AUTOMIZED PHARMACY USING FACE AUTHENTICATION

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Abstract: Today's technological advancements are revolutionizing the way patients receive treatment. Smartphones are no longer only for making phone calls; they can now be used as a series of embedded sensors to build new packages in a number of fields, including healthcare, e-commerce, homecare, social networks, environmental monitoring, transportation, and security. In today's healthcare systems, the use of mobile devices is becoming increasingly valuable. Furthermore, cellular generation is playing an increasingly important role in chronic disease management, encouraging the elderly and pregnant women to receive timely treatment, expanding service areas, and improving health conditions and scientific system efficiency. Because of advancements in various generation domains, mobile phones are powerful and feature-rich, but they are also expensive. As a result, smart phones with internet connectivity will be commonly used all over the world in the coming years. All types of mobile phones have a user-friendly interface and intuitive operation, allowing them to be used by anyone, including the disabled and elderly patients. With a few tweaks, this device may also be used in hospitals. The problem of 1) remembering to take the prescribed dose on a daily basis is challenging in a busy schedule. 2) It is very difficult to recall the name of the medication to be administered. 3) The patient's life may become more complicated as a result of the first two factors. These issues arise for all as a result of prescription non-adherence. As a result, there is an increasing demand for in-home healthcare devices and technology to provide patients with electronic resources to help them control their medications.

Keywords: Technology, healthcare, smartphone, dosage, mobile phone.

1. Introduction

The computer can be described as an automated pharmacy that has been installed on a commercial scale, allowing an unlimited number of users to use it at any time. When a patient forgets to take their medication, the current system uses intelligent reminders [12]. It also has double-dose warnings and tracks each medication intake case. Those that take several drugs should be able to buy more than one bottle. These bottles are only available in the Rs. 3000-4000 price range. Present pill bottles are so small that only one drug can be taken at a time. The bottles also cost Rs. 3000, which is obviously out of reach for most people, especially those who need multiple bottles. A increasing concern, according to a number of national surveys and published reports, is the deliberate misuse of prescription drugs to get high, such as pain relievers, stimulants, tranquilizers, and sedatives. In reality, prescription drugs have overtaken marijuana as the most abused illicit substance by young people aged 12 to 17.

Smart Pill box

The Smart Pill Box is an internet-of-things-based smart box that monitors a patient's health and medication. This box only cost less than 1500 dollars, making the machine more available to the
general public [7]. Apart from intelligent reminders, caretaker reminders, and double dose monitoring, the device also has an authentication system that warns the user each time the box is opened, preventing stealing of medicines. The smart pill box is a microprocessor-controlled container for dispensing medications. The box has four spaces, allowing it to hold up to four separate medicines at a time [15]. When the box is not opened on time or at a particular time, it emits a signal. Patients' and caregivers' cell phones are linked to the medicine box via the Internet.

**Patient's Mobile App**

The patient's mobile app allows him to get push alerts reminding him to take his medications. Although getting updates, this app reminds the patient to take his medications. It also checks that the medication was taken, and if it wasn't, it keeps reminding the patient until he does [9]. This application also allows the patient to display his full prescriptions as well as disease descriptions. This is the most important application since it is directly related to the medicine cabinet. The program also records an incident each time the package is opened, allowing the user to determine if the drug was taken by him or stolen.

**Caretaker's Mobile App**

The aim of the caretaker's mobile app is to alert the user when a loved one misses a dose. The patient's caretaker is the one who registers him or her. When a person is scheduled to see a doctor, he or she signs them. The caretaker can schedule any available doctor based on their availability and schedule [5]. So that he or she does not have to plan a visit with the doctor around a busy schedule.

**Doctor's Mobile App**

The aim of the doctor's mobile app is to build a primary profile for a patient and to receive notifications about the patient's next check-up. The concerned hospital authorities will register the doctor and will also update the availability of each doctor. The primary profile of the patient is obtained by the doctors at the time of booking. After speaking with the patient, the doctor prescribes drugs and changes the patient's profile, which is also updated in the patient's and caregivers' mobile apps [13]. If the patient's medical records are open, this doctor will review them and do any necessary follow-ups.

