

# Design of Automated Pill Reminder

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**Abstract**— Assistive Technology (AT) maintains and improves the individual's functioning and independence, thereby promoting their well-being. But today only 1 from each 10 people in need have access to AT due to high costs and a lack of awareness, availability, personal training, policy and functioning. By 2050, more than 2 billion people will need at least 1 assistive product with many elderly needing 2 or more. Elderly make important contributions to the society. Though some people aged well, other become frail, with a high risk of disease. In this paper, we propose a first approach related the design of AT device. This uses open source technologies and gives a new choice in taking medication dosages. "The Intelligent PillBox" allows the organization of several medication schedules that health disorders presented in elderly need basically. Arduino Mega 2560 was taken as the principal controller. This prototype contains; a programmable alarm system with an automatic opening and closing system, an interactive user interface and a notification system through GSM network. The development of this device is focused in the support of elderly people and other vulnerable groups that may need for an assisted care.

**Keywords**— Assistive Technology, Elderly, Intelligent PillBox Design, Internet of Things, Ambient Assisted Living, Medication Schedule

## I. INTRODUCTION

The pill dispensers in the other words electronic pill organizers are developed to alert people about the intermediation. It is an easy way to use tablet dispenser which can assist in the management of medication and allows the correct dose to be available at the correct time of day or night. Their purpose is to help people who may suffer from impaired ability to adhere to their prescribed medication regime. They are commonly used in medicine and some people can use individually as well such as elderly, chronically ill. These devices are evolved to care public health, the cost of medicine industry and waste of drugs. The advanced models of these dispensers can be available in the medicinal industry. As the people getting busier these days, they tend to forget to take their medicines at prescribed schedule.

According to the national council report, —In the United States and around the world, there is compelling evidence that patients are not taking their medicines as prescribed, resulting in significant consequences. A large percentage of patients fail to comply with their prescribed medication schedules. This can result in unnecessary disease progression, complications, lower quality of life, and even mortality. This growing trend of medicine non adherence has many causes. —The most commonly cited reasons for noncompliance include, not being convinced of the need for treatment, fear of adverse effects, difficulty in managing more than 1 dose a day, or multiple drug regimens. Paper identified that —24% of respondents ascribed non adherence to forgetfulness. 20% did not take medications due to perceived side effects. Additionally, it is projected that the population growth of retirement-age Americans will cause the current healthcare system to become overloaded and inevitably fail in as little as ten years. Although forgetfulness is not the only factor contributing to the medication non adherence issue, it is the biggest factor, and hence, there is a real need to develop an automatic medication self management device. In addition, if the device can provide near real time medication remote monitoring to alert health care providers of non adherence events, it would also help reduce medication non adherence caused by the other factors.

As a consequence of this Geriatrics are facing unnecessary disposal of themselves into the hospitals. Hence a device or a system is to be designed in such a way that it can dispense the pills at preset time. Since the target audience of the device are the Geriatrics, it must be user friendly, handy, safe to use, light in weight. To build a working prototype we made use of famous Engineering Design Approach where we followed different steps to achieve different attributes. Before we begin with the actual implementation of the prototype we listed down different attributes for the device. We took feedback from many patients and we found there is a huge need of this device in medicinal field. We started working according to the

feedback given by the patients and the attributes and finally we were successful in designing a automated pill dispenser device. This modules gives different steps to be followed to design above said device using Engineering Design approach. By using latest technology in electronic field is raspberry pi zero W gives best output in fewer amounts and also reduces the size of raspberry pi kit. All same function as raspberry pi 3 module B. Elderly, sick, and mentally handicapped people have to take multiple medications to deal with their illnesses. Keeping track of these medications is very burdensome and can be life threatening. Our project will attempt to assist these people in taking the correct dosage at the appropriate times. The automated medical dispenser system will have the capability to dispense up to five different medications. It will alert the user to take the medication through audio and visual alarms. These alarms will go off at the time to take the medication programmed by the user. In this system for lock purposed the motor are fixed. By using this only one box will opened and other box are closed. For that purposed the geared is used for locked purposed. The heart of project is raspberry pi zero W all peripheral devices are connected to pi. For, buzzer purposed the six limit switches are added for opened and closing the box. Raspberry provides the platform for programming so for that proposed the python language is used. One minute alarm get on after that alarm will off and it switch for next box for time and compared it. As same as third box also added the snooze option to snooze the time and take the pill after some time. One counter is used for to show the decrement of pill from pill box. Means user not take the pill. It all show on monitor for user proposed for switch are available to interact with system.

