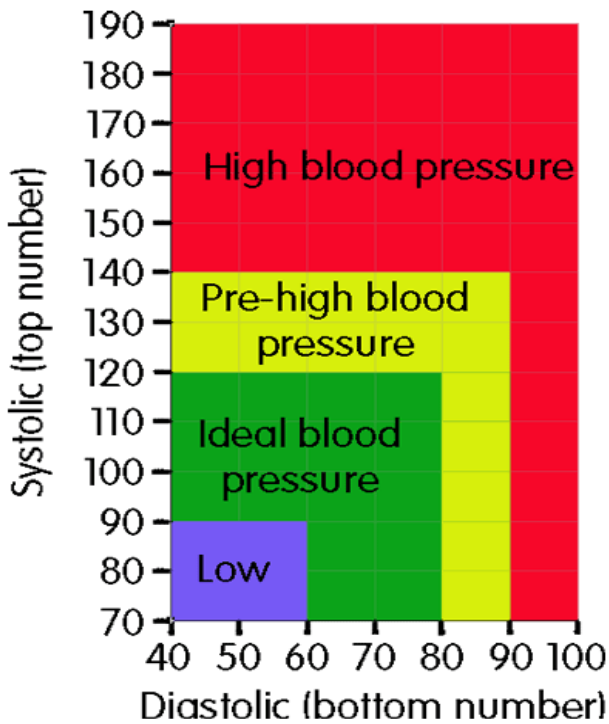


Figure 3: Old age Blood pressure

#### 4. Implementation

The flow chart below in figure 4 of the application gives information about the working of the application. If the patient blood pressure is in the range of 140-120/80-90 then the message goes to the family member of the patient that "patient blood pressure is in the Pre high condition" due to this family member can reach to the patient. And if the patient's blood pressure is 150-190/90-100 then the message will be delivered to the doctor and gives information that the "patient blood pressure is high". This message is delivered to doctor who is in the vicinity of 5km else the message will deliver to the cardiologist contact number which is stored in the phone contact list. Due to this doctor will try to give instant first aid through the family member and can reach to the patient as soon as possible. If the patient blood pressure is not in any other situation then no message will be delivered to anyone and it will be stored in the application. The saved data can be viewed by the doctors for the future reference it can be useful in the treatment if required.

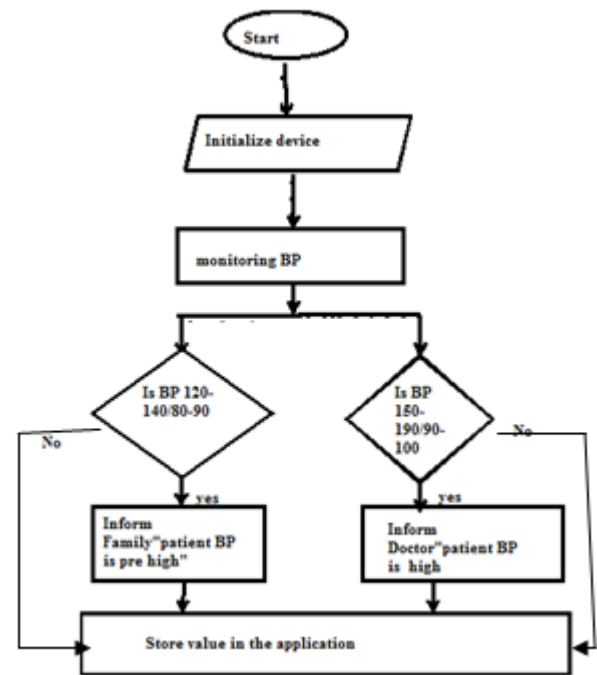


Figure 4: Flow chart of the flow of application

#### Algorithm Of BP Levels

1. User is at normal mode
2. if ((sbp >= 140 & sbp <= 190) & (dbp >= 90 & dbp <= 100)) then
3. label = |High BP |
4. else if ((sbp >= 120 & sbp <= 140) & (dbp >= 80 & dbp <= 90))
5. blabel = |Pre High BP|
6. else if ((sbp >= 90 & sbp <= 110) & (dbp >= 60 & dbp <= 80))
7. blabel = |ideal bpl
8. else if ((sbp >= 80 & (dbp <= 60))
9. blabel = |Low BP|
10. else if ((sbp == 120) & (dbp == 80))
11. bplevel = |Normall

The proposed consists of four Hardware, Android application, wireless media and Bluetooth. Hardware is the wearable sensor which is used to monitor the blood pressure of the elderly person, sending the status with the suitable keyword to the speed dial mobile number of the application. Android application use to detect the status of the patient with the help of the received data from the sensor that is stored in the database, first it verifies and then delivered message to the respective person. Bluetooth device is attached to the wearable sensor and to the smart phones of the patient and with Bluetooth android application receives data from the blood pressure monitoring sensor and uses it respectively.

#### 5. Conclusion

Government, family member and also non-government agencies are trying to take care of our senior citizen by introducing technologies in the day to day life of Senior

Family member. Life of the senior family member can be easier and secure with a use of the technologies. Health issue is the major concern for the Senior Citizen. In this paper, there is a smart solution proposed. For the Senior family member of the concerned family. A wearable sensor which is connected to the patient body, which can monitor the blood pressure of the patient. Wearable sensor measures the blood pressure of the person and transmits data to the android phone application of the patient with the help of the Bluetooth device. Though the application will then review the data received and send a message to the family member or the doctor who is in the distance of 5 km. Due to this doctor or the family member can take possible steps for the patient treatment and the first aid. This application is user friendly and can be helpful for the senior citizen of the society.

