

## SMART PILLBOX FOR AUTOMATIC HEALTH MONITORING DEVICE

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**ABSTRACT:** The Intelligent PillBox allows the organization of several medication schedules that health disorders presented in elderly need basically. Arm Processor was took as the principal controller. This prototype contains a LCD display an interactive user interface. The development of this device is focused in the support of elderly people and other vulnerable groups that may need for an assisted care. Intelligent PillBox Automatic and Programmable Assistive Technology Device is presented. Available from The electronic pill box device is a smart, portable, wireless programmed, embedded hardware device that incorporates a number of functionalities. The device has a user centric and robust design for the patients. It is very useful for senile people. It is of great use for the elderly or illiterate patients who either forget to take their medicine or are unable to read the medicine name.

**Keywords:** Intelligent, Embedded, Wireless Senile

### I.INTRODUCTION

According to research statistics, Taiwan is stepping into the aging Society. The elderly population in Taiwan will rapidly increase to 294.2 million in 2015 that is about 12.6% of the total population. The progress in medical technologies is one of the main contributions for the aging population. Most of the elders have the chronic diseases. Medication safety for the elderly is very important. The elders need some supports for them to take the drugs correctly. Plaid style pill box is still the most popular now, and many studies on the smart pill box have been already developed, such as the smart pill box developed by H.W. Guo et al. This pill box uses single-chip microcomputer MCS-51 as its core processor. Caregivers can put the drugs into the pill box and set the time.

When the scheduled time is up, the system will drive the stepper motor to send out drugs. The system can guarantee that the drugs can be received every scheduled time instance. The additional function such as reminding the elders and the dispensers is implemented. Brianna Abbey et al. proposed the smart pill box in 2012. The purpose of this system was to develop a medication device that increased medication compliance, monitored medication taking behaviour, and communicated with pharmacists.

The above systems are well designed for the elders. However, they do not elaborately record the drug-using behaviours of the elders. The drug-using recording can provide the caregivers to adapt their strategies to take care of the patients. In this paper, we combine the advantages of the existing pill box and improve their functions. We point out the available improvements and innovations. First, we can use the Internet to replace the Bluetooth, because transmitting range of Bluetooth is too short. Combining the pill box with cable network and the wireless network can send information to any location in the world. Second, the pills are packed together. Scattering pills in a cell will easily cause the patients missing the pills. Less medication and more medication will not happen. Third, voice is more efficiency than the light to remind the patients. We use the alarm clock to replace the LED lights.

The traditional pill box was designed for a day or a week for loading pills without falling out of the container. An electronic

pill box can be a reminder to the user via setting an alarm but the price is much higher than traditional pill boxes. The population aged over 65 has reached 12.51% of the total population in 2015 in Taiwan. Rapid population aging has become a common global trend, and so there is a need to raise awareness about promoting health and well-being or the quality of life of the elderly. The issue is how quality care can be provided to those with reduced access to providers. Recently developed applications feature integrated individual sensors as part of a sensor network, which relies on modern wireless communication technology. They work by transmitting data from the sensor network to a personal computer or mobile phone. An assistive devices, smart pill boxes (SPB) such E-Pill-Medsmartplus, which allow family members of the elderly to monitor whether medication has been taken or not to ensure effective health maintenance. Some of the smart pill boxes are just reminding or monitoring devices without any interaction between the elder person and his/her family. Our interactive SPB not only detects (forwards to webpage) that the elder person is taking the pills but also receives a remind message backwards to the LCD on SPB by displaying words and/or patterns, or speaking a voice to the user

The IPB is designed for long-term and short-term medication. The infrared sensors are installed at the entrance where the patients take the drug package. The time to take the drug package away will be recorded. A base plank is installed under the spring. As the motor rotates, the packages will be pushed forward. A package drops to the entrance when it moves out of the range of the plank. Using the package can ignore the type of drugs. It can be applied to any kind of drugs easily. When the scheduled time for medication is up, our system gives the alarm to remind the

patient. At the same time, the motor rotates the spring to drop one drug package. The system keeps on giving alarm until the patient taking the drug away. The system will record the time and inform their families or the caregivers via the Skype.

