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Smart Pill Prompting for Elderly People Using Internet of Things

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ABSTRACT

The main objective of our project is to develop a Pill Prompting box using Internet of Things (IoT). Now-a-days people are suffering with different type of diseases, in order to cure those diseases doctors were advised them to take daily medicine to prevent from dangerous stages of that disease. At present, every person is busy in their own daily life and neglecting to take medicines in preferred time. Improper intake of medicines may lead to serious health issues. So, in this project we are implementing a pill prompting box which is used to remind the patient or elder people to take daily dosage medication in preferred time suggested by the doctors. By taking medicines in given preferred time we can save many lives to some extent. Hence this project can be used in home for patients, doctors in hospital.

Keywords: Pill Taken, Pill Missed, Medicine Box, Raspberry Pi, Pi Camera, IR Sensor, email

1. Introduction:

According to the world health organization (WHO), over 80% of the human beings above the age of 50-60 years are prescribed pills, which might be to be fed 2-3 instances in a day. With the growing of many vascular diseases and diabetes many of the elderly people, taking right medication has become the first priority to stay healthful. But among this people, 40-60% are having an problem of forgetting to take pills on right time. In clinic or in house, the sufferers should take the right doses in suitable time. Even younger people who are used to take care of elderly human beings in home neglect due to different issues. So, it could cause prolong duration to get over the diseases. Sometimes elderly people take incorrect pills and incorrect doses which can cause severe issues. Henceforth it's miles important for the affected person to take right pills at unique amount and time. Developing of digital tool may be efficient way to clear up the above issues in this era of generation[17].

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2. Related Work

B. Ayshwarya et al [1], proposed a system IoT-enabled pharmaceutical box is made up of several sections. The following is an overview of architecture. The patient's information is collected by the microcontroller utilising biosensors such as a temperature sensor and a heart rate sensor. DC power is sent to a smoothing capacitor, which regulates DC fluctuations from the rectifier, and the regulators are provided the same DC current without variations. These regulators can be utilised in logic systems, instrumentation, Wi-Fi modules, bio sensors (temperature and heartbeat sensor), and other solidstate electronic equipment because of the voltages available. The suggested medication box is made up of sensors that gather and report the patient's condition via software that constantly monitors whether the medicine is taken on time or not. When the capsules are first inserted into the kit, the information about them is usually stored in a supporting database. Mohammed Abdul Kader et al [2], proposed a system in which SD card shield, real-time clock, and reset button serve as input devices, while LED and LCD display serve as output devices. The time schedule and audio file are stored on the SD card shield. For reading time, a real-time clock is employed. When real time matches the time set on the SD card, the LCD display displays the measured value and the LED light blinks. After that, an amplifier circuit is used to boost the audio signal. The reset button is used to restart the procedure and ensure that the patient has taken their medication. Akhilesh Agrawal et al [3], proposed a Wifi module, ATMEGA, Sensors, LED, LCD, Connectors, and Buzzer are all part of this system. There are two aspects such as application-based and hardware-based. This programme offers flexibility and choice in which the doctor plans the dose of medicine and has access to each patient's name and details, as well as his medicine name and the timing schedule at which the patient must take the medicine. The doctor might print the schedule after he has planned the drug dosage. The hardware comprises of a pill dispenser box with 21 slots and one LED light in each slot one infrared sensor When a doctor plans a patient's medicine dose using app, a buzzer will sound to remind them of the time, and LED light will illuminate the slot from which the drug must be taken, as well as the name of the medicine and the time. The IR sensor will send a message of successful medication to the microcontroller AT mega 2560 as soon as the patient opens the 11 lid of the slot, after which the buzzer will be snoozed until the next medication, and a message will be sent to the software application that the patient has successfully taken the medicine. P. Ranjana et al [4], proposed a system the data is collected by the sensor and stored in the database. The data analysis is performed on the database to determine whether the symptoms are normal or not, as well as to determine whether the system is aberrant or falls below the threshold. As a result, the value is gathered and saved. Each data point

