

# **Patient Medicine Reminder System Using UTLP Kit**

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**ABSTRACT:** Automatic reminder for medicine is useful to all patients. Now a day's, patient monitoring is a critical task. The physician has to monitor the patient health continuously and the prescribed medicine has to be given by time to time. There are instance, when patients remember to take medicines at the stipulated time but forget which pill has to be taken at the correct time. In this paper, a patient medicine reminder system is introduced. The time and medicine names are changed according to the patients need through the keypad connected. By using keypad, the prescribed timings can be entered, at which the patients has to take the medicine. The list of medicines has to be taken by the patient at the prescribed time is displayed on Character Liquid Crystal Display and the time is displayed on seven segment display. So thus the status of the patients can be easily monitored by the physician's. This is implemented using Unified Technology Learning Platform.

**KEYWORDS:** Unified Technology Learning Platform (UTLP) Kit, OMAP 3530 processor, Spartan 6 FPGA, Keypad.

## **I. INTRODUCTION**

Patient monitoring and management in critical care environments such as the Intensive Care Unit (ICU) , Surgical Intensive Care Unit (SICU) involve estimating the status of the patient and reacting to events that may be life threatening. It is impossible to keep a tab on every patient throughout the day. New solutions are needed in this field to help the doctors and the nursing staff to monitor the patients. A critical element of this is the medicine administration and monitoring.[1] This has been achieved by the patient medicine reminder system. Health maintenance organizations, medical researchers and health practitioners realize that in an environment that rewards short-term cost savings and emphasizes management of current diseases, increased use of patient reminders can significantly improve delivery of preventive care services and treatment for chronic illnesses and can lead to long-term beneficial outcomes as well. The applications of patient medicine reminder system is been initiated in a wide range in the modern health care field. It's been implanted in most of the hospitals to ease the effort of the patient entourage.[2] It is as well a second-hand for the aged and memory loss group. It is well known that patients who are prescribed medications, or who take Over The Counter (OTC) medications, should take such medications at pre-determined dosage time intervals as prescribed by the doctor or as indicated on the OTC medication package. Many drugs and medications currently prescribed by physicians must be taken at prescribed time intervals. If the patient ignores such instructions, for example, by taking the prescribed medication too often or too seldom, this may result in serious adverse effects such as overdose risks or reduction in the concentration of medication in the body. Many patients miss dosages because they are distracted or forget about their medications at the correct dosage time. This is particularly true of elderly patients who may be taking more than one medication at different time intervals. Although patients may set an alarm clock or the like at a prescribed medication time interval, they may set the incorrect time interval or may forget to re-set the alarm after taking a medication dose, and may also be away from the alarm and not hear it when it goes off. When required to take medicine on a daily or hourly schedule, many people have a problem in recalling the time when the medicine was last taken. Similarly, many patients are unable to remember or determine the previous dosage of medication taken or whether it has been taken at all. This problem is particularly common among elderly patients, who may experience short-term memory loss or, because of their infirmities, confuse the dosage previously taken of each

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medication. Patients may also be unable to accurately read the medication containers themselves, and often have no means to determine whether they have taken the mandated doses at the prescribed time intervals.

Abbey, B. [1] et al. described the importance of Medication adherence with electronic devices equipped with reminder capability and medication intake recording. It presents a remotely programmable pillbox. This pillbox is equipped with a web application which gives the health professional or caregiver a tool to check and program the pillbox. Also, a mobile application is implemented to establish a connection with the web-application to show pills' daily schedule and pill taking notifications.

Dalgaard, L.G. [2] et al. described a MediFrame: A Tablet Application to Plan, Inform, Remind and Sustain Older Adults' Medication Intake. Healthcare activities in private home settings that are not supervised by a healthcare professional can challenge older adults. MediFrame is a personal medication management system to support older adults in non-clinical settings such as the home. It describes the user-centered design process and the resulting tablet application and how MediFrame can be used to support adherence in medical treatments through fieldwork informed use scenarios.

DeMeo [3] et al. described the Medication adherence using a smart pill bottle. Medication non-adherence refers to patients routinely failing to take their medication as prescribed, and is arguably the largest problem in healthcare. Wireless and low-power embedded computing technology is enabling the design of real-time intelligent pill bottles to increase adherence. It demonstrates a real-world solution using a bottle with advanced pill detection and wireless connectivity to a cloud infrastructure. The infrastructure aggregates the information and reminds patients to take their medication at appropriate times. It also alerts healthcare providers to any non-adherence.

