



A Cognitive Approach in Monitoring the Lifestyle of Rural People in Progress Towards Smart Village System

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ABSTRACT

MEDIGENCE is an Android App designed mainly to assist the health care professionals, medical practitioners, and the patients by providing health care access through video chat or mobile internet in remote locations. The system is composed of a Smart ICU system that can trigger reminders, protocols, and alarms to other hospitals, family members or the police station in the event of an accident, as well as patient data recording. The prototype is designed to maintain the medical histories and clinical decision-support systems that are easily accessible and consistent across locations and time for improved care. This cloud-based application handles patient enrolment, diagnosis, treatment, medication, and follow-up for technology-enabled health workers and health-care centres providing low-cost, portable, timely health care access. Illness outbreak detection and mapping; epidemic prevention and containment; progress tracking via smart phones and social media can be managed to a greater extent through this application.

Keywords – Health Care, Smart Village, SOS, Cloud Server, Internet of Things (IoT)

I. INTRODUCTION

Healthcare is a right that everyone has, not just the wealthy. However, a lack of better infrastructure in terms of quality, lack of access to medical facilities and drugs essential in everyday life, and a paucity of skilled medical specialists have kept healthcare facilities from reaching 60% of the Indian population. In rural areas, medical services are generally terrible. Every village must have access to high-quality healthcare, and everyone, regardless of financial circumstances, must be able to make use of these benefits. Rural residents are more likely to travel considerable distances to obtain healthcare, especially subspecialist treatments. In terms of travel time, cost, and time away from the office, this can be a substantial strain. Furthermore, a lack of dependable

transportation creates a barrier to care. Patients in urban areas can usually take public transportation to their medical visits; however, these services are sometimes missing in rural places.

Rural areas have a higher percentage of elderly persons with chronic diseases that necessitate numerous trips to outpatient healthcare facilities. Without access to public or private transportation, this becomes difficult. The "Smart Village" approach is based on the idea that technology can help with education, power, farming, small-scale business prospects, better health care, entrepreneurship, internet access, and overall improvement of rural village residents. In India, rural populations face significant barriers to getting health-care services. It will play a critical role in providing health care to people in rural locations by monitoring the health care system via internet access and providing emergency notifications as well as precise data in real time for improved health decisions.

General practitioners, along with emergency and public health services, are the most basic and critical service required in rural areas. Primary care physicians provide a wide variety of services and treat a wide range of medical conditions. Smart health care will be one of the most important strategic ways to meet the healthcare needs of India's rural communities. India is a country where the village is home to a sizable portion of the population. Our country's success and development are dependent on improved living circumstances in rural areas, where all necessary life-supporting amenities, including healthcare, are readily available to everybody. Poverty, sickness, and a lack of sanitation characterise Indian villages. This project investigates the role of advanced technology in healthcare delivery, with a particular focus on smart health care from the Smart Village's perspective.

II. LITERATURE SURVEY

Through Information Technology, Smart Villages will be connected to towns and cities, and such technologies will undoubtedly benefit local, regional, and national initiatives in Smart Health Care. Smart health care including assistance for diagnosis and treatment, health management, disease prevention and risk monitoring, virtual assistance, smart hospitals, assistant drug research are implemented with technologies like IoT, Big data, Cloud Computing, Artificial Intelligence that could transform the traditional medical system into a more convenient and personalized manner [1]. Smart fitness mirror was proposed to monitor the fitness status of the user such as BMI, amount of fat present in the body, body temperature on daily basis and achieved an overall accuracy of 95.3% [2]. Atallah et al predicted the usage of mobile health application of among 376 participants from Saudi Arabia out of which 46% reported to use the app for monitoring their health [3].

With the advent of Electronic Health Record and ease of access to information, timely diagnosis is rendered to the patients. Added to EHR mHealth has become a boon to the Doctors in fetching the current and updated data from the server through which necessary steps for further treatment is taken care of. With the help of these biomarkers, we can correlate and predict the disease state [6]. A dedicated web application was developed to track the health parameters of the patients through the sensor network specially for the patients recovered from malaria and pneumonia [4,7]. Oxygen saturation, a major biomarker of COVID-19 and Chronic Obstructive Pulmonary Disease (COPD) was critically monitor in diagnosing the health conditions of the patients during the pandemic [5]. Lunde P et al assessed the effectiveness of app-based intervention for a

duration of 3 months in promoting the patient's lifestyle affected with Non-Communicable Disease for 1588 records [9].

