

A Novel Approach in Building an Intelligent Pill Box which is Automatic and Programmable Assistive Technology Device

Pallavi Kulkarni¹; Poornima H P²; Soundarya L³; Sushmitha S⁴; Mrs. Vidhya K⁵

⁵.Asst.Prof, B.E, M. tech(PhD), Department of Information Science, East West Institute of Technology

^{1,2,3,4}Students, Department of Information Science, East West Institute of Technology, Bangalore, India

Abstract: - In this paper, Assistive Technology is used for maintaining the functioning and independence of individuals, which helps in promoting their well-being. Today many persons who are in need, does not have an access to AT due to high costs and a lack of awareness and availability. Here, the first approach is based on the designing of AT device. Device allows the organization of several pills, in order to prevent health disorders presented in elderly and physically challenged people. Renesas is the main controller used. This device contains an alarm system, it reduces the manual work as it consists of automatic opening and closing system with the DC motor, and a portable voice-based authentication system through GSM network. This device is designed for purpose of older people and other groups who want assistance.

Keywords:- Intelligent Pill Box, GSM, LCD, IR Sensor, DC Motor, Renesas Microcontroller.

I. INTRODUCTION

The (IOT) Internet of things which is used to connect the world, envisions future easiness of people in everyday life with micro-controllers, transceivers and also protocols which enables the communication and making the difficult tasks to be done easily. The first aim is related to the design of pillbox device, which provides choice of taking medicines which is low cost and consist of hardware and software. This device focuses on elderly people who needs assisted care. It includes adaptive and rehabilitative devices for people with disabilities or elderly population. Old aged people, make an important part as family members, active economy participants, volunteers, etc. It also helpful for others who become weak and some of them at risk of disease and a costly dependence This project deals with the implementation of portable voice – based authentication system by using GSM with the help of Renesas micro controller.

The main aim is to develop an android Smartphone application to help aged people to live an independent life. It reduces the health costs and burden of health care professionals since their medical aspect, like timely consumption of medicine as per is set as a reminder and it helps them to lead a independent lifestyle. Renesas is the principal controller used for controlling purpose. Renesas is the most reliable controller when it comes to real time applications. Also since aged persons are prone to small

accidents, few sensors are embedded in the system as precautionary units. So, this module help the elderly and physically disabled persons to perform their daily life activities.

II. LITERATURE REVIEW ON INTELLIGENT PILL BOX

A. P Crilly *et.al*, Usage of Smart Phones and Body Sensors to Deliver Pervasive Mobile Personal Healthcare

Prevalent health care is considered as the main key driver and it helps in reducing the costs and enables the improvements in disease management. The advancement in wireless communication and sensor technologies permit the real time acquirement, transmission and processing of medical information.

Varieties of approaches of streaming physiological data from body sensors over a network which is wireless is examined and studied. Modern smart phones provide sufficient storage and other features which provides a flexible programming environment. Here, a central data server is used, against a smart phone, to store and process the medical data and other information related to it. The main requirements of minimization of energy consumption versus the timely delivery of anomalous conditions are investigated using a simulated body sensor network. The investigations show that when a patient uses a mobile, basically a smart phone is a device which is most convenient to perform the initial processing of important signs and sending medical alerts.

B. N Armstrong *Developing Smartphone Applications for People Suffering from Alzheimer's Disease*

The population of older people living worldwide and average life expectancy is increasing, so the number of diseases and age related impairments is also rising day by day. Alzheimer's disease (AD) related to brain is one of the most common diseases in life. In order to give assistance to persons with AD daily the current work has been considered that involves the design and evaluation of a number of smart phone based applications. These applications includes a picture dialing telephone and messaging service and every single hour reminder application to alert the patients to consume their medicines on time. It gives initial details of the pre-study results, evaluation of the applications of healthy adult users. It also provides details of how each of the application's user

interfaces which have been redeveloped are presented neatly.

C. B Chowdhry, Real-time Patient Management System

With respect to the context of health care, the use of RFID (radio frequency identification) technology can be used for not only bringing down health care expenditures but also it facilitates automating patient identification processes in hospitals and in other health care centers where it includes use of mobile devices like PDA, smart mobile phones for designing health care systems. Here a RFID model is outlined for designing a system in the health care. An application of the architecture is also described in the area of RFID-based real-time hospital patient management system (HPMS).

