

“Forget Me Not”

Medicinal homely care for older adults

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Abstract : Regular intake of correct dose at correct time is an important part of medical care for older people. Without drugs, many older people would function less well or die at an earlier age. Old person usually tend to consume more drugs than any ordinary younger person because they are more likely to have chronic disorders such as high blood pressure, diabetes, and arthritis. Most of the drugs consumed by older people for chronic disorders are taken for years, other drugs may be consumed for only a short time to treat such problems as infections, some kinds of pain, and constipation. On average, older people take four or five prescription drugs and two non-prescription drugs each day. Now problem arises for in taking correct medicine at accurate time regularly with definite quantity for making dose effective and impactful. This study proposes a framework of medicine management system based on algorithm which eradicates difficulties faced by older people such as to remember time, name of dose, quantity or amount of dose, along with some specific description along with feedback and assistance mechanism. This system will reduce the injuries due to wrong medicine intake and will help older people to take their dose by own without forgetting.

Keyword: Chronic, arthritis, Frame work, prescription, assistance-mechanism, eradicates.

1. INTRODUCTION

Statistical Tally:(Global Scenario:

The aging of populations is one of the glaring consequences of demographic transition. The advanced countries of the world have developed policies and programme to avert crises and promote economic growth. The developing economies such as South Asia are also well on their way along a similar course, and are either prepared to face the consequences or to manage the growing number of the elderly through appropriate policies. The world's population is expected to increase to 9.4 billion by 2050 from the current 7.3 billion. During the same period, the proportion of the elderly population is expected to increase from 10.4 per cent to 21.7 per cent. Among the elderly, it is the oldest among the old whose numbers will increase most rapidly over time, or about 320 million by 2050. The likely scenario of the global population projected by the United Nations (2005) for the period 2005 to 2150 is presented in the following table:-^[1]

Table 1.1: Global elder population. ^[11]
Future Scenario of the Global Population Projected by UN

	Total population (in billion)	60 years and above (per cent)	65 years and above (per cent)	80 years and above (per cent)
2005	7.3	10.4	7.4	1.3
2025	8.1	15.1	11.2	2.4
2050	9.4	21.7	15.8	4.3
2075	10.1	26.5	19.5	6.0
2100	10.5	29.2	22.5	7.5
2125	10.6	30.2	24.1	9.3
2150	10.9	31.8	25.6	10.8

Source: United Nations, 2005

Indian Scenario:

As of 2011, India is a population of 1.21 billion people. It is the second most populous country in the world, only to China¹. In 1997, the number of people aged 60 years and above, was 63.64 million. As of March 1, 2012, the projected number stands at 98.5 million. The number of “elder” people in India (60+ years) has increased by 54.77% in the last 15 years. In comparison, the working population (15-59 years of age) grew from 532.6 million to 758.61 million during the same time period², increasing by 42.34% in the last 15 years. As of March 1, 2012, the old age dependency ratio, which measures the number of elderly people as a portion of those of working age, stands at 0.132. By 2050, India's old age dependency ratio is projected to cross over 0.20. This editorial aims to put in perspective the plight of the Indian elder with respect to the changing demographics, the changing social structure and the near absence of specialized geriatric care.^[10]

The projected population aged 60+ and their percentage share in the total projected population of the country, for the year 2006 to 2026 (as on 1 March) as per the May 2006 Report of the Technical Group on Population Projections constituted by the National Commission on Population published by the Office of the Registrar General of India, is as under.^[19]

Table 1.2: Indian elder population ^[11]
**Projected Population of Senior Citizens and
 Their % share in Total Projected Population**

Year	Projected Senior Citizens Population (Crore)			As % of total population		
	Persons	Male	Female	Persons	Male	Female
2006	8.36	4.07	4.28	7.5	7.1	8.0
2011	9.85	4.81	5.03	8.3	7.8	8.8
2016	11.81	5.81	5.99	9.3	8.8	9.8
2021	14.32	7.06	7.26	10.7	10.2	11.3
2026	17.32	8.46	8.86	12.4	11.7	13.1

Social Scenario:

One of the important social issue concerning elders and geriatric care in India is the changing family structure. A rapid transition to urban areas in recent areas has led to breakdown of the joint family structure and emergence of the nuclear family. With no social security structure in place and with inadequate facilities in health care, rehabilitation and recreation, the Indian elder is staring at a bleak present and future. The basic social structure in India has historically been the ‘joint family, where extended family, including brothers with their spouses and children stay under one roof. This family structure has been the socio-economic backbone of the average Indian. In times of disease or emergency, members of the family have pooled in resources to help each other out. The family has also looked after it’s elders in their old age by giving them socio-economic and emotional support. It is believed that since the elders raise children, it is the duty of the children to support and take care of them in their time of need. There are other issues with influence elder care. With an entire generation of females working, the traditional concept of the ‘housewife’ caring for the house and the adult has changed significantly A large number of couples now opt to have kids late into their marriage or not to have them at all, citing professional commitments. Absence of grandchildren, with the presence of a working son and spouse perhaps deprive them of an emotional support that was taken for granted just a couple of ago. It only gets worse for the elder whose spouse has passed away. In India, staying with your daughter while she’s staying with her ‘in-law’s’ is considered taboo. Hence for elders with a lone daughter and no other family, it is more difficult. And to appoint someone on rental bases to take care for medicinal assistance has some security issues. The elder is now left to fend for himself. And in case if a grandchild or maid is kept for taking her that person has to well aware of all the medicine ,timings of it ,quantity, additional instruction etc. that becomes too tedious to remember.

Problem Statement:-

For elderly people, medications can be a lifeline to good health...or a disaster waiting to happen. When doses are skipped, or too much medication is taken, the results can be deadly. Older people tend to take more drugs than younger people because they are more likely to have chronic disorders such as high blood pressure, diabetes, and arthritis. Most drugs used by older people for chronic disorders are taken for years. Other drugs may be taken for only a short time to treat such problems as infections, some kinds of pain, and constipation. On average, older people take four or five prescription drugs and two non-prescription drugs each day.

Medication problems are widespread. According to the Department of Health and Human Services: 55 per cent of the elderly are "non-compliant" with their prescription drugs orders, meaning they don't take the medication according to the doctor's orders
 Approximately 200,000 older adults are hospitalized annually due to adverse drug reactions[4]
 There are many reasons why seniors don't take their medications as prescribed. Here are some common causes of medication mistakes, and what to do about them.

Vision Problems: For elders who have [vision problems](#), not being able to read small print on labels or distinguish between pills can lead to potentially dangerous misuse.

Memory Loss: Elders who suffer from dementia disease may simply forget to take their medications, causing them to skip doses. The opposite is also true: if they can't remember whether they took their medication, they might take it again, causing overdose.

Seeing the social scenario lonely elder person has to manage to remember medicine name ,timings of it ,quantity, additional instruction such as whether to take medicine at morning ,noon, eve or night further before meal or after which is difficult for even a young person. Say if we have appointed to take care then also job becomes tedious and relevantly costly.

2. FIELD SURVEY AND ANALYSIS

Participant profile: Participants in the field survey were older people who needed regular medications and with varying level of problems with their sight, hearing, memory etc. They were selected using ‘purposeful sampling’. The selection of participants was random, Age group was set 60 or above.

Data Collection: The methods used in the user study were a structured interview with both closed and open-ended questions. An interview was conducted based on a questionnaire which was designed in order to understand the factors affecting and difficulties occurring in managing to intake of correct dose in correct time and with appropriate conditions. Sample of 30 has been taken for survey. Interviews consisted of the following main themes:

Questionnaire’s Questions along with their analysis are as follow:

1) Number of intake Dose due to chronic or special case disease every day?

Table 2.1: No of Intake dose

No of Dose	1-3	4-5	More than 5
No of Person	12	17	1

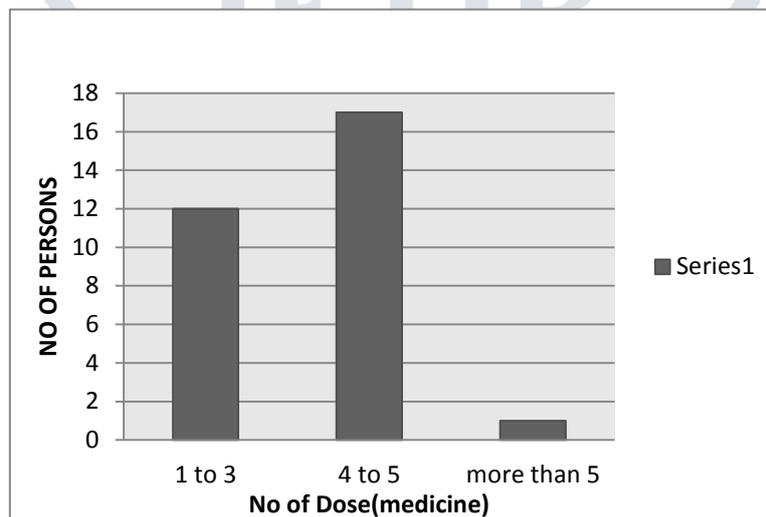


Figure 2.1: Graphical representation of intake dose

2) Do you take dose by your own or someone is there to assist?

