

FUNDAMENTAL RESEARCH ON MEDICATION REMINDER SYSTEM

Aishwarya Chawariya¹, Prajakta Chavan², Akanksha Agnihotri³,

^{1,2,3}Students of Department of Electronics and Telecomm Engineering,

Savitibai Phule Pune University, Pune, Maharashtra, India

Abstract – Geriatrics relies on care and medication so that they can be healthy, but sometimes the complex medication may lead to mistakes like taking incorrect amounts of medicine, or missing doses or taking medicines at the wrong times. Such mistakes might lead to unnecessary visits to doctor and in hospitals, or can lead to illness and death. Hence it is required to design a Medication Dispensing Device that can help Geriatrics to take medication on schedule. Raspberry pi using image processing is designed specifically for users who take medications without close supervision. The programming language used for image processing is python. The system also takes into consideration physical disabilities of blind and deaf people. Hence it includes visual as well as audible signals for them. The dispensing unit is nothing but a system which will control dispensing of medicines at prescribed time. Being cost effective and compact this system avoids expensive in-home medical care.

Key Words: Geriatrics, Raspberry Pi, Instapush, LED, Bluetooth, Android app, Etc.

1.INTRODUCTION

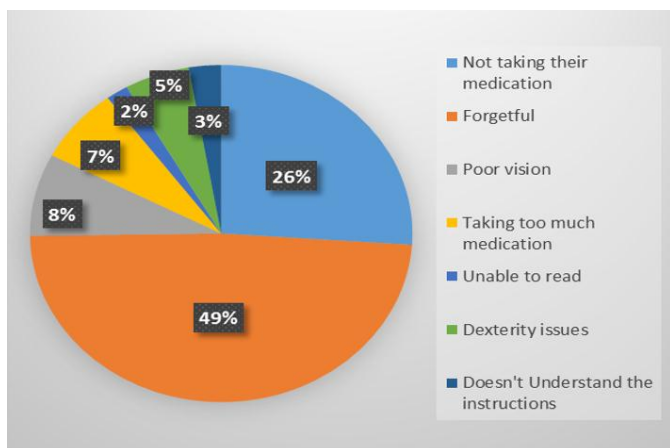
A human beings tend to relies on medicine due to some illness/disease,etc. But people tend to forget to take medicine due to their busy schedule, Even if any person have to remind about medicine to their family member if they are out of town/city, they also forget to inform them at right time. Nowadays, people are way to busy such that they forget to remind the Geriatric about the medication. Such irregular dosage could lead to serious health issue or death. We started with basic needs about the user so that they won't relies on other people. The three very important aspects, whom to give pills, how many pills and at what time, should be the main prospective for developing any system There was a need to develop such a system,which will help all people including the Geriatrics and disabled people. Considering this people, a self-care system should be present so their won't arise any issue regarding health problem. In this paper, we presented the problems of many people concerning of medication and to resolve their problems we came upon with the idea of the system which will help people for reminding about their medication.

2.LITERATURE SURVEY

As stated by the WHO Poor adherence can lead to serious health risk. For instance, a recent study found out that the risk of hospitalized patients, having diabetes congestive heart failure, mellitus, hypertension, or hypercholesterolemia who actually were non adherent to prescribed remedy was more in comparison with the general population. Non-adherence rate can vary widely, even in the rigid controlled and monitored environment of a clinical test. To mention, patients with long term conditions are questionable to follow prescription than those with acute state[14].

The effectiveness of a therapy or treatment directly depends upon a patient's ability and willingness to follow a prescribed regimen. The patient's ability for reading and understanding the instructions for medication is a key factor. Patients who face difficulties in understanding the instructions in a prescription which ultimately results in decreased adherence and poor medication management and consumption. Issues of low literacy must be recognized and strategies designed with this limitation in consideration. A patient with heart failure problem not taking prescribed medication or who tents to forget to take their medicine, costs the U.S. health care system an average of almost \$8,000 annually, according to a 2011 analysis published in Health Affairs. The _gures are high for other illnesses too almost \$4,000 per patient with high blood pressure, over \$3,700 per patient with diabetes and about \$1,200 per patient with high cholesterol. Dr. Brennan and a team of researchers at Brigham and Women's Hospital, in Boston, have been studying this issue since 2010 by analyzing pharmaceutical insurance claims data. They've determined several reasons behind not taking proper medication and among those, one of them is: There is a high degree of complications for patients who takes several different drugs for a variety of conditions. There are currently around 80 million U.S. residents with several chronic conditions and multiple medications to manage. Patients who have a several different kind of prescriptions are dubious to follow medications because they may have difficulty managing schedule that involves taking several different medications schedule throughout the day[1].