Rutuja Somwanshi et al defined "Smart Village" as a catalyst in delivering bundle of services by accessing basic amenities in building a happier society through smart technologies and services [9]. The concept of smart village is categorized into 6 different dimensions such as Governance, Technology Resources, Village services, living and tourism to improve the overall quality of the villages [11]. Services like sanitation, education, drinking water, healthcare facilities, environment protection, smart agriculture are provided to leverage the standard of living of the villagers. The residents of the village are trained in accessing these services towards the development of better future [10].

Sustainable models for the development of Smart Villages based on renewable energy sources were implemented to meet the energy demands, creating a smart energy saving villages thereby resolving various global issues prevailing to climatic changes [11]. These services became the driving force for the development of Smart Village. Several researchers focused on the implementation of the Smart Village and very few could propose relevant concept and theories in building a potential solution for the rural problems. PRISMA a theoretical model composed of 4 main components: objectives, strategies, dimensions, and foundations were proposed to enrich the conceptualization of Smart Villages [12]. VDD model containing 5 dimensions covering resources, technology, service chains, institutions, and sustainability along with 4 development phases were introduced in Indonesia as a part of descriptive qualitative and documentation study [13]. Though several improvements were made for the enrichment of Smart Village, still there is a lag which needs to be bridged with the help of technology so that our next generation could enjoy the benefits.

III. METHODOLOGY

Rural residents encounter significant challenges in getting the medical treatment they require. In Indian states, there are few doctors to give vital medical care to all who require it, and the care that is available is out of reach for the rural population. As a result, the solution to these issues is "SMART Health Care," which is a more intelligent approach to dealing with healthcare. SMART Health Care is relying on the facilities of Internet of Things (IoT) to improve access to care, increase quality of care and most importantly reduce the cost of care. The Internet of Things (IoT) is used to describe systems that link to the internet for the purpose of exchanging data, tracking, and monitoring, as well as releasing localisation in health care administration. Smart Health Care's main strength is the global coverage it can offer. It's the idea of connecting everyone, anywhere, at any time, with any service or network. Next generation is a notion that, through connectedness, has the potential to have a significant impact on human lifestyle. Smart phones, tablets, and laptops connected to a network via 3G/4G will play a big role in improving health care access and involving people in their own treatment. The Internet of Things (IoT) is set to revolutionize the health-care industry all over the world.

This work involves the development of a Mobile Application which is user friendly without much complex UI and easily readable for the villagers and layman. The application is developed using the MIT App inventor through simple clicks and drags. At the initial step the user needs to register himself/herself with the application. Those who are in need of immediate recovery or assistance will contact the caretaker or helpline

and record their medical history. The recorded information will be stored in a centralized location restricted from unauthorized access and is shared to the nearby hospitals or police stations in case of assistance or accidents for further action. If the patient undergoes network failure, they can contact the helpline / caretaker for alternative arrangements. The locations of the patients will be shared using the GPS tracker so that they can track the position for quick assistance.

