Linux Based Speaking Medication Reminder Project

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ABSTRACT

Most of times patients may forget to take the medicines at proper time as per their prescription which may cause in late recovery from the disease/illness. In case of some specific diseases like diabetes, hypertension, anemia, medication mix-ups or improper dosages prove dangerous to patients. So, it is necessary to take proper medicines in proper quantity at proper time. Medication reminder solutions have become a matter of concern in health-care research, as advancements in treatments and medication may be offset by patients' low attention to medication schedule. There is need for a strong automatic system to remind patient about the concerned medication which will assist them for the medication and one can avoid the adverse effects of improper medication. Here I am presenting "LINUX BASED SPEAKING MEDICATION REMINDER PROJECT" which will fulfill the concerned purpose. This project will help elder and illiterate people with their regular medication by reminding them time to time.

Keyword: Raspberry pi zero, Audio playback board(APR33A3), Linux Operating System, RTC DS1307, Microcontrollers, Medical Prescription, Python Language, LCD Display.

I. INTRODUCTION

As the people getting busier these days, they tend to forget to take their medicines at prescribed schedule. As a consequence of this Geriatrics (the branch of medicine or social science dealing with the health and care of old people) are facing unnecessary disposure of themselves into the hospitals. Hence advice or a system is to be designed in such a way that it can remind the medication dosages at preset time [1]. Any living being can be a patient which may include human beings, animals, pets, etc. The patients under human being category may include businessman, social workers, politicians, teachers, students, etc. These people may be busy with their daily routine life schedule or else we can consider elder people who usually forgot to take their medicines. If they are suffering from any kind of serious disease/illness like diabetes, heart problem or some neural disease then it's their duty to take proper medicines in proper quantity at proper time. Any kind of miss in medicine dosages will directly put their life in threat.

In recent years with development in electronic communication systems, many devices and software applications are available that helps in complicated drug management. Out of them, most convenient ones are alarm watches and automatic medication dispensers. Alarm watches with audible or vibrating alarms reminds someone to go their daily/weekly/monthly pillbox and take appropriate medication on time. With alarm watches, user can set to alarm several times a day, so odd medication schedules can easily be accommodated. These watches are complex to program, and seniors can easily have frustrated by instructions that are not clear. Other option available to complex medication reminder problem is Android based Medication Reminder System.

There are many loopholes of existing reminder systems. To list a few:

They do not provide facility to reset the system and feed it with changed prescription at any point of time to user. The scheduled reminders are as per the system defined time intervals only. Also, the existing devices won't allow user to store the inputs according to convenience of user i.e. in any kind of language or as per size and color of tablets.

II. System Working

The System consists of Audio Playback Board to take the inputs from user, Raspberry Pi Zero to provide serial input of RTC timer, microcontroller to build the logic to set the reminders according to inputs from user. Audio playback board will store input i.e. tablet names as per user convenience in 8 channels provided. This input will be given to microcontroller along with serial input of timer from raspberry pi. Two push buttons are provided to increment or decrement the timer. LCD Display and Speaker are the output devices used here for alarming to user. All the components used are explained in next section in detail.

a. Audio Playback Board
The aPR33A series C2.0 is specially designed for simple key trigger, we can record and playback the message averagely for 1, 2, 4 or 8 voice message(s) by switch, It is suitable in simple interface or need to limit the length of single message, e.g. toys, leave messages system, answering machine etc. Meanwhile, this mode provides the power-management system. We have used this to take inputs from user in audio format and provide it as output.
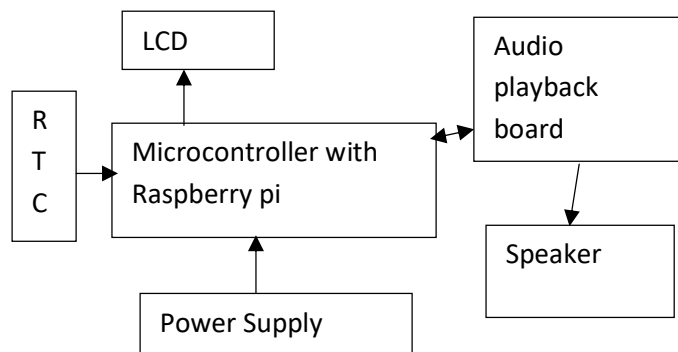

