Smart Drug Dispenser For Aged and Feeble People

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Abstract- **It is necessary to provide medication to the aged in time. Automatic medication dispenser is designed specifically for users who take medications without close professional supervision. It relieves the user of the error-prone tasks of administering wrong medicine at wrong time. The major components of this medication dispenser are a microcontroller interfaced with an alphanumeric keypad, an LED display, a Motor Controller, an Alarm system, a multiple pill container and dispenser. The overall operation is to facilitate the user to set the timings to dispense multiple pills at required timings. The Alarm system is designed to provide two types of indications – one by lighting an LED and the other by providing a beep sound. The user is required to press a button to get the pill and reset the alarm button. The second alarm is to indicate the optimal availability of the pills in the container to warn the user to refill the dispenser with the required quantity of pills.**

The major objective is to keep the device simple and cost efficient. The software used is reliable and stable. Elderly population can benefit from this device as it avoids expensive in-home medical care.

I. INTRODUCTION

Medication reminder problem most frequently occurs with elderly age group. If elderly people can take care of health in daily life, it will reduce care burden among young generation. If we improve medical compliance, it will help senior citizens and other patients who are facing the problem of medication reminder to live life independently. It is also found that chronic diseases are frequently occurred during ageing process, there are more than 50%[1] of older people suffered from different diseases across world. Older people need to take multiple drugs[2] due to physical and mental function decline. Doctors prescribe medicine to patients and also suggest which medicine to take at what time. In case of older people, they are not able to memorize which medicine to take at what time. Same cases found with users who unable to read and understand doctor's prescription. However due to aging or busy life, patient sometime forget to take medicine which would led to readmission to hospital following by exacerbation. It not only affects the disease, but also seriously endangers patient's health and security. Many reports indicate that adherence with prescription among elderly patients with chronic condition is poor. The range of medication adherence rates seen in elderly is 26% to 59% [3]. Studies have demonstrated the prevalence of poor adherence across all types of regimens and diseases, including life threatening illness. For this reason, often caused by medication non-compliance with more discussion and concern. Improvement in the field of medical compliance will helps to increase cost-effectiveness. In recent years with development in electronic communication systems and products, some devices and software were developed for medication reminder.

Existing evidence-based medication adherence interventions for self care settings requiring human carer involvement are often disadvantaged by high-resource delivery needs and impracticality for everyday clinical practice settings. Consequently[4] a recent popular strategy has been the use of technology-based interventions to improve medication adherence. These interventions are generally realized through the use of information and communications technology-driven electronic reminders to inform patients of the time to take their medication, and sometimes also the dosage. Electronic reminders are defined as automatically generated or sent reminders, without personal human contact between the healthcare provider and the patient. These reminders may occur independently of the actual medication or may be associated with various medication storage and handling devices. The smart drug dispenser serves this purpose.

II. LITERATURE SURVEY

According to World Health Organization, over 80% of the people above the age of 60 years are prescribed medicines that are to be administered 2 - 4 times a day. With the increase in Cardio vascular diseases and Diabetes among the peer group regular medicine administration has become a necessity. But among this another 40-60%[5,6] is having the issues related to forgetting the taking of medicines at right time. The current common techniques used in market for the reminder includes the normal alarm with a pill box. But this does not check for overdose and wrong dosage among the patients. It only uses a clock, which on passage of a set time generates an alarm.

Moreover the timely alerting for the re-filling of the pill box to user is also absent resulting often in breaks in the course of therapy. The sensing of slots of the pill box can be done by both Load Sensing methodology and by Light based sensing. The advantages of the slot based sensing as shown in fig 2.2 is that individual moment sensing is possible for detecting over dosage problems and

incorrect dosage issues. The survey for various modes of sensing the slots has been performed both analytically and practically and comparisons between the modes have been performed.

The Smart Drug Dispenser (SDD) [4] in use today such as those manufactured by Omnicell, Inc. and Pyxis[7], Inc. are predicated on a transformation in drug distribution originating in the United States in the early 1960's known as unit-of-use packages, or unit-dose systems. These systems replaced a previous approach to drug distribution known as multiple-dose drug distribution systems (multi dose systems). Multi dose systems meant nurses had full responsibility for the entire medication system, which involved administering hundreds of doses of medicine along with paper-work, inventory control and dose preparation. Unit-dose systems on the other hand, provide nurses with individually packaged and labelled doses at eight or more hour intervals and are ready to administer according to the administration schedule determined by the nurse (Simborg & Derewicz, 1975).