## II. LITERATURE REVIEW

There are a large variety of medication administration assistance devices for nonprofessional users. Most of them are manual, providing multiple compartments called pill trays. The pill tray has a number of compartments that can be filled with medication. Each compartment can hold different sizes and combination of medicines. The user is required to take the medicine from each tray each day for a maximum of 28 days. It does not provide any alarm to indicate the time of taking the medicine. Pill-Mate-Medicine reminder is a gadget that uses both visual and audible signals to remind user. It reminds at a per-set time to take medicines or attend certain events. A smart phone application is designed to help patients to avoid mistakes. It reminds its users to take correct medicines on time and record the in-take schedules for later review by health care professionals. 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% 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 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.

## III. PROPOSED WORK

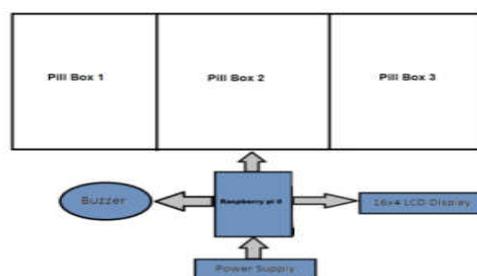


Fig. 1 Block Diagram Of System.

We have taken three pill box and we have done interfacing with raspberry pi zero with the help of program in pi zero, now the source code will help the user to set the time, date, and medicine name. Whatever time the user has set at that time the alarm and led will blink at that particular pill box and also vibrator will vibrate. if the patient forget to take the medicine the snooze function also provide to take that medicine again after 10 to15 minutes later. Considering the patient is blind at that case the system will gives an alarm and it will vibrate the particular box then the blind patient will sense the vibration and it will take medicine only from that box other box will be lock with the help of stepper motor and it will not open. By using this step the patient can easily get the medicine from the system. So it is helpful for all the people.

### 3.1 PCB Layout

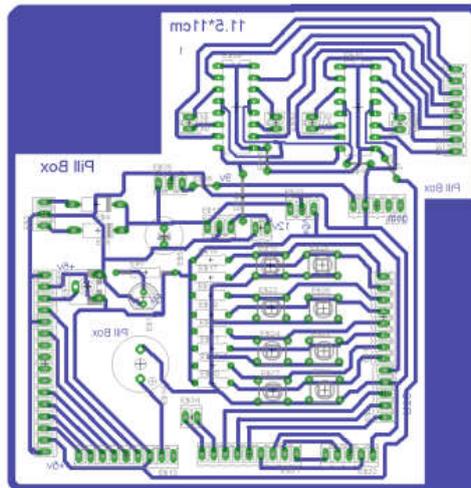


Fig.2 PCB Layout.

The above PCB layout is of Pill Dispenser box.

- It contain power supply module with the help of transformer, the transformer will reduce 230v/50Hz to 12v-0-12v(step down transformer) 12 volt it is a basic need of any electronic circuit by using LM7805 & LM7812 the output of that IC is 5v and 12v and it is pure dc form.
- 2) This power is distributed two drivers IC and also given to LCD display, it is the use of this power supply.

### 3.2 Pill Box



Fig. 3 Design of Pill Box Container.

The pill box is made of cardboard material it has 3 compartment over which a glass is fixed through which a pill can be observe and the size of that compartment is L:B:H is 13cm:15cm:12cm. Same as for remaining 2 box. In that box the setting is done in such a way that the motor is fix in each separate compartment and also connected with limit switches through that compartment.

- Installation of operating system in raspberry pi zero w.
- Go to www.Raspberry pi .com site download NOOB operating system.
- Install NOOBS on SD card and insert the SD card into raspberry pi kit.
- Wait for a minute and it shows such type of window as given below.