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is assigned a value, for example, the ECG and Blood Pressure capture ranges are verified against the normal range. If it goes below the threshold, it sends a signal to take medicine or see a doctor. If the patient's condition is normal, the bell in the medicine cabinet will alert you. Sultan Ahmad et al [5], proposed a system in which design was built specifically for the Android operating system. We use a reminder mechanism in their system, which sounds an alert when it's time to take medicine. There is also an Android application that allows the user to specify their medication timing. Some features in the programme will assist the user in learning more about their medicine. It maintains track of the medicine, so the amount of medicine they need to take may be calculated in the app. An IoT-enabled pill box with numerous compartments, each with a lid to open and an IR sensor connected, makes up the gadget configuration. The pill box system contains IR sensors for monitoring and reporting. Samir V. Zanjal et al [6], proposed a system in which the elderly and individuals with chronic conditions who need to take their medicines on time would benefit from this suggested method. are suffering from dementia, which causes them to forget things in their everyday routine. This has been studied in light of the situation. This paper examines the technologies of Home health care is currently being utilised to help improve this scenario by reminding the patient. patients drug schedules, remote monitoring, and new medicine data updates. Prescribers can accomplish this over the internet. Pallavi Prakash Ghogare et al [7], proposed a system in which it has pill box with a collection of compartments makes up the Medicine Reminder System. It is developed in such a manner that regular people may use it to take their medication without difficulty. LEDs are used in the pill box's control system to provide visual notifications to the patient for treatment. The device includes a buzzer that provides audible notifications to the patient. It will buzz for a set amount of time, during which time the person must push the key by taking the drug; otherwise, an alert will be sent to the patient's caregiver through GSM informing them that the patient has not taken the medicine at the time suggested by the doctor. The notifications are sent via the buzzer and LEDs at the time selected by the caretakers.

3. Proposed Methodology

The system should be connected according to the block diagram in Figure 1. Before testing with dynamic inputs on the model, we should create our system with the essential and required components. Figure shows a kit depiction of hardware components. Make sure all of the connections are safe and secure. Using an HDMI cable, connect Raspberry Pi to an external monitor or desktop. Then connect the Raspberry Pi to the internet so that we may communicate with the input data via System. Also, connect the camera interface which allows to take images.

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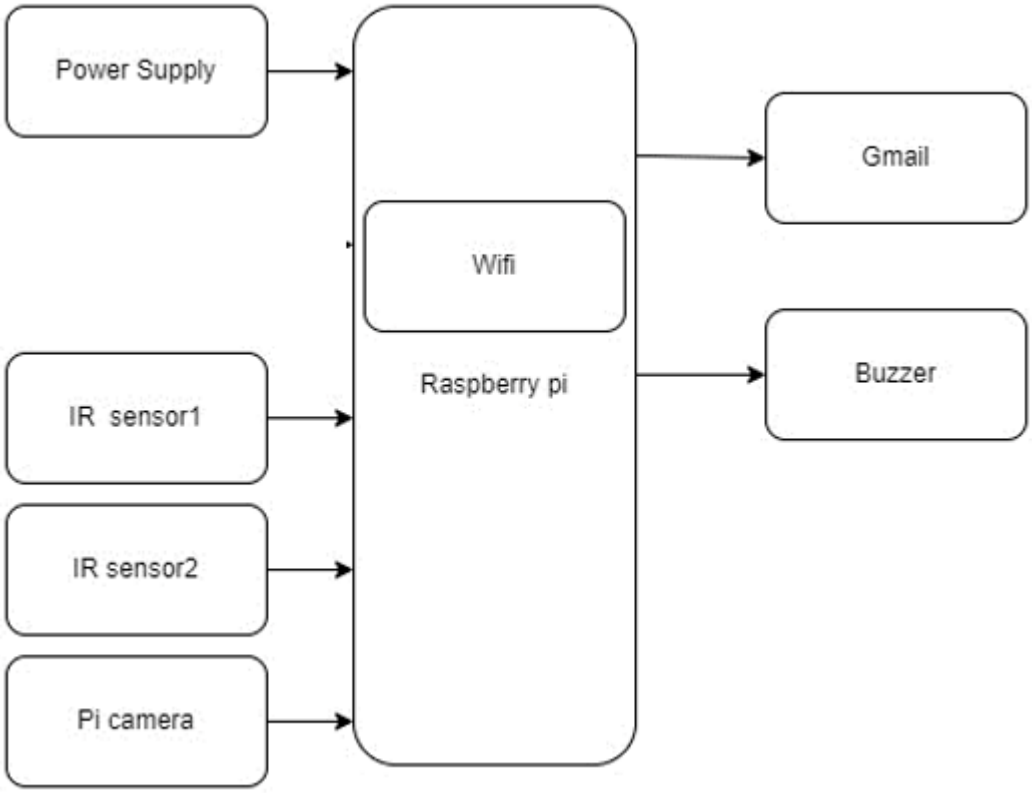

Figure-1: Block diagram for the proposed model

In order to reduce the responsibility of family members of dividing the medications in the pillbox, we assume that the medicine the patients need to take at particular times has been packed into the pill box. Using the input system, we must set the pill time for the needed medicine in this system. Various times can be specified for different medications. If you need more than one pill at a time, enter the box numbers into the system to acquire the tablets you need. We also specify the number of tablets that will be inserted into the system. The output of a real-time clock is continuous time. To determine the pill time, the system continually checks the time using a real-time clock. The system indicates that it is time to take a pill if the system time matches the pill time. When the system time match with pill time, the buzzer starts ringing and IR sensor blinks the light at the appropriate pill which was set by the user. If the pill has taken then a snap will be taken using raspberry pi camera and sent to the email which was given in the code (family member) saying PILL TAKEN. In the same way if the pill is not taken then the email will be sent to the family member saying PILL MISSED. So, in this way the family members will get intimated by email.