**Pharmacist’s Mobile App**

The pharmacist's mobile app's aim is to connect with the bottle at any time to obtain refill notifications. As a consequence, any drug can be taken at any time. There are times when pharmacies do not have drugs available at a time when they are required. And this makes their work more difficult because they will have to look for drugs all the way. While the current version of the Autonomous Pill Dispenser shows promise and a clear ability to trap and release medicine, potential versions of the original model will undoubtedly be improved. In Autodesk Inventor, a cone with a coarser interior may be built to improve the pill isolation success rate. Although the difference between when the pill is supposed to be released and when it is actually released is small, it still leaves room for error. This problem could be mitigated by faster Bluetooth serial signal transfer and increased SMS distribution speeds. Patients with poor motor coordination can also have trouble flipping the system to trigger the dispensing mechanism.

2. Materials and Methods

Python is one of the most widely used programming languages. It's used for server-side web creation, software development, mathematics, and machine scripting. Python can be used to build web applications on a server. Python can be used to build workflows in conjunction with other applications. Python has the ability to link to databases [4]. It also has the ability to read and edit files. Python can be used to manage large amounts of data and perform complex calculations. Python can be used for rapid prototyping as well as development of production-ready applications. Python
can be used on a variety of platforms. (Windows, Mac, Linux, Raspberry Pi, etc). Python has a basic syntax that is close to that of English. Python's syntax enables programmers to write programs in fewer lines than other programming languages.

**Features of Python**

Python is a basic language to learn and use. It is a high-level programming language that is developer-friendly. Python is more expressive, which means it is easier to understand and interpret. Python is an interpreted language, which means that the interpreter runs the code line by line. This makes debugging easy, making it appropriate for beginners. Python can run on a number of platforms, including Windows, Linux, Unix, and Macintosh. As a consequence, we may assume that Python is a portable programming language.

**Applications of Python**

Python is known for its general-purpose design, which allows it to be used in almost every software development domain. Python can be used in almost any field of creation. We're defining application areas where Python can be used in this section. Python can be used to build web applications. It includes libraries for dealing with internet protocols like HTML and XML, JSON, email processing, request, beautiful Soup, and feed parser, among others. It also includes frameworks for designing and developing web-based applications, such as Django, Pyramid, and Flask [3].

**Raspberry Pi**

Raspberry Pi is a single-board device with a tiny footprint. Raspberry Pi is a common platform for real-time image/video processing, IoT applications, and robotics. The Raspberry Pi is slower than a laptop or desktop computer, but it is still a computer that can have all of the expected features and abilities while using very little power. Deb is officially provided with a Rasping OS by the Raspberry Pi Foundation. It has an on-chip GPU and an ARM-based Broadcom Processor SOC (Graphics Processing Unit). Raspberry Pi's CPU speed ranges from 700 MHz to 1.2 GHz. It also has SDRAM on board, which ranges from 256 MB to 1 GB. On-chip SPI, I2C, I2S, and USART modules are also available on the Raspberry Pi.

![Figure 1. Raspberry pi](image)

**Components**

The Raspberry Pi is a lightweight, low-cost device the size of a credit card that connects to a computer monitor or television and uses a regular keyboard and mouse. It's a capable little gadget that allows people of all ages to learn about computers and programming languages like Scratch and Python. The Raspberry Pi 3 Model B+ is the most recent model, but there are also versions like the Raspberry Pi Model A, Raspberry Pi Zero, and Raspberry Pi Zero Wifi. The Raspberry Pi has sold millions of units worldwide and is used by everyone from hackers to engineers, teachers, hobbyists, and scientists.