### BLOCK DIAGRAM

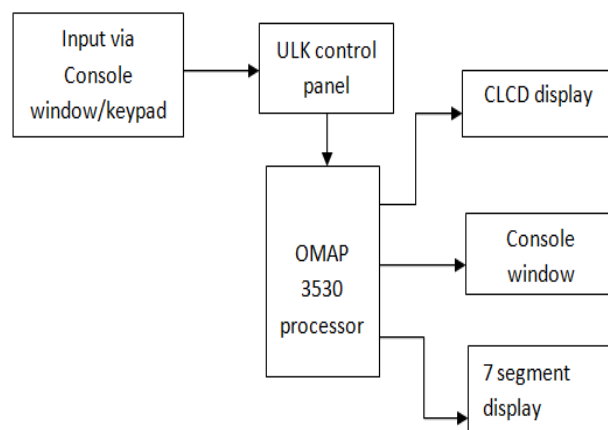


Fig.1. Block diagram of Patient medicine reminder system

Mohammed, M.N.A. [4] et al. described that forgetfulness is a major difficulty in Patients who do not take their drugs with the exact dosage on time; it has been found that this leads to malfunctioning and lowers the efficiency of their medication. Dose Reminder System, is a simple device designed for home use, it can be easily programmed by the caregiver and used by the elderly. Time and dose control proved to be very effective in illness management; therefore, it was essential to develop an effective solution that solves this problem, which will increase accuracy and reduce amount of attention and cost needed for care giving. The prototype produced was designed on low cost to make

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it within reach of the majority; functions are fully working, also the model is mobile but the size is a bit larger than required. The design was successfully implemented and tested.

Silva, B.M. [5] et al. presents a SapoMed, a mobile health (m-Health) application for medication administration management. SapoMed is a medication intake diary that tracks and manages all the prescribed medication aiming to prevent medication errors. Through visual, audio, and vibrating alerts, SapoMed keeps users aware of their medication schedule. The application allows users to register medications through the mobile phone camera to capture the barcode available at the medication boxes. It makes use of Web services to consequently retrieve all the medication information and posology. Furthermore, it uses the same Web services to save past intake medication and their intake records.

Zao, J.K. [6] et al. described that the out-patient medication administration was identified as the most error-prone procedure in modern healthcare. It presents a smart phone application that helps patients to avoid most medication administration errors. Wedjat can remind its users to take the correct medicines on time and keep an in-take record for later review by healthcare professionals. Wedjat has two distinguished features: (1) it can alert the patients about potential drug-drug/drug-food interactions and plan an in-take schedule that avoids these adverse interactions; (2) it can revise an in-take schedule automatically when a dose was missed. Wedjat works with the calendar application available on most smart phones to issue medicine and meal reminders. It also shows pictures of the medicine and provides succinct in-take instructions. A prototype of Wedjat has been implemented on Window Mobile platform. It introduces the design concepts of Wedjat with emphasis on its medication Scheduling and grouping algorithms.

## A. Description

The block diagram of patient medication reminder system is shown in the figure 1. The program is coded using C language and compiled using eclipse software. After compilation, the Unified Learning Kit (ULK) control panel is interfaced to the UTLP kit. The code is loaded in control panel to run the system. It is processed by using two devices. They are Texas OMAP 3530 processor and Xilinx spartan6 FPGA. According to the given input, the output is displayed in console window, Character Liquid Crystal Display and seven segment display.

## B. Eclipse

Eclipse is multi-language software which is developed by development environment tool including an Integrated Development Environment (IDE) and an extensible plug-in-system. It is written mostly in Java. It can be used to develop the applications in Java program and, by means of various plug-in systems, other programming languages including Ada, C, C++, COBOL, FORTRAN, Haskell, Perl, PHP, Python etc. Eclipse IDE tool is a tool which is used for developing applications based on C language for UTLP.

## C. ULK control panel

The Unified Learning Kit control panel is an application program and it is developed using Ubuntu development personal computer which facilitates the communication between the Ubuntu Host personal computer and the Unified Technology Learning Platform. It also enables downloading and executing the UTLP program in usual mode. Fig 2, shows the host and client interface.