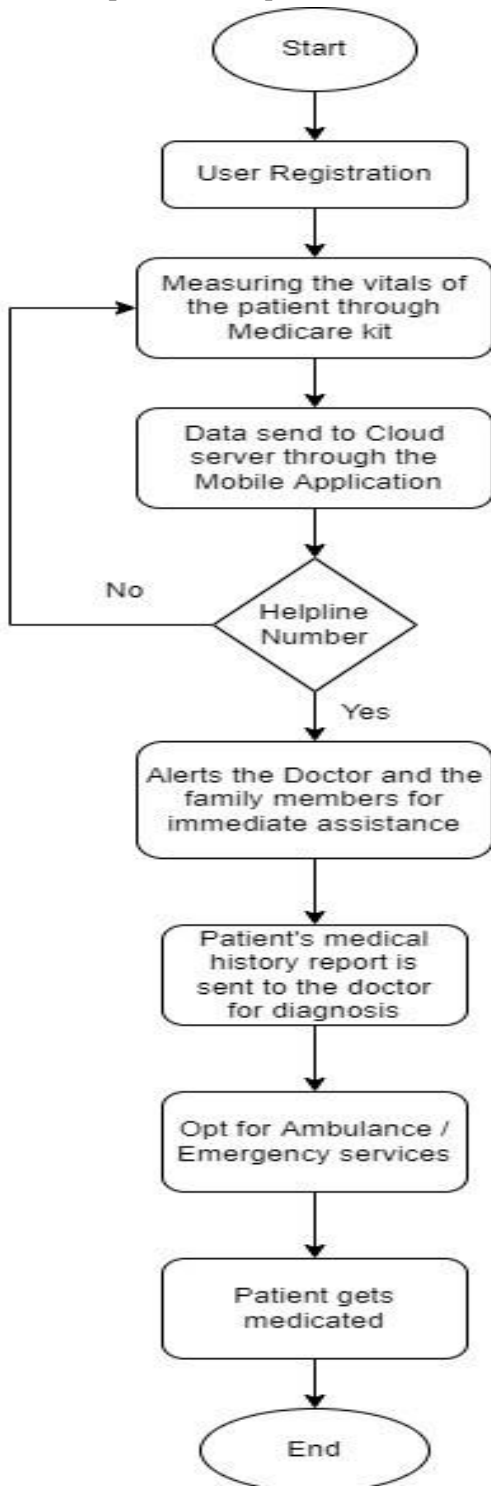


Fig 1.1 Overview of the proposed methodology – MEDIGENCE

In case of Physically challenged people or Heart patients or any special cases who need to be monitored regularly, a Medicare device Kit can be provided. The Medicare kit is developed using Raspberry PI that could continuously monitors the vitals of the patients including the heart rate, blood pressure and checks for any abnormality in the body. The data generated from the sensors is sent through the App and is circulated to the hospitals so that the doctors can regularly monitor their activities along with their traces of history. Through this work timely assistance can be provided to the patients thereby preventing them from entering stages of complications and saving their lives.

At the other end, the details of the Doctors are manually added by the patients for continuous monitoring of the patient in case of remote location. Through this we can to a great extend reduce the cost and the time involved in travelling to the hospitals. This Application highly benefits the pregnant women in providing them with timely medication. Through this we can prevent infant's death rate due to delayed medications. The patients can opt for ambulance and other emergency services through the SOS button that directly alerts the hospital for assistance. Our objectives can be highly successful for physically challenged persons, pregnant women and patients who must be regularly monitored.

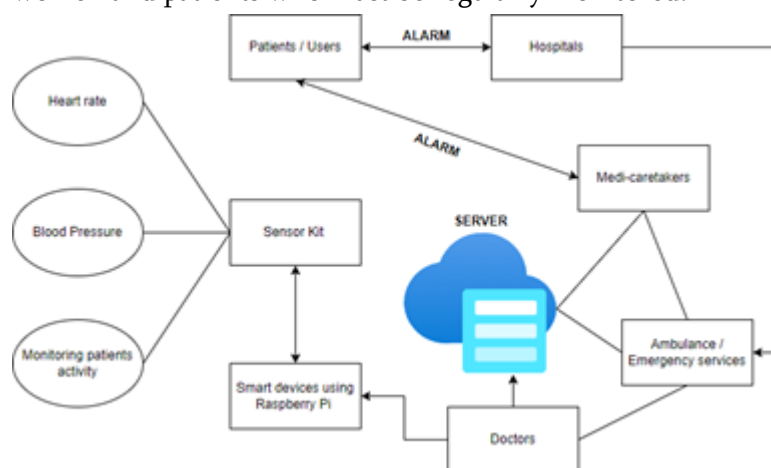


Fig 1.2 Block Diagram for Healthcare in Smart Village

IV. OUTCOMES

During the obstacles of rural India's evolution, Smart Village has a vision for proper village planning and development that will result in a clean and pollution-free environment, a green and healthy environment, a crime-free and disease-free environment, internet connectivity, and an overall improvement of rural village residents. As a result, the rural villages lacked access to primary health care, particularly for children and expectant mothers often requiring them to travel several miles on foot which can be overcome by extending healthcare to more village people, improving quality of care, and reducing the cost of care through empowerment of technology applications. Thus, Smart health Care can provide the required health care services to the remote villages through the advantages of technologies via internet of things (IoT) which will provide accessibility, better health outcomes, customized and targeted m-medicines for individual patients in rural villages of India.

V. CONCLUSION

In the forthcoming decade, Smart Health Care can widely organise the Smart Village model and lead the way in improving India's rural health care. SMART Healthcare should be an integral aspect of Smart Village efforts to improve and establish an effective health care system in rural areas. As a result, introducing smart health care will be one of the most important strategic methods to meet the health care needs of rural communities in India from a view of Smart Village Project. The suggested system application is also put in the ambulance to convey emergency information to the medical centre in a timely manner, allowing the patient to track the ambulance. The proposed system model and application allow a patient to send an emergency message to a designated emergency contact, which includes medical and location information. With a single press of a button, the user can get directions to the nearest hospital. This application can be enhanced in the future with security mechanisms to protect health information.