## 6. Future Work

Android application is a booming technology that provides many benefits to the users. This paper proposed an initial framework of the android application. In present scenario it is not a working application. We will develop this application in the future, by solving all the issues related to the security and the regional message sending. We will develop this application in physically working condition. In future there will be a more features also and the development will be greater.

## 7. Acknowledgement

Authors express their deep sense of gratitude to the vice-chancellor of Amity University Prof. (Dr.) BalvinderShukla. For her keen interest in promoting research in Amity University and has always been an inspiration for achieving great heights.

## References

- [1] Gartner Identifies the Top 10 Consumer Mobile Applications for 2012. Gartner Inc. November 18, 2009.
- [2] info, Health.[Online] <http://www.jneuroengrehab.com/content/9/1/21>.
- [3] A Research for Removing ECG Noise and Transmitting 1-channel of 3-axis Accelerometer Signal in Wearable Sensor Node Based on WSN. S. -C. Lee and W. -Y. Chung. 2011, Vols. 20., pp. 137-144.
- [4] [Online] Available:[http://Compnetworking.about.com/cs/bluetooth/g/bldef\\_bluetoot h.htm](http://Compnetworking.about.com/cs/bluetooth/g/bldef_bluetoot h.htm).
- [5] Using the Android Platform to control Robots. G'obel, S., Jubeh, R., Raesch, S. L., and Z'undorf A. Kassel University Germany : s.n.
- [6] Design and Implementation of a Wearable ECG System. Byungkook Jeon<sup>1</sup>, Jundong Lee<sup>2</sup> and Jaehong Choi<sup>2</sup>. <sup>1</sup>Department of Information Technology Engineering, Gangneung-Wonju Nat'l University, Namwonno, Wonju-City, Gangwon-Prov. : s.n., March 2, 2013, Vol. 7, pp. 220-711.
- [7] Mobile Phone Based Remote Patient Monitoring System for Management of Hypertension in Diabetic Patients. Alexander G. Logan, Warren J. McIsaac, Andras Tisler, M. JaneIrvine, Allison Saunders, Andrea Dunai, Carlos A.

- Rizo, Denice S.Feig, Melinda Hamill, Mathieu Trudel, and Joseph A. Cafazzo. 2007, pp. 942– 948.
- [8] [Online] <http://www.technologyreview.com/news/532811/a-sleek-wristband-that-can-track-seizures/>.
- [9] Smart vest: Wearable multi-parameter remote physiological monitoring system. P. S. Pandian, K. Mohanavelu, K. P. Safeer, T. M. Kotresh, D. T. Shakunthala, P. Gopal and V. C. Padaki., Medical Engineering & Physics : s.n., 2008, Vol. 30, pp. 466-477.
- [10] Android Phone Controlled Robot Using Bluetooth. Arpit Sharma<sup>1</sup>, Reetesh Verma<sup>2</sup>, Saurabh Gupta<sup>3</sup> and Sukhdeep Kaur Bhatia<sup>4</sup>. J.S.S. Academy of Technical Education Noida, India : s.n.
- [11] A Novel Approach to Home Automation:Application Development with Google Glass. William Kang, Quinn Williamson.
- [12] "Medical alert system for remote health monitoring using sensors and cloud computing". Indumathy N, Dr.Kiran Kumari Patil. Reva Institute of Technology and Management, Bangalore, India<sup>90</sup> : s.n. eISSN: 2319-1163 | pISSN:2321-7308
- [13] Cloud Computing Through Mobile-Learning. N.Mallikharjuna ,Rao<sup>1</sup> C.Sasidhar<sup>2</sup> ,V. Satyendra Kumar<sup>3</sup>. Annamacharya P.G College of Annamacharya P.G College of Annamacharya Institute of Technology Computer Studies, Computer Studies, and Sciences, Rajampet, AP, India. : s.n.
- [14] Recent advancements in wearable bio-sensor applications. 1Vidhu Rawal, 2Ashutosh Dhamija, 3Sonam Gupta. 5, August 2012, [www.ijrsret.org](http://www.ijrsret.org), Vol. 1, pp. 154-159.
- [15] Health Track- Health Monitoring and Prognosis System using Wearable Sensors. Jagannath Aghav, Smita Sonawane, Himanshu Bhambhlani. Dr. Virendra Swarup Group of Institutions, Unnao, India : s.n., August 01-02, 2014. IEEE International Conference on Advances in Engineering & Technology Research (ICAETR - 2014), .
- [16] Pervasive healthcare and wireless health monitoring.I. In: Mobile Networks and Applica-tions. Varshney, Upward. 2007, pp. 113-127.
- [17] Wireless sensor networks for healthcare: A survey. Ersoy, Alemdar and C. Computer Networks, Vol. 54, pp. 2688-2710.
- [18] Wearable and Implantable Wireless Sensor Network Solutions for Healthcare Monitoring. Ashraf Darwish 1, and Aboul Ella Hassanien. Cairo, Egypt : s.n., 2011, [www.mdpi.com/journal/sensors](http://www.mdpi.com/journal/sensors), pp. 5561-5595. 1424-8220.
- [19] Implementing Security on Android Application. 1, Kirandeep, 2, Anu Garg. 3, Phagwara (Punjab)-144401, India : s.n., 2013, The International Journal Of Engineering And Science (IJES), Vol. 2, pp. 56-59. ISSN: 2319 – 1813 ISBN: 2319 – 1805.
- [20] Ameet chhatwal, Anoop Ahire,Abhishek Kamble.Android based distributed tracker application on LOG LIFE.
- [21] Literature Review on Bluetooth.

## Author Profile

**YashikaTyagi** is a final year student of MCA Amity University Noida. Presently she is working in Wipro Technologies. Her research interest are healthcare sector, Android and Ambient intelligence