D. M Malan David et.al, Code Blue: an Ad Hoc Sensor Network Infrastructure for Emergency Medical Care

Sensor devices integrated with embedded processors have less-power, low bandwidth ratios and a moderate amount of storage capacity. It has the ability to enhance emergency medical care. Usage of sensors can track patients status and location, on the other hand simultaneously operating as active tags. CodeBlue a wireless infrastructure considered for arrangement in case of emergency medical care, for consolidation of low-power, wireless sensors, PDAs, and PC-class systems was developed. It uses very large networks with thousands of devices and in extreme network conditions, so this device will support reliable adhoc data delivery. It introduces the architecture and mainly points on research challenges being addressed by the Code Blue development effort.

III. EXISTING SYSTEM

Identifying lonely individuals and loneliness among older people is critical, so detecting the loneliness is challenging and difficult. With the use of self-labeling approach, people may prevent reporting loneliness which happens due to the numerous social activities associated for loneliness. Due to this, several steps are taken to indirectly assess loneliness levels. While these measures may overcome the negative disgraces associated with being lonely, they still contains self-report which is subjected to memory problems, and under or over estimation. Hence, an objective and continuous method development to assess loneliness in seniors is essential as it enables identification of loneliness at the earliest possible stages. Home sensors have been used to look after individuals in the homes. These systems are helpful for older people to remain independent and healthy as long as possible.

IV. PROPOSED ARCHITECTURE

A huge number of problems when faced, aim is to take care of the patients. The sensors used would track stable patients through treatment, to the hospital destination, while conveying vital sign. A smart phone which is used, acts as the control node in the network. There is no definition clearly described about smartphone. Smartphone is used to differentiate between a normal

mobile phone which offers basic features such as making calls and sending text messages and a smart phone is one which offers many built-in applications and other features and provides Internet connectivity and is very useful in many areas. Smart phones has more powerful processor, wider screen and more storage capacity than that of a normal basic mobile. The Smartphone is used for discovering and configuring the connections to the sensors. Since they are heterogeneous in nature, so sensors are arranged in star network, and they do not exchange information with each other. Proposed system reduces the expenditures on health and other costs related to health care and the burden put on the health care professions. Reminder is set, to take the medicines on time. Normally senior citizens are prone to small accidents, sensors are embedded in the system as a measure of precautionary unit.

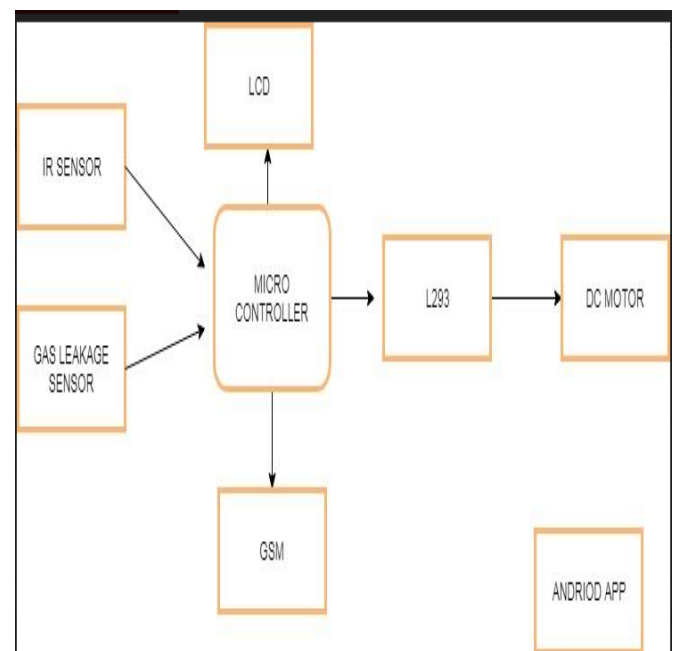


Fig 1:- Proposed System Architecture

In this architecture, modular design concept is developed and the system mainly consist of only one microcontroller, LCD, GSM, RF Transmitter RF Receiver sensors. The microcontroller acts as a building block of the architecture which controls entire operations of the module. The microcontroller contains a program that helps it to perform actions according to the inputs provided by the output that is produced from the sensors. The elderly persons will get notified about drug consumption via android voice output as drug remainder alarm, which involves different medication schedules, the system allows to alert the patient to take pills at exact hour. This programming would be stored by the patient or the care taker. However it is the user who will give the information to set the schedules. Whenever the alarm is activated, the particular compartment door is opened automatically by using a DC motor. If the patient consumes the medicine from the pillbox, which is composed of an infrared transmitter and an Infrared receptor it tells the microcontroller to close the door automatically after a small duration of time. When the alarm is activated the