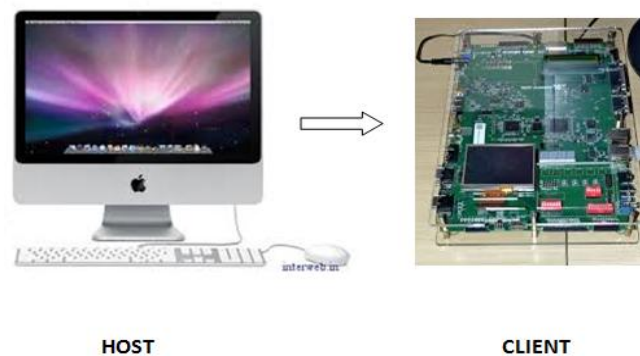


Fig.2. Host and Client Interface

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### D. Texas OMAP3530

The ULK is based on Texas Instruments OMAP3530 application processor and Spartan-6 FPGA. The Texas Instrument OMAP 3530 processor is a high performance processor which is based on OMAP architecture. It is used to support high-speed devices and number of thread processing applications. The OMAP3530 processor supports with different interfaces such as Mobile DDr, Nand Flash, Audio in & out, TV out, Touch screen LCD, VGA out, Ethernet, Keyboard, USB two SD cards, Control sensor header, I/O expansion connector, I2C header for GPS, Bluetooth & Modern Connectors, Simple Digital Interface connector, IrDA connector, Camera Connector & LCD connector.

### E. Spartan-6 FPGA

Spartan-6 FPGA delivers an optimal balance of low risk, low cost, and low power for cost- sensitive applications, with 92% less power consumption and 12% increased performance over previous generation devices. Spartan-6 FPGA is built on a 45-nanometer (nm), 9 metal layer, and dual- oxide process technology.

Spartan 6 FPGA has 2 megabyte of Serial Peripheral Interface Programmable Read Only Memory (SPIPROM) from Atmel. Then, it has 10 bit ADC with parallel interface and 12 bit DAC with parallel interface. It contains JTAG interface, 7-segment LED's, 20 pin header and 70 pin I/O expansion connector, DIP switches and Status LED's. The Spartan-6 family provides leading system integration capabilities with the lowest total cost for high-volume applications. The thirteen member family delivers expanded densities ranging from 3,840 to 147,443 logic cells, with half the power consumption of previous Spartan families, and faster, more comprehensive connectivity. Spartan-6 FPGAs are the programmable silicon foundation for Targeted Design Platforms that deliver integrated software and hardware components that enable designers to focus on innovation as soon as their development cycle begins.

### F. UTLP- Interfaces

UTLP has different devices and interfaces which can be accessed both in the normal mode and in the lab mode. The program developing and executing them using control panel for the following devices in the normal mode such as 7 segment display, Character LCD, Keyboard, Graphics LCD, Touch panel.

Application Programming Interface (API) are the functions provided by interface libraries. By using these library calls in the programs for an interface functionally. At the linking time, the API library binaries to make an executable program. In the UTLP normal mode, there are interface libraries provided for different devices and functionality.

Reads a string from the control panel input window-

Void ulk\_scanf\_string (char\*user string)

Outputs a string on the serial port-

Uin8 ulk\_printf (cons char\*fmt....)

Prints a string in the control panel output window-

Void ulk\_cpanel\_printf (const char\*fmt...)

Reads a hex value from the control panel input window-

Voidulk\_scanf\_hex (unsignedlong\*hex variable)

### G. Character LCD

A 16x2 LCD shows to display 16 characters per line and has 2 lines.

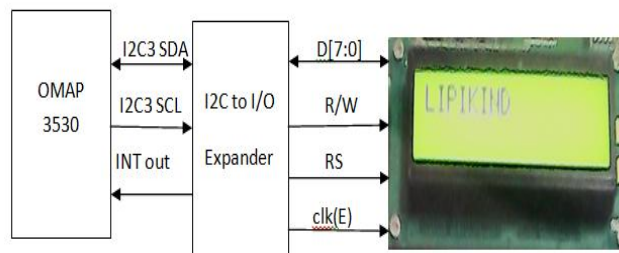


Fig.3. Character LCD





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(d)



(e)

Fig.6. (a) Eclipse Software program window, (b) ULK Control panel,  
(c) ULK Load operation, (d) Character LCD and 7 segment display Output,  
(e) Unified Technology Learning Platform (UTLP) kit

### III. CONCLUSION

This paper helps the patients for the intake of medicines at the right time. In recent days, people get affected with many diseases, even early ages. So that, they need to take medicines every day to maintain their health condition. Because of their busy schedule, they forget to take their prescribed medicines. This makes them to be failed in maintaining their health conditions. This project was implemented to remain the list of medicines and timing for the intake of medicines will be helpful for the patients. Thus this makes them to avoid the difficulties which may be faced by the patients while forget to take the medicines at the proper time.

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