VI. REFERENCES

- [1]. ShuoTian, WenboYang, Jehane Michael LeGrange, PengWang, WeiHuang, ZheweiYe “Smart healthcare: making medical care more intelligent”, Global Health Journal, September 2019, Volume 3, Issue 3, <http://dx.doi.org/10.1016/j.glohj.2019.07.001>
- [2]. Amgad Muneer, Suliman Mohamed Fati, Saddam Fuddah, “Smart health monitoring system using IoT based smart fitness mirror”, TELKOMNIKA Telecommunication, Computing, Electronics and Control Vol. 18, No. 1, February 2020, pp. 317~331 ISSN: 1693-6930, accredited First Grade by Kemenristekdikti, Decree No: 21/E/KPT/2018 DOI:10.12928/TELKOMNIKA.v18i1.12434
- [3]. Atallah N, Khalifa M, El Metwally A, & Househ M, “The prevalence and usage of mobile health applications among mental health patients in Saudi Arabia,” Computer Methods and Programs in Biomedicine, vol. 156, pp. 163-168, 2018.
- [4]. Yunzhou Zhang, Huiyu Liu, Xiaolin Su, Pei Jiang, and Dongfei Wei, “Remote Mobile Health Monitoring System Based on Smart Phone and Browser/Server Structure”, Journal of Healthcare Engineering · Vol. 6 · No. 4 · 2015 Page 717–738
- [5]. Mohammad Monirujjaman Khan, Safia Mehnaz, Antu Shaha, Mohammed Nayem and Sami Bourouis, “IoT Based Smart Health Monitoring System for COVID-19 Patients”, Hindawi Computational and Mathematical Methods in Medicine Volume 2021, Article ID 8591036, <https://doi.org/10.1155/2021/8591036>
- [6]. Joy P. Ku and Ida Sim, “Mobile Health: making the leap to research and clinics”, npj Digital Medicine (2021) 4:83 ; <https://doi.org/10.1038/s41746-021-00454-z>
- [7]. Ankita Gosavi, Harshvardhan Kariwala, Rohini Kaninde, Nilesh Rathod, “Remote Health Monitoring Using Non-invasive Mobile Technology”, International Journal of Advance Research and Innovative Ideas in Education, Vol-3 Issue-2 2017 IJARIE-ISSN(O)-2395-4396

- [8]. Lunde P, Nilsson B. B, Bergland A, Kværner, K. J. and Bye A, “The effectiveness of smartphone apps for lifestyle improvement in noncommunicable diseases: systematic review and meta-analyse”, *J. Med. Internet Res.* 20, e162 (2018).
- [9]. Rutuja Somwanshi, Utkarsha Shindepatil, Deepali Tule, Archana Mankar, Namdev Ingle, Dr. V. S. Rajamanya, Prof. A. Deshmukh, “Study and development of village as a smart village”, *International Journal of Scientific & Engineering Research*, Volume 7, Issue 6, June-2016, ISSN 2229-5518
- [10]. Omkar Takalkar, Dattatray Ghanwat, Avadhut Waghule, Roshan Hinge and Prof.Zope.M.T, “A Review Paper on- Development of Village As a Smart Village”, *Journal of Emerging Technologies and Innovative Research (JETIR)*, 2019 JETIR March 2019, Volume 6, Issue 3, JETIR1903734
- [11]. A A Aziiza and T D Susanto, “The Smart Village Model for Rural Area (Case Study: Banyuwangi Regency)”, *IOP Conference Series: Materials Science and Engineering*, Volume 722, 3rd International Conference on Engineering Technology for Sustainable Development (ICET4SD) 23–24 October 2019, Yogyakarta, Indonesia
- [12]. Muhammad Mishbah, Betty Purwandari, Dana Indra Sensuse, “Systematic Review and Meta-Analysis of Proposed Smart Village Conceptual Model: Objectives, Strategies, Dimensions, and Foundations”, 2018 International Conference on Information Technology Systems and Innovation (ICITSI), IEEE, DOI: 10.1109/ICITSI.2018.8696029
- [13]. Susy Ella and Rosita Novi Andari, “Developing a Smart Village Model for Village Development in Indonesia”, 2018 International Conference on ICT for Smart Society (ICISS), IEEE, DOI: 10.1109/ICTSS.2018.8549973