**Web camera**

A webcam is a small digital video camera that is linked to a computer or a computer network,
Webcams come with software that must be installed on the device in order for users to record or display video over the Internet. Webcams can take photos as well as high-definition videos, but the video quality is often inferior to that of other camera types. A webcam is a digital image-capturing input system. These are sent to a disk, which then sends them to a server. They can then be transferred to the hosting side. A webcam is typically used on laptops and desktop computers. Webcam is a small digital camera that functions like a regular camera but is programmed to communicate with web sites and other internet pages. It captures real-time images from the location where it is located using a tiny grid of light-detectors known as a charge-coupled system (CCD). Since webcams lack internal memory to store files, they transfer data instantly.

![Web Camera](image)

**Figure 2. Web Camera**

**Servomotor**

Servos can be used in a variety of applications, including toys, home electronics, automobiles, and airplanes. At least a few servos are used in any radio-controlled model vehicle, aircraft, or helicopter. Servos shift levers back and forth in a model car or plane to power steering or change wing surfaces. A servo controls the speed of a fuel-powered automobile or aircraft by spinning a shaft linked to the engine throttle. Servos are used in electronic devices like DVD and Blue-ray DiscTM players to expand and retract the disk trays. Servos regulate the vehicle’s speed in 21st-century automobiles.

![Servomotor](image)

**Figure 3. Servo motor**

**SD CARD**

A flash memory card, also known as an SD card, is a modern generation of memory devices based on semiconductor flash memory. It has a small size, quick data transmission, and can be hot-plugged, among other features. The data is transferred between the host and the card in 512-byte blocks in clock serial mode. Micro SD cards (micro SDHC, micro SDXC) are smaller physical SD cards that are commonly used in lightweight digital devices such as smart phones and other portable digital devices. Normal SD Cards are 24mmx32mmx1.44mm in size and run at a voltage of 2.7-3.3V. They used almost the same form factor as the existing Multi Media Card (MMC) format but were slightly thicker (2.1 mm vs. 1.4 mm).
The dimensions of a standard SD card are:
- 24 mm wide
- 32 mm tall
- 2.1 mm thick

Each SD card has a slanted upper-right corner to ensure the card can only be inserted one way.

![Figure 4. SD card](image)

**Medicine Dispenser**

Pill dispensers are often used for medicinal reasons, as well as to assist people, whether elderly or chronically ill, in taking their prescription drugs, over-the-counter medication, or regular supplements on a set schedule [7]. If the patient fails to remove the drug from the dispenser, the pill dispenser will transmit a signal to a monitoring station, which will notify the patient, family, and friends.

![Figure 5. Medicine dispenser](image)

### 3. Results and Discussion

The success rate of the pill dispenser for different pill sizes was used to gauge the project's success. Since up to three different types of medication can be dispensed, the following metrics were calculated for each pill size: how often the correct pill is dispensed, and how often the correct pill is dispensed [11]. The number of times a single pill is given out. The time between when a pill was released and when the patient received an SMS update. It's important to remember that no human subjects were included in this study; instead, all data was obtained during laboratory research to assess the device's effectiveness.

For each form of drug, metrics 1 and 2 were calculated as percentages, while metrics 3 and 4 were calculated as time delays in seconds [13]. For each of the following pill diameters, each metric was calculated: 0.48cm, 0.58cm, 0.69cm, 0.86cm, 1.52cm, 2.03cm.

There are numerous systems that assist with the same goal. However, these systems are difficult to use, non-mobile, costly, and require a lengthy process. These issues are addressed by the proposed scheme. The outcome of applying these fundamental operations to a test image is investigated. The proposed approach was tested using the PYTHON function and various image processing techniques [14]. After comprehensive research, the textured cone design was found to trap exactly one pill. It's a dependable solution that can adjust to any FDA-approved pill size and shape, which can vary from small to large. It is important to remember that no human subjects were included in this study; all data was obtained during laboratory research to assess the device's effectiveness.
4. Conclusion

This project focuses on the issues that people have with their prescription medications. It not only benefits patients but also their caregivers by reminding them to take the right amount of medication at the right time. The smart medicine box, which is powered by a microcontroller, has been shown to function well. The benefit of this box is that it is very simple to use and has a low level of difficulty.

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