2.1 REASONS FOR LOW MEDICATION ADHERENCE.



While designing and planning for this thesis, several papers had been gone through to make it possible as it was very challenging to complete the job with a limited knowledge. By taking into consideration of the Geriatric and also the disabled people we took survey of them by asking the basic need for them about medication. We asked people in NGO, about their medication problem, what kind of feasibility they expect about the medication reminder. Different papers related to medication reminder were also taken into consideration. “Automatic Pill Dispenser” In this paper, a device consisting of no interference of human. This system makes use of the concept of rotating compartments in circular step wise motion using stepper motor which is used to store the pills. It also purvey built in alarming system with the device consisting of LED and Buzzer to indicate the time of medication. But the main disadvantage of this system is, it needs manual handling of system. Also they have used smartphone, which is mostly not used by elderly people [3] In “Pill Dispenser with alarm Via Smart phone notification” system, proposed a dispenser consisting of alarm system which helps to get alert in the form of notification on smartphones. They have used the available technology to send notification on the smartphone using instapush application. After receiving the notification user needs to press the dispenser button which is located at pill dispenser unit. But in this system, user needs to push the button on the dispensing unit which basically requires energy. Moreover it makes use of smartphone which is not used by many elderly people [4]. “The Autonomous pill dispenser” The healthcare will create medications schedule using android app and loads medication in device. At prescribed time, patient receives text message notification to take the pills. Android app sends signals to device via Bluetooth. Patient needs to flip the unit so that one pill gets trapped in tip of the cone and using vibrator it gets dispensed. So it requires following particular steps for dispensing of medicines which is not easy task for aged people and disabled people [5]

Also there are several patents published for various types of medication dispensing devices. A brief summary of the

products proposed by each patent is included below: Timed Medicine Dispenser: This Product is basically a timed based dispenser which will give notification to the user about the medication. In the dispenser unit, the pills need to be pre-separated first in order to get correct dosage [14]

Medicine reminder and dispenser: This device consist of 28 compartments having slideable plate which supports for dispensing of medicines which are arranged in forms of rows and columns [16]. Med Center Medication Reminder: This device organizes a months worth of medication with 4 daily alarms. This consist idea of color-coding and verbal reminders, for helping people which have complicated medication routines. The medicines have to be pre-separated and kept in the appropriate pillbox [17]. Med Time: This product consist of a disk that rotates having several compartments consisting of pills separated within different compartments. It also contains alarm system and a timer, which can provide sound at particular schedule. For the overall operation the dosages must be separately put in the compartments which require the help of others [18]

Several online articles discussed about the hazards and problems people are facing now a days regarding their medication. One thing that was evident in these writings was that, following the doctor's prescriptions timely has become a big challenge for people now a days.

2.2 TABLE.

| Sr. No. | Projects | Methodology | Limitations |
|---------|-------------------------------|---|---|
| 1 | The Autonomous pill dispenser | Android app sends signals to device via Bluetooth. Patient needs to flip the unit so that one pill gets trapped in tip of the cone and using vibrator it gets dispensed | Elderly people find this difficult to flip the device and less likely to use android phone. |
| 2 | Automatic Pill Dispenser | Makes use of the concept of rotating compartments in circular step wise motion using stepper motor which is used to store the pills. Notification on smartphone is | Smartphone s are less likely used by elderly people. |

| | | | |
|---|--|--|--|
| | | provided. | |
| 3 | Pill Dispenser with alarm Via Smart phone notification | They have used the available technology to send notification on the smartphone using instapush application. After receiving the notification user needs to press the dispenser button which is located at pill dispenser unit | Smartphone rarely used by elderly patients. Cannot used by blind people, as it need to press the button on dispensing unit. |
| 4 | Timed Medicine Dispenser(Product) | Gives notification about medication . It has built in alarm system. | In dispenser unit, the pills need to be pre-separated first in order to get correct dosage. Cannot be used by deaf person. |
| 5 | Medication Reminder with Medicine Dispenser | Prescription is scanned using image processing. Raspberry pi B+ module is used . No manual setting of dosage of medicine is needed. As system is set automatically can be used by anyone including disabled people as well. | Pi camera gives error sometimes and need to reboot the processor. |

3. PROPOSED SYSTEM

The idea deals with the development of a system that will help a patient or a person in any medical vulnerability by means of providing them constant reminders of dosage, and providing a reminder about medicine with other health related issues. The intention of this system is to provide a comprehensive understanding of how the Raspberry pi based medicine Dispenser system is built. Starting with a basic high level understanding is key to understanding the more detailed components of the machine. From the high-level understanding it is then possible to understand every component in a very detailed manner. Inputs to the machine include the capturing of prescription which will help to know the number of pills, and when to take the pills along with storing of image in memory. Adding to this, the time and date for the dosage is loaded too. Image Processing is done in order to extract dosage information. With the use of motors medicines are provided based on Real time clock. After getting medicine in container alert notification will be provided in visual and audible form. The system helps the user to set the time of dosage which will help to dispense multiple medicine at particular schedule. The notifications are intended to remind the user about medicine. Also mail will be sent to the predefined email address about the medicine being dispensed. This system is useful not only for the normal people but also for the disabled people.