3) If by own or by assistance do you miss dose or wrong (Error) dose is consumed?

Table 2.2: Way to take med & error

Way to take med	By own	Under assistance
No of Person	20	10
Error	18	9

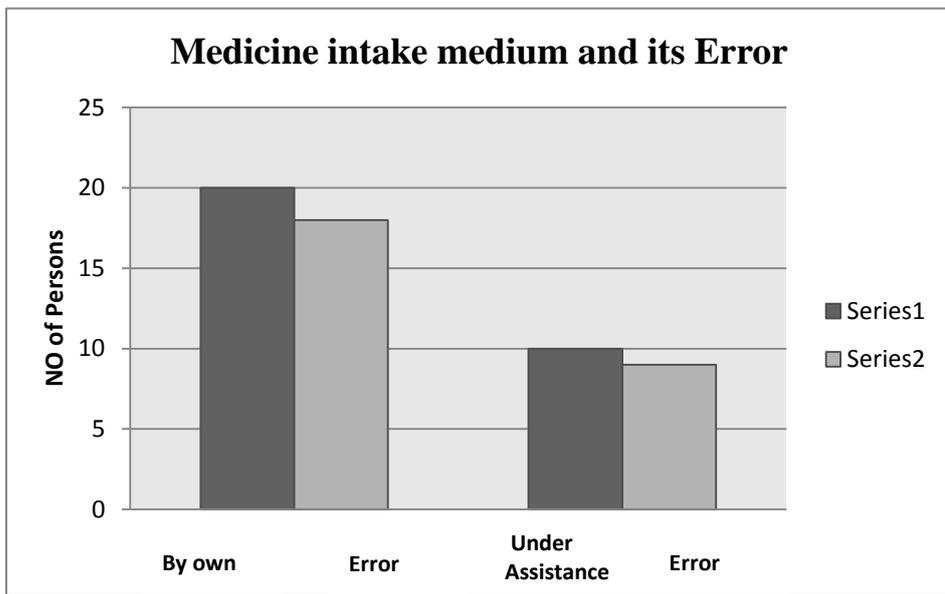


Figure 2.2: Graphical representation of medicine intake medium and error

4) Which factors halts taking medicine regularly or wrong dose intake?

Table 2.3: Barriers in taking dose

Barriers in taking dose	Memorizing time	Differentiating Dose	Additional info	All of them
No of Person	10	6	10	4

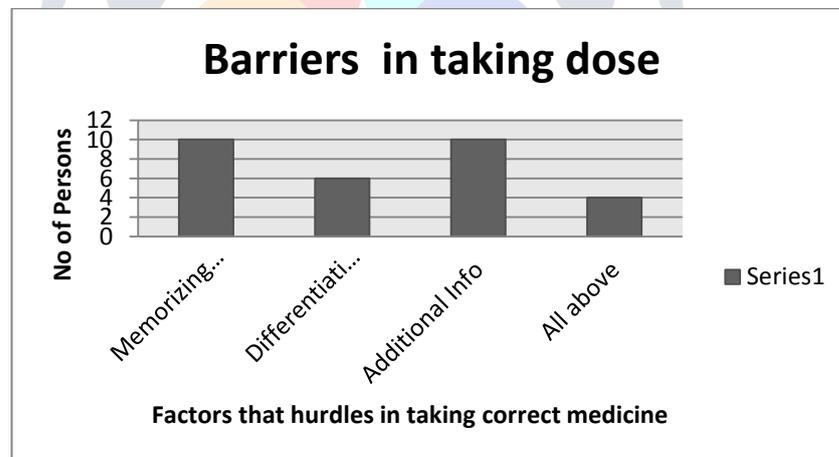


Figure 2.3: Graphical representation of barriers in taking dose

5) Would it help to take correct dose regularly if any device assists u in mentioned problems?