First, the caregivers open the control interface and enter the schedule to take medicine. Next, system enters the loop and checks the time. The motor will be triggered when the scheduled time is up. The installed infrared sensors will detect whether the patient takes the drug package away. This time will be recorded to the back-end database so that the delay time to take medicine can be computed. At the same time, the caregivers will be informed via the Skype software. If the patient does not take medicine, the alarm will be given for 30 minutes. An additional message will be sent to the caregivers when the alarm rings 20 minutes. The purpose is to inform the caregivers to acknowledge the patient in person.

## II. RELATED WORK

The main objective of this paper is to solve the aforementioned problems by designing and synthesize a tool which will enable the owner to track every pill to ingest in an easy and simple way requiring no training or complex learning from their side in order to operate the device. This device will be an intelligent pill dispenser. The pill dispenser will be designed to prevent errors in hospitals and retirement homes where many pills have to be given daily to each one of the patients, each patient owning a device will not only drastically reduce the chances of errors occurring but also well optimize and speed up work for the caretakers/nurses by allowing the device to take care of pill management for them and freeing the time slot usually dedicated to that.

This device is intended to log the pill name, number of pills and hours at which each pill

is actually taken versus the time it should have been taken. Nowadays there has been an increasing awareness as the number of pills prescribed to elder people, stating that so many pills may have negative effects on the patient's health. The pillbox's logs will help gather data concerning this matter. There is a need to ensure the device is wirelessly connected so device management (defining the hours when a particular pill must be taken, number of pills in each compartment, etc...) as well as possibility of emitting warnings to the owner's relatives or nurses if needed (such as the patient not taking pills). In essence, the device will have to be a wireless electronic apparatus, having special attention to make it very precise as an error could prove fatal.

iMediPac is an intelligent pillbox in which pills are sorted by each day in a disposable envelope which will be later inserted in the pillbox. Each day the pillbox lights up the compartment which has to be taken that day and the user breaks and retrieves the pills from inside the pillbox. If pills are not taken the pillbox alerts relatives with notifications. On the down side, the pillbox is very bulky of a huge size making it difficult for a person to carry it all day, while pills will probably have to be taken throughout the day. It also shows in the promotional videos a complex method of configuring personal data, which may lead to elderly people not being able to program it correctly. Finally it doesn't solve the problem of pills complexity as nurses, pharmacists, etc... have to spend huge amounts of time preparing the dose for each day in the refill sheet as well as refills having to be constantly bought and refilled. Adhere Tech smart pill bottle consists on a plastic bottle in which to store the pills and some circuitry which allows for the bottle how many times the pillbox is opened. It uses sensors for a precise measurement of

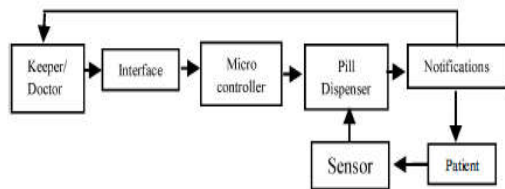
remaining medication and can send messages, calls or notifications to patient if pill is not taken. Its main weak points are the impossibility of storing different pill types in one bottle as well as having a lack of information on how the pillbox can be managed, which may led to believe it will only be implemented at hospital-level.

Philips Medications Dispensing Service is a non-portable pill dispenser oriented towards elder users which stay at home. It is operated in a very simple way with the use of one button and has voice prompts. It is equipped for emergencies with a large pill storage and a battery backup system so it can supply pills to the user in case a power outage. On its downside it is worth mentioning its non-portability and the use of individual cups with each day pills, not reducing probability of confusing pills for the caregivers. Memo Box is a small pillbox with just one compartment in which many different pills can be stored. It possesses a portable size and can track when the pillbox is forgotten at home. Whilst its simplicity can be very attractive it offers no more functionality than the one which could be achieved with a normal pillbox and a pill-reminder app installed in the phone.