4. FUTURE POSSIBILITIES

1. Reducing documents by introducing OCR

The mobile application can be updated with OCR system. It can be trained to precisely understand a doctor's handwriting over time and after scanning any doctor's handwritten prescription or report, it will store the prescription or report in digital text format which will be much easier to understand by patients.

2. Cloud based multi-end application

The mobile application can be developed and made cloud based. Doctor's version of the application can be developed so that doctors can access their patient's data easily and follow up easily with their patients on a regular basis. Doctors will be able to update their status on their availability and patients will be able to use this information and set appointments with the doctor or their assistants.

3. Security Reason

we can make the system secure so that dosage information cannot be changed by unauthorized users.

4. Real time video

Using a real time video processing by which a caretaker can see the video of the patient concerned by being away from patient. The system can further be developed as such that it can be involved with all the Hospitals, Clinics or any Health Centers.

5. CONCLUSION

Thus by referring many existing products, previous projects and research papers based on medicine dispenser and also taking into consideration problems faced by disabled people, Geriatrics, etc. We thought of such a system which will help to overcome the disadvantage of existing or previous system.

REFERENCES

- [1] Kovac M "E-Health Demystified: An E-Government Showcase Computer", vol.47, no.10, pp.34,42, Oct. 2014..
- [2] Beena Jimmy and Jimmy Jose, "Patient Medication Adherence: Measures in Daily Practice", Oman medical Journal.
- [3] Mrityunjaya D H, Kartik J Uttarkar, Teja B, Kotresh Hiremath, " Automatic Pill Dispenser", International Journal of Advanced Research in Computer and Communication Engineering ISO 3297:2007 Certified Vol. 5, Issue 7, July 2016
- [4] Nurmiza Binti Othman and Ong Pek Ek, "Pill Dispenser with Alarm Via Smart Phone Notification", 2016 IEEE 5th Global Conference on Consumer Electronics.
- [5] Shaantam Chawla Mechatronics Research Laboratory Academy for Technology and Computer Science Hackensack, NJ 07601 USA, "The Autonomous Pill Dispenser: Mechanizing the Delivery of Tablet Medication", 7th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON) IEEE 2016
- [6] R.S.H. Istepanian, E. Jovanov, Y.T. Zhang, "Guest Editorial, Introduction to the Special Section on M-Health: Beyond Seamless Mobility and Global Wireless Health-Care Connectivity," *IEEE Transactions on Information Technology in Biomedicine*, Dec. 2004, 8(4): 405 - 414.
- [7] D. Raskovic, T. Martin, E. Jovanov, "Medical Monitoring Applications for Wearable Computing," *The Computer Journal*, July 2004, 47(4): 495-504.
- [8] L.E. Burke, M.A. Styn, S.M. Sereika, M.B. Conroy, L. Ye, K. Glanz, M. A. Sevicik, L. J. Ewing, "Using mHealth technology to enhance selfmonitoring for weight loss: a randomized trial", *American Journal of Preventive Medicine*, Vol.43, Issue 1, July 2012, Pages 20-26.
- [9] Merz, B. (2018). *Forget to Take Meds? The Real Cost of Ignoring Your Doctor's Orders.* [ONLINE] Available at: <http://www.theatlantic.com/sponsored/cvs-innovation-care/forget-to-take-meds-real-cost-ignoring-your-doctors-orders/89/> [Accessed 10 March 2018]
- [10] Dobbels F, VanDamme-Lombaert R, Vanhaecke J, DeGeest S. *Growing pains: Non-adherence with the immunosuppressive regimen in adolescent transplant recipients.* *Pediatr Transplantation.* 2005;9:381-390.
- [11] Anon. Poor medication adherence increases healthcare costs. *PharmacoEconomics and Outcomes News.* 2005;480:5.

[12]Osterberg L, Blaschke T. *Adherence to medication*. N Engl J Med. 2005;353:487-497.

[13]Praska JL, Kripalani S, Seright AL, Jacobsen TA. *Identifying and assisting low- literacy patients with medication use: a survey of community pharmacies*. Ann Pharmacother. 2005;39:1441-1445.

[14]Todd Ruppap, PhD, RN, *Overcoming Barriers to Medication Adherence for Chronic Diseases*. Us Department of health and human services. February 2017

[15]
https://www.amazon.in/s?k=Timed+Medicine+Dispenser&ref=nb_sb_noss

[16]
https://www.amazon.in/s?k=.+Medicine+reminder+and+dispenser&ref=nb_sb_noss

[17]
https://www.amazon.com/s?k=Med+Center+Medication+Reminder&ref=nb_sb_noss

[18]
https://www.amazon.com/s?k=med+dispenser+3+times+a+day&crd=3TL00T6K4KJ05&srefix=Med+Time+disp%2Caps%2C365&ref=nb_sb_ss_i_1_13