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4. Results and Discussions

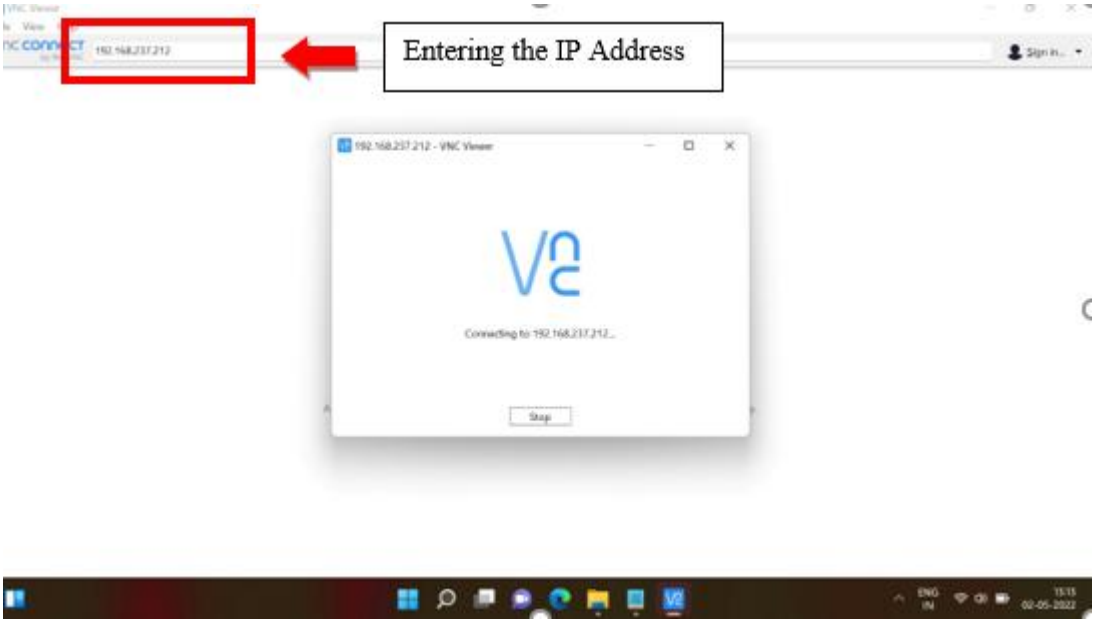

Figure-2: Opening VNC viewer in system

Figure 2 depicts about the VNC viewer in the system. To proceed with the connection, we need to enter the IP Address as represented above. Then the system gets connected.

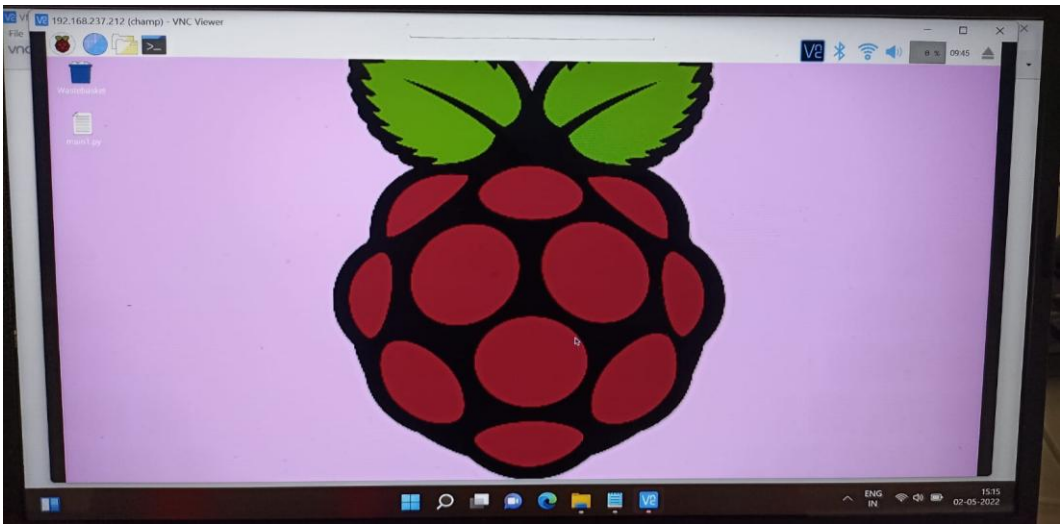

Figure-3: Raspberry Pi environment gets opened

After successful connection, the Raspberry Pi environment gets opened as shown in the Figure 3, the code that starts camera, to detect the person is taking pill or not. Based on the result obtained whether pill taken or pill missed the appropriate email will be sent to the family member.