III. FUTURE WORK

The fast paced life of people has always taken a toll on the people. The irony is that the new medicines are found for the never ending chain of diseases. These new diseases often require timely medication and course therapy for curing. But the busy life schedule of the people often let down the best procedure. Most common reason for the failure of a method of cure is the failure of the patient to administer the dosage in the right proportion and at right time.

The new awaited feature in these so called intelligent pill boxes is the availability of the automated alert system for the chemist to send the re-fill of the tablets. With the GSM technology, we are able to connect to most people around the planet. So a link between the patient and the chemist is employed using GSM. Also, it is not convenient for a fixed device to alert the patient nowadays. So portability is a necessity in this device.

IV. METHODOLOGY

Details about the design of the automatic medicine dispenser (AMD) are included in the paper. Initially the requirements to design this device are collected and then design consideration is taken care. Finally a design process is suggested to design automatic medicine dispenser. The Programmable automatic medicine dispenser designed allows the care taker to reliably administer medications to a patient without needing to be present every time the medication is scheduled. The caretaker pre-programs the AMD that allows it to set up to 21 medications does through an ergonomically designed interface, utilizing an alphanumeric keypad and LCD display. The AMD can be pre-programmed to repeat the same cycle for one month. An alarm is provided to load the medicine if the number of pills/capsules falls below a threshold value that can be fixed by the owner.
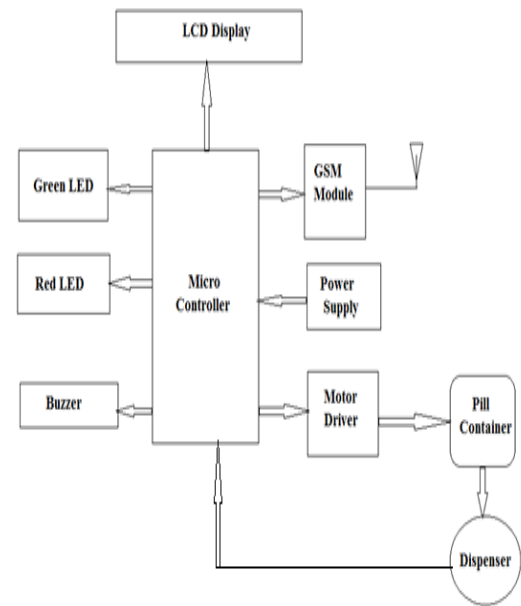

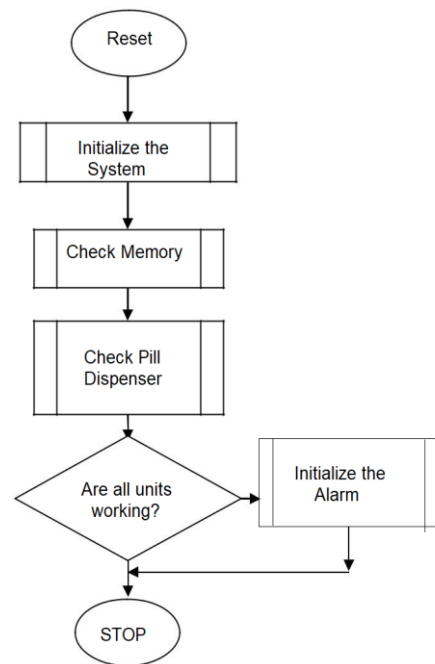
Figure 1: Block diagram of Smart Drug Dispenser

Figure 2: Flow chart for Smart Drug Dispenser.

Hardware Requirements:
The various hardware components used in the Smart Drug Dispenser are as mentioned below
1.   L298 Motor Driver.
2.   8051 Microcontroller.
3.   Power Supply.
4.   2 LEDs (green & red).
5.   16x2 LCD Display.
6.   Pill container.
7.   GSM Module.

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Software Requirements:

The various software components used in the Smart Drug Dispenser are as mentioned below

1.   Keil Micro Vision 4
2.   Embedded c
3.   Flash magic .
4.   Software Developing Kit.
5.   Eclipse.

V CONCLUSION

Medication Support is the device which have the ability to dispense up to five different medications each individually contained within a MDT(Multi Drug Therapy). The Dispensing Scheme is, if only one medication needs to be dispensed the lid of the corresponding medication will open. If multiple medications need to be dispensed the various medications will be dispensed sequentially after each lid flashing is closed. The proposed system is made ease and helpful for the old age patient especially who used to forget to take medicines on time or they couldn't recognize / can't read the name of the medicines. It has the facility to send alarms four times a day. In case patient doesn't take medicines even after alarm them SMD system sends a message to the particular number fed in the system memory. It is possible to program in order to change the number of times dispensing the medicines as per requirement.

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