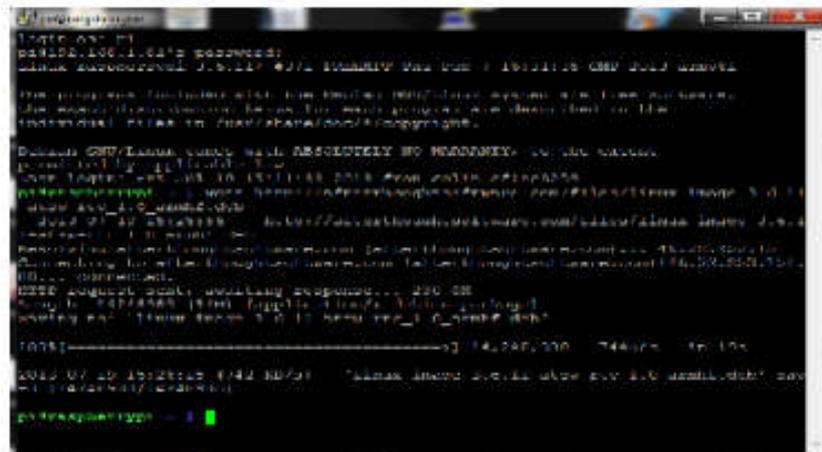


Fig.4 First Window of Raspberry Pi.

By default the id and password for it is

**Id: pi**  
**Password: raspberry**

### 3.3 Module Interfacing

#### I. Raspberry Pi Interfacing With Lcd

- Import library file from directory.
- Initialize data pin of led to transfer data through raspberry pi.
- To show the output on screen for that the instruction is `lcd.write( string(_Hello Raspberry pi)`

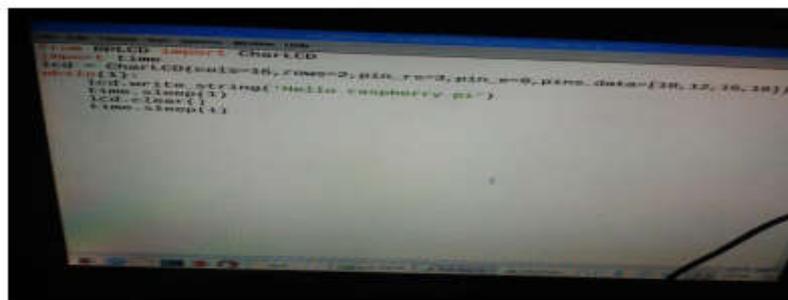


Fig 5 Program of LCD Interfacing.

## II. Output will display on LCD 16\*2 display



Fig.6 Display on Screen.

### 3.4 Interfacing of motor.

Following steps to operate a motor.

- To set the time according to user for box 1 same as for box 2 and box
- According to set time it will gives alarm & motor will get open for 1 minute.
- If the user take the pill in duration of 1 minute the buzzer will get stop & motor will get back to its original position, else wait for a 1 minute and come back to its original position.
- Same process for next 2 box will flow.
- One buzzer is mount on PCB and 4 switches are present in PCB.



Fig 7 Operation of Motor.

### 3.5 Mounting Component on PCB



Fig 8 Mounting Components.

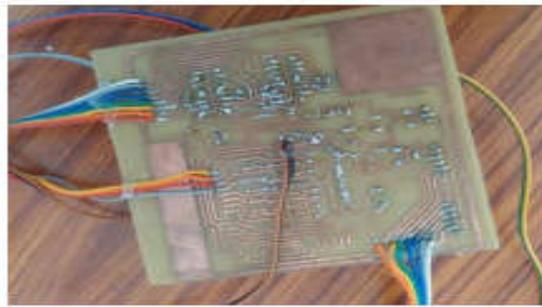


Fig 9 Soldering of Components.

A **printed circuit board (PCB)** mechanically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Components are generally soldered onto the PCB to both electrically connect and mechanically fasten them to it. Printed circuit boards are used in all but the simplest electronic products. They are also used in some electrical products, such as passive switch boxes. Alternatives to PCBs include wire wrap and point-to-point construction, both once popular but now rarely used. PCBs require additional design effort to lay out the circuit, but manufacturing and assembly can be automated.