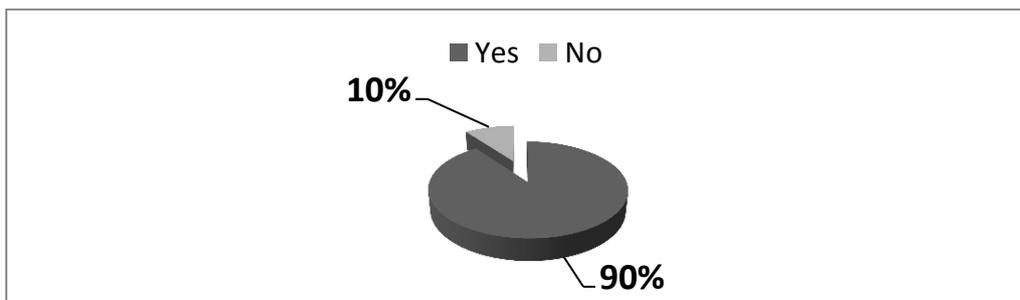


Figure 2.4: Pie Chart of whether any device as mention in project will help or not

Summary: Data obtained from survey after analysis concludes few facts such as:

- Most of old person take their dose by themselves as they are alone at home or may be due to some or other reason.
- Whether they take by own or under assistance errors do occur in taking medicine.
- Factors such as memorizing time, differentiating dose, additional information are major problems in taking medicine and all of them agreed that the proposed device will surely help them for medicine management.

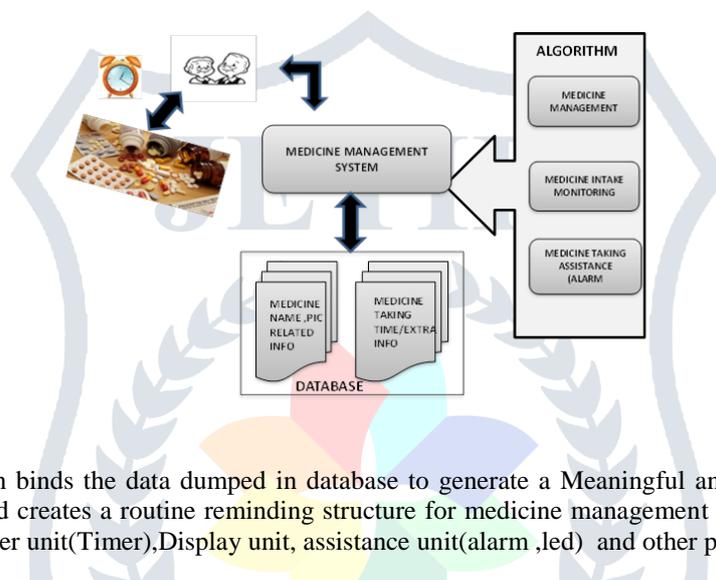
3. PROPOSED SOLUTION

Operating Scenario:

After understanding the problem statement and analysing the survey Result I have come up with a solution whose operating scenario is shown in above figure. Here the home medicine management system can be subdivided in to two major sections:

- Database section
- Algorithm section

Database section: This section consists of all the data related to system. It's just like a Storage space where all the data is dumped .The data present here can be name of medicine, images of medicine, timings to take medicine, additional information which is to be recalled along with dose such as some dose is to be taken strictly with empty stomach, or it can be some specified meal along with the dose.it can also have information to differentiate between medicine which look like.



Algorithm section: This section binds the data dumped in database to generate a Meaningful and required structure. It uses the required data from database and creates a routine reminding structure for medicine management system.it can be subdivided into many parts such as time reminder unit(Timer),Display unit, assistance unit(alarm ,led) and other possible units.

CONCEPTUAL BLOCKDIAGRAM

Figure 3.1: Operating scenario

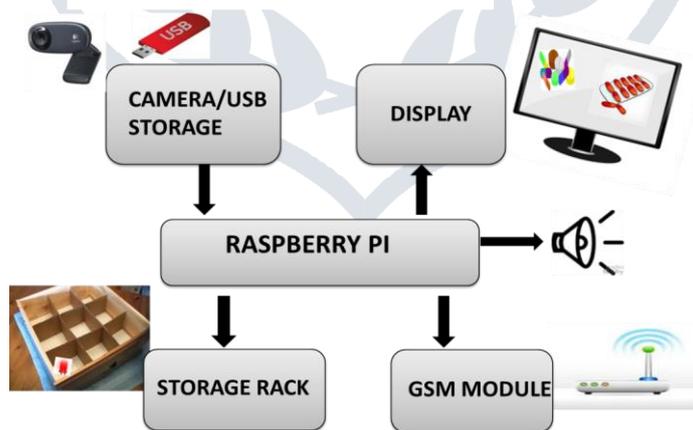


Figure 3.2: Block Diagram of proposed system

Block diagram of the medicine management system is as shown in figure ,it basically consists of Processor i.e Raspberry Pi board in this case, display ,camera, speakers (if Display in not TV),Racks and possible modules.The heart of the system is Raspberry pi board through which all other modules such as display ,camera or speakers are connected.