### III. EXISTED SYSTEM

In this paper, we existed a first approach related to the design of AT device, to give a new choice of taking dosages which uses new technologies linked to free hardware and software, with a low cost that does not have limitations on licenses and functions. This programmable device has been built with consideration to quality attributes (e.g., usability, reliability), which allows the organization of several medication schedules that health disorders used to present in elderly need. This device is focused in the support of elderly people due to this special and sensible group for assisted care.

Improving lifestyle not only in elderly sick people also in general sick people is a main goal of this development; our device involves reliability and usability with a friendly technology. In the case of elderly people as in Marcellini et al. It is well known with the years, the gradual degradation of faculties can affect the ability to cope with machine technology that is nowadays common in public spaces, like telephone cards and ticket machines (which require physical and mental agility) or automatic tellers (where codes are needed to be memorised and alternatives must be selected rapidly).



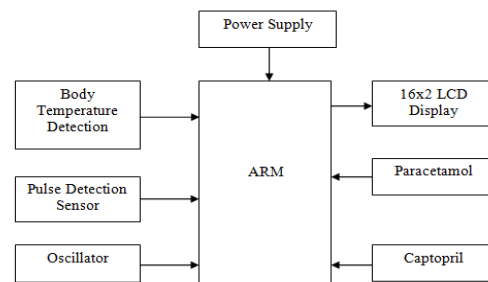
**Fig. 1: EXISTED SYSTEM**

As Figure (1) shows, a block diagram which summarizes the contribution of this paper. Here, it is an interaction between keeper and doctor (1) with the pillbox (4) through an interface (3) and a microcontroller. The device pill box (4) sends notifications (5) to patient (6) and keeper (1). When a patient (6) takes the pill, there is an interaction between the pillbox (4) and a sensor (7). Finally, about that interactions are send. The elements have been selected due free hardware and software, and another, look for functionalities that we pretend to give to the device. The disadvantages of those systems are; in first place there are not medication (pills) stored and in second place it doesn't have an alarm system. Electronic developments covering this requirements have resulted in pill boxes or dispensers many of them only with alert systems to notify the patient as alarms (sound alerts) or lights, and others expensive ones with

mechanical dispense systems but without reports about dosages.

The lack of availability patient-related information causes many errors in healthcare. The use of new information and communication technologies (ICTs) could increase the accessibility of medical information and it's essential for patient safety. Internet of things (IoT) is a global network infrastructure, linking physical and virtual objects through the exploitation of data capture and communications capabilities. The connectivity of sensors and other healthcare devices (IoT) plays an important role on care of patients, because it allows to get access in real-time of medical information. Thus, the study and development of an effective Healthcare/IoT gateway could be crucial in patient care. The creation of alternatives of AT devices looks promising and necessary due to that today only 1 in 10 people in need have the access to AT due to high costs and a lack of awareness, availability, personal training, policy and financing. The introduction of AT devices in IoT could lead us to a future where important information of patients would be available anytime and anywhere, in order to make a correct treatment and to prevent calamities.

**IV. PROPOSED SYSTEM**



**Fig. 2: PROPOSED SYSTEM**

The above figure (2) shows the architecture of proposed system. In this system we use Body temperature detection, pulse detection sensor, oscillator, ARM, LCD display, paracetamol and captopril. Firstly

oscillator will oppose the error signals and transmits the pure signals into the system. Power supply gives sufficient power to operate the system. As we know that ARM processor is one of the family of CPU. ARM processor can operate at a higher speed, performing more millions of instructions per second. From LCD display we can observe the output.