door opens. The LCD displays information about patient, hour and dosage that should be taken. The notification system is activated by an alarm that sends an SMS to the patients phone to remind her/him to take the medicines on timely manner. It is important for the doctor or the keeper to also receive notifications about the patient, suppose if the IR sensor doesn't receive any signal or the message. A gas leakage sensor/smoke sensor detects the presence of gases in an area, often as a part of safety system.

V. METHODOLOGY

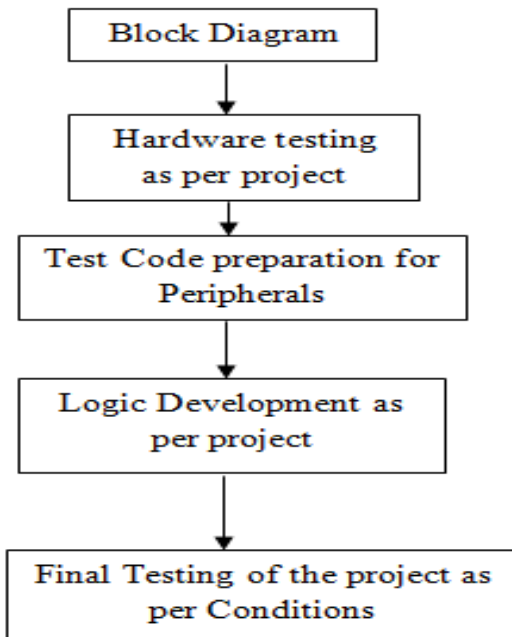


Fig 2:- Methodologies

The software and hardware requirements are very important to be generally required to the system and work is being done in accordance to the matter for designing a particular computer architecture, the power of central processing unit is a fundamental requirement for the computer, to be used in a very alternatively manner it's important to work in an orderly manner that can be generally categorized and worked with increasing demand for high processing power and resources of attest versions with increasing over a period of time

A. Hardware Requirements

- Renesas Microcontroller
- LCD
- GSM
- IR sensors
- LED
- LCD

B. Software Requirements

- Embedded C
- Cubesuite+ Tool
- Renesas Flash Programmer

Consider the block diagram and hardware part will be tested as per the project. In software part the test code will be prepared as per the project like to send an alert message to the keeper and caretaker. Logic development will be done as per project and final testing will be performed to check whether it is performing as per conditions

VI. RESULTS

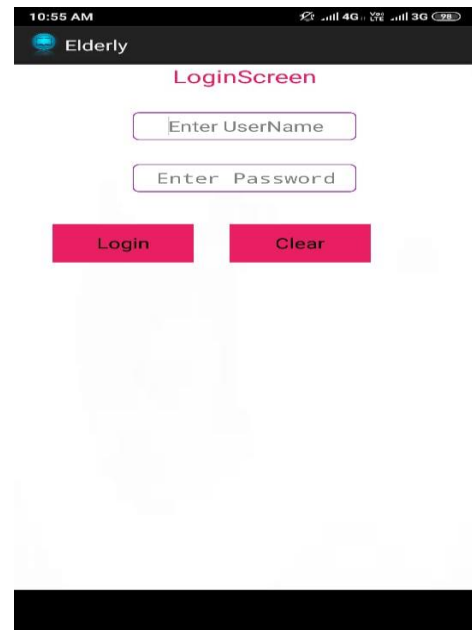


Fig 3:- Login Screen

An android application named elderly has been developed in which the user has to sign in by entering their user name and password. Then the user has to register the number and set an alarm as a reminder to take the pills on time.

If the person has not taken the pills on time then a notification message will be sent to the care taker.