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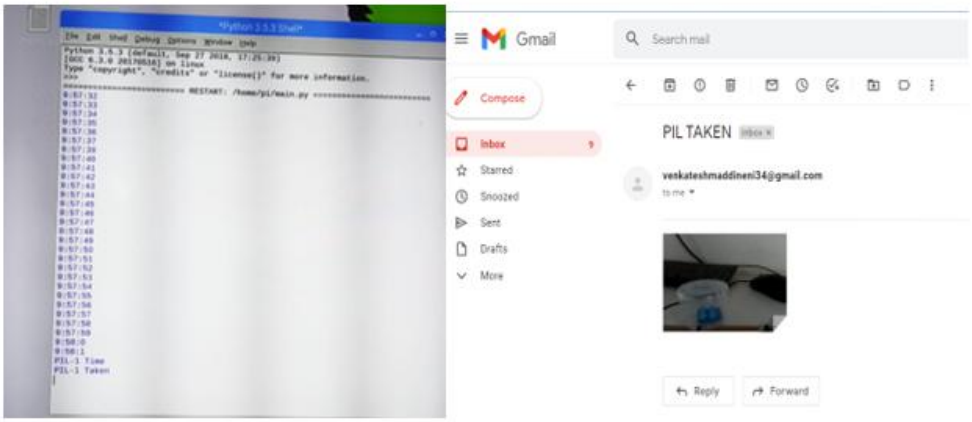

Figure-4: Result showing 'PILL TAKEN' with email

Figure 4 depicts the system's first test scenario. This test case is designed to verify the system's functionality as the patient takes the pill in front of the camera. If a person takes the pill on time, the system should show the output as 'PILL TAKEN' and send an email with a picture regarding the pill status, according to the code. The system displays pill taken because the patient in the frame took the medication on time.

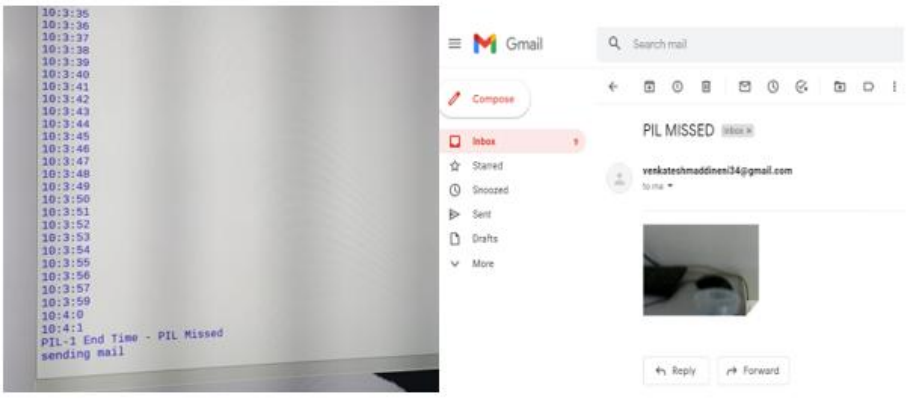

Figure-5: Result showing 'PILL MISSED' with email

The second test scenario for the system is depicted in Figure 5. Because the patient missed the pill in front of the camera, this test scenario is used to check the system's operation. According to the code, if a person fails to take the pill within a certain amount of time, the system should display the output as 'PILL MISSED' and send an email with a photo of the pill status. Because the patient in the picture skipped a medicine at a specific time, the system indicates pill missing.

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5. Conclusion and future work:

In this paper, we have detected the patient taking the pill in time or not using Raspberry Pi and IR Sensors. If the pill time has arrived, then a buzzer will ring with the respective medicine box. So that the patient can't get confused. If a patient takes pill in given time then the pi camera captures the image and system send an email to the family member with an image and pill status. Similarly, if a patient miss the pill in given time, then the pi camera captures an image and system sends an email to the family member with an image and pill status. Hence the family member gets the update of every pill and they can save their loved one's by saving time. We hope to develop our medicine update framework in the future by introducing Video Streaming and Voice-alert notification, a system that will not only send notification but also read the text of the notification. A data-sharing for patient and health-care professional data exchange will also be created.

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