- **Raspberry pi:**^[9]



Figure 3.3: Raspberry Pi B+

- Dual step-down (buck) power supply for 3.3V and 1.8V
- 5V supply has polarity protection, 2A fuse and hot-swap protection
- New USB/Ethernet controller chip
- 4 USB ports instead of 2 ports
- 40 GPIO pins instead of 26. The top/first 26 pins match the original layout, 9 additional
- GPIO and 2 EEPROM Plate identification pins
- Composite (NTSC/PAL) video now integrated into 4-pole 3.5mm 'headphone' jack
- MicroSD card socket instead of full size SD
- Four mounting holes in rectangular layout
- Many connectors moved around

Camera Module: Any usb camera can be used basically this module is to capture images of medicines. It can also be further utilised as video monitoring.

Display Module: This section displays all the information regarding medicine. Display in the system depends on the availability of user's need. If user has HDMI TV it can be utilized by connecting it to HDMI port of Raspberry Pi, even normal TV can be connected by video output of board or a separate display can be provided if cost is not a issue. If we connect to a separate display speaker connection would be required.

Rack/Shelves: For assistance purpose racks are created for keeping separate medicine in different partition.As when it is time to take medicine led in particular partition glows indicating user from where medicine is to be taken and provide assistance. After taking medicine, it is to be kept in same place from where it is taken, for that we can program led for glowing for some time period or we can also provide lid to shelves.

GSM Module: This module adds portability to system hence when person is not at home still necessary information will be provided to take correct dose.

Flowchart:

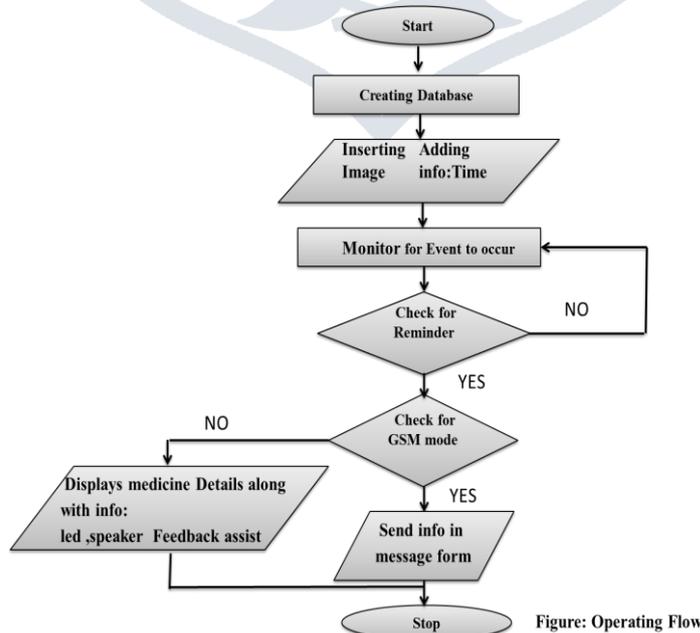


Figure: Operating Flow

Figure 3.4: system flow

Flow chart Description:

- Initially image of the medicine mentioned in dose is to be inserted in device this can be done via camera or any storage device.
- After inserting images relative information such as name of medicine, time to take medicine or any additional information such as taking medicine before or after meal or some special meal to be taken with medicine.
- After database is created program starts monitoring event to occur, in this case event is time to take medicine.
- If any event occurs it checks for simple or gsm mode if it is simple mode, image of that particular medicine along with additional data gets displayed on the screen.
- Elderly old person can see the name of medicine, as well as image of that medicine to be taken So that wrong medicine is not taken and he/she can easily differentiate from other medicine in the dose.
- Additional information is also displayed along with image.
- Text to speech feature is also indulged so that not only visually impaired old people can assisted, but it also provides efficient additional assistance in taking medicine.
- Along with all this events led present in rack indicates which medicine is to be taken i.e this section is additional assistance part.
- And if device is in GSM mode all information would be text to particular number
- With help of all this events right dose at right time is taken by old people without missing any dose

CONCLUSION

This project is targeted to overcome the problems faced by elderly old persons to take medicine of their dose on regular basis. Time management, differentiating dose, recognition of medicine or remembering additional information regarding dose which are some common factors that has been concluded from literature review and survey, hence the project provides solution to such kind of hurdles faced by old person. Mentioned device will reduce the injuries to old persons due to wrong medicine intake or missing the dose with a simple real-time solution.

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