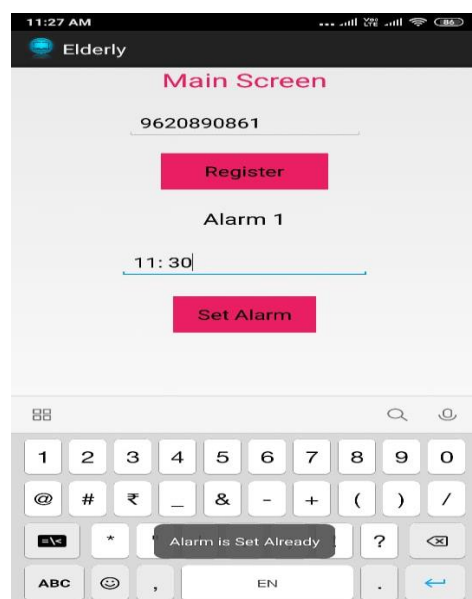


Fig 4:- Main Screen



Fig 5:- Pill Box

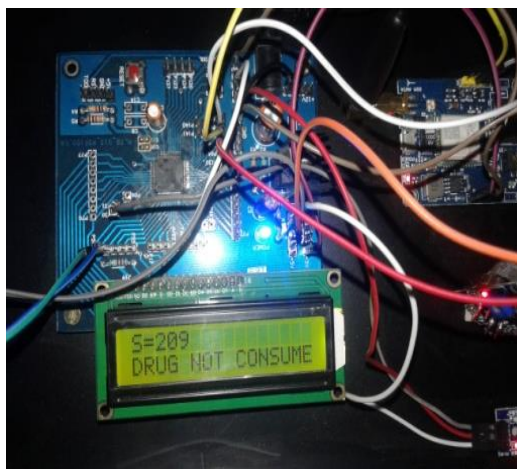


Fig 6:- LCD Display

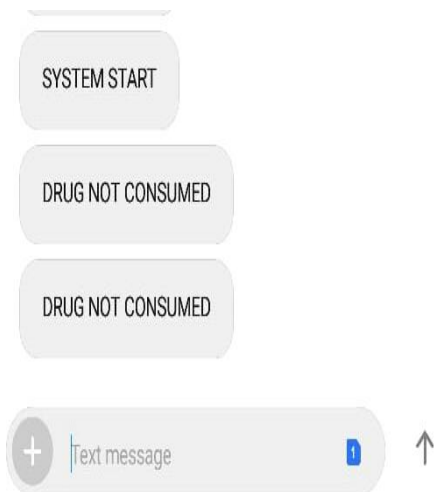


Fig 7:- Notification Screen

FUTURE ENHANCEMENT

LED can be displayed on each of the pill compartments be another feature that we could look in future. Depending on the patient whether taking the correct pill from compartment or not. If patient takes wrong pill then red LED light will be fall on that particular compartment. We hope that these advancements can make the patient to take correct pill from compartment.

REFERENCES

- [1]. P. Crilly and V. Muthukkumarasamy,, "Using smart phones and body sensors to deliver pervasive mobile personal healthcare," in*proceeding of 6th International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP)*, Brisbane, pp.291 - 296, Dec. 2010.
- [2]. N. Armstrong, C.D. Nugent, G. Moore, and D.D. Finlay, "Developing Smartphone applications for people with Alzheimer's disease," in*Proceeding of 10th IEEE International Conference on InformationTechnology and Applications in Biomedicine (ITAB)*, pp. 1 - 5, Corfu,Greece, 2010.
- [3]. B. Chowdhury and R. Khosla, " Real-time patient Management System," in *proceeding of 6th IEEEInternational Conference on Computer and Information Science*,Melbourne, Australia, pp. 363 - 368, July, 2007.
- [4]. Malan, T. Fulford-jones, M. Welsh, and S. Moulton, "CodeBlue: Anad hoc sensor network infrastructure for emergency medical care," in*Proceeding of International Workshop on Wearable and ImplantableBody Sensor Networks*, London, 2004.

VII. CONCLUSION

With the help of this system, the senior citizens will get notifications about pill box consumptions through android voice output.Smoke sensors will be used in kitchen area to notify the elderly people in home in case of emergency and lack of memory. It can be used for physically disabled people.