### 3.6 Algorithm

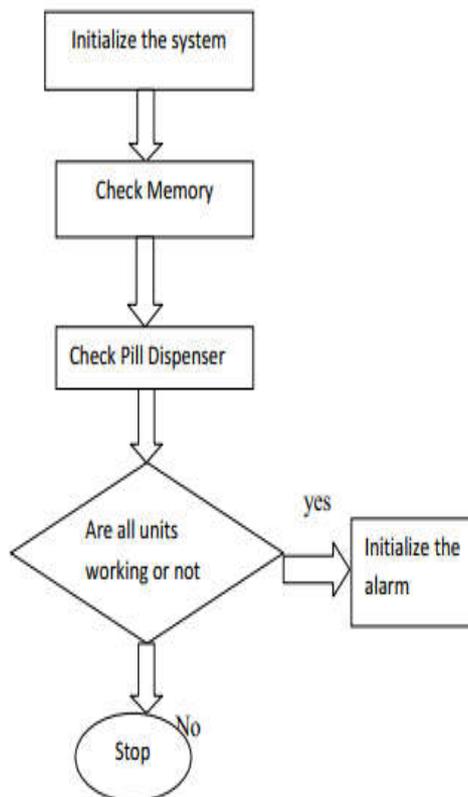


Fig 10 Algorithm System Procedure.

#### IV. EXPERIMENTAL RESULT

- While installing the OS in pi 0 W the it has shown the black screen only to over this problem some instruction has to given and then it will provide the GUI screen.

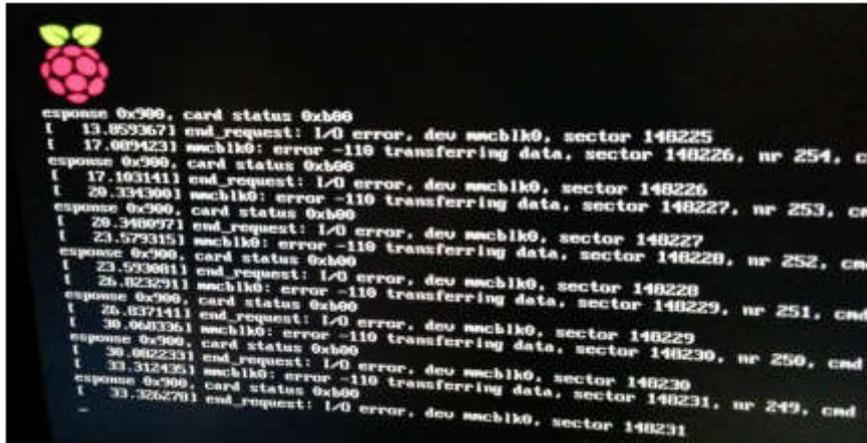


Fig 11 monitor screen

- When we are interfacing LCD with raspberry-pi the date will transfer properly.
- But all i/o devices get connected (i.e. motor, buzzer, switches).When all these devices are connected the length of program will get increase due to that the data of LCD will get fluctuate and it will not show the real time on lcd and it will not show the instruction for user . And this problem still ongoing.
- For showing the output we use the monitor screen.

#### V. CONCLUSION AND FUTURE SCOPE

The Automatic Medicine Dispenser is working for pills and capsules of any size. It has been found that the dispenser can be programmed for different medicines. It has the facility to send alarms four times a day. It is possible programmable to dynamically change the number of times and the number of pills to be picked as per requirement. Patients may have been hospitalizing already for missed and over dose medication. Patients who needs to take multiple medications or have complex medical regimens. Main advantage of propose system is remote configuration of electronic drug reminder through mobile application and portability of device. It helps to notify caregiver about expiration of pills, refilling of the pills and battery status. It not only dispenses pills as per schedule time but also confirms that user has taken it from pill collection tray. With the help of medication database connect to application, help users to access information about it such as medication identification photos, on which disease it works perfectly etc. Reporting of miss dosages will help doctors to see progress in patient's health. However disadvantage of system is no pill cutting strategy is being implemented and no scalability. However different versions of electronic drug reminder will have different number of pill loader compartment as per patient's need.

The pill dispenser will be developed with off-the-shelf technology for the design and implementation of the project. The end goal is not to develop any new technologies associated with current manufactured dispensers. Rather, the goal is to design a unit with the same basic functionality, but for a much cheaper price. By using GSM module we can send the message and track all the medicine information, if the user will not take the pill on particular time the user will get the message on the cell phone.

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