Coming to body temperature, the Temperature estimation in the present modern condition incorporates a wide assortment of necessities and applications. To meet this wide cluster of requirements the procedure controls industry has built up countless and gadgets to deal with this interest. In this examination you will have a chance to comprehend the ideas and employments of a large number of the regular transducers, and really run a trial utilizing a choice of these gadgets. Temperature is an extremely basic and generally estimated variable for most mechanical architects. Numerous procedures must have either an observed or controlled temperature. This can go from the straightforward checking of the water temperature of a motor or load gadget, or as mind boggling as the temperature of a weld in a laser welding application.

This component is two distinctive metallic materials sandwiched together. At the point when a temperature is detected by the component, the metallic parts need to grow. Since they are diverse materials and extend at various rates, a worry is created in the curl of material. This pressure makes the component attempt to fold over itself. The pointer needle is connected as far as possible of this either specifically or by system. The movement of the spring melded material moves the marker. Before the appearance of electrical indoor regulators, the most well-known utilization of these thermometers was in home

warming frameworks. The indoor regulator comprised of a bimetallic spring, for example, utilized in the gage type thermometer and a switch, for the most part a mercury level switch. As the spring wound and loosened up with temperature change, the point of the mercury switch would change, shutting or opening the contacts. These are as yet utilized in numerous homes today. Another commonplace area that you may discover this kind of thermometer is your home flame broil, or on the off chance that you have obtained an in-stove thermometer. A considerable lot of these have uncovered components with the end goal that you can look and perceive how they are built.

Pulse detection sensor is designed to give digital output of heart beat when a finger is placed on it. At the point when the heart beat identifier is working, the beat LED flashes as one with every heart beat. This advanced yield can be associated with microcontroller straightforwardly to quantify the Beats per Minute (BPM) rate. It takes a shot at the rule of light balance by blood move through finger at each heartbeat. The LCD panels Enable and Register Select is associated with the Control Port. The Control Port is an open authority/open deplete yield. While most Parallel Ports have inside draw up resistors, there are a not many which don't. Accordingly by consolidating the two 10K outside draw up resistors, the circuit is more versatile for a more extensive scope of PCs, some of which may have no inside draw up resistors. We endeavour to put the Data transport into turn around course. Subsequently we hard wire the R/W line of the LCD board, into compose mode. This will cause no transport clashes on the information lines. Subsequently we can't peruse back the LCD's inner Busy Flag which lets us know whether the LCD has acknowledged and wrapped up the last

guidance. This system produce effective results compared to existed system.

## V. RESULTS



Fig. 3: OUTPUT-1

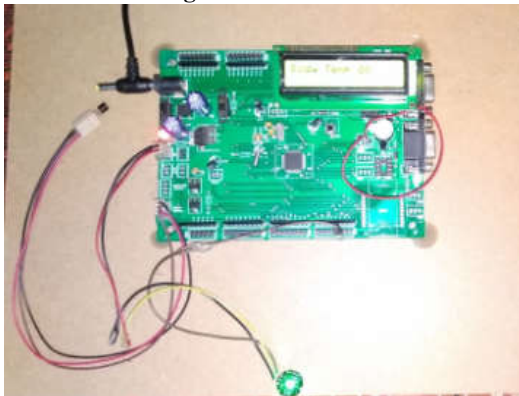


Fig.4: OUTPUT-2

## VI. CONCLUSION

This study investigated the feasibility of use of a touch screen based robotic system by older adults and analysed their interaction in addition to eliciting their opinions and suggestions around medication assistance. The older adults could complete the tasks successfully, felt confident while using the system and actually found it easy and simple. Although there was a large number of errors, most of them seem possible to be addressed by making the application more robust, particularly in terms of capability to resolve ambiguities around missing information items. Further studies should consider a robot with built-in medication dispenser and with more intelligent dialogue design (e.g., more ability to seek clarification of unexpected situations such as users reporting medications at variance

with the electronic record). They should also be conducted on a larger sample size with random selection of users who are minimally supported or prompted to elicit subtler usability issues. There is also an opportunity to explore a wider range of applications that exploit the user friendliness of touch screen based automated dialogue systems in healthcare.

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