Fig. System Block Diagram.

b. Raspberry Pi
Raspberry Pi is a popular Single Board Computer (SBC) in that it is a full computer packed into a single board. We all are already familiar with the Raspberry Pi 3 and its predecessors, which comes in a form factor that has become as highly recognizable. The Raspberry Pi comes in an even smaller form factor. The introduction of the Raspberry Pi Zero allowed one to embed an entire computer in even smaller projects. This guide will cover the latest version of the Zero product line, the Raspberry Pi Zero -Wireless, which has an onboard Wi-Fi module. While these directions should work for most any version and form factor of the Raspberry Pi, it will revolve around the Pi Zero W. We have used it to have real time for reminding purpose.

c. RTC
The DS1307 serial real-time clock (RTC) is a low power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially through an I2C, bidirectional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12hour format with AM/PM indicator. The DS1307 has a built-in power-sense circuit that detects power failures and automatically switches to the backup supply. Timekeeping operation continues while the part operates from the backup supply.

d. Microcontroller
The Atmel Pico Power ATmega328/P is a low-power CMOS 8-bit microcontroller based on the AVR® enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328/P achieves throughputs close to 1MIPS per MHz This empowers system designer to optimize the device for power consumption versus processing speed.

All the components are used to assemble "Linux Based Speaking Medication Reminder Project". Microcontroller is programmed to set timer by taking inputs via push buttons. Push buttons will allow users to increment or decrement the reminder time in seconds. Here one single click of push button will increment or decrement the time by one second, we

can set the time increment factor according to requirement.

To hold the real time for the purpose of reminder, I have used RTC DS1307 to provide real time even though the system is switched off for a while. This serial input is provided to microcontroller via raspberry pi through serial transmission.

An 8-channel audio playback board is used here to store 8 different audio inputs. To set the medication reminder user has to operate the audio playback board in record mode and need to store inputs according to their convenience. Each input can last up to 60 seconds. Here one can store the reminder with medicine name, size of tablets, color of medicine, etc. This feature will help illiterate and senior citizens to store easily. Then let the playback board operates in play mode so that it can give output at particular intervals.
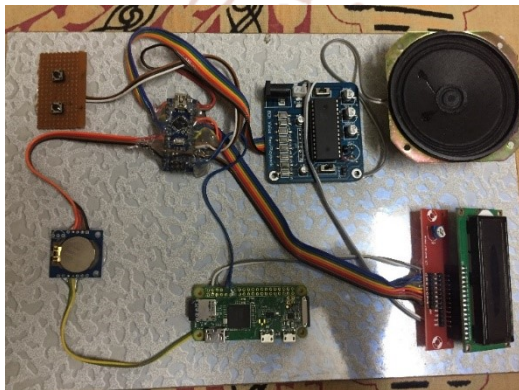

Fig 2. A Fully Assembled Reminder System

Accordingly, the alerting message will be displayed on LCD on every reminder alarm. If someone want just 2 or 4 inputs to be feed to the system then audio playback board can be programmed accordingly.

The system can be used to store any regular medication. Consider below prescription to be stored in system with 15 sec intervals.

Sr. No	Medicine (Audio Input)	Interval
1	1 Paracetamol Tablet	15 sec
2	1 Blue Tablet	15 sec
3	1 Spoon yellow Syrup	15 sec
4	1 Red Capsule	15 sec
5	1 Glass water	15 sec
6	1 paracetamol	15 sec
7	1 Green Round tablet	15 sec

Table 1. Medical Prescription

Now the timer is set by increment/decrement push buttons given. Time can be monitored on LCD. Reset Button is provided on microcontroller. Put the audio board in REC mode and store all inputs by pressing respective channel buttons. After completion of inputs, put the audio board in PLAY mode which will allow it to go for reminder alerts.

III. Conclusion

Features of The System:

1] It can be used by elderly people who forgot to take their regular medication.

2] It can be easily handled by illiterate users to store inputs according to their convenience.

3] This system can save human beings from extreme effect of improper medication mix-ups.

4] To assist ADR's affected patients and save them from life threating events.

IV. Acknowledgement

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