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Automatic Medication Dispenser

Y. Prakash[1], G. Saroja[2], N. Niharika[3], P. Disha[4], K. Pavithra[5]
Assistant Professor, Dept. of Electronics and Communication Engineering[1]
UG Students, Dept. of Electronics and Communication Engineering[2,3,4,5]
G. Narayanamma Institute of Technology and Science, Telangana, India

Abstract: *In moment's time there is a growing need to assist the seniors. There is an increase in the death rate of the aged people caused substantially due to the overdose of medicine or because of taking the wrong medicine. Numerous seniors who suffer from Dementia or Alzheimer's may not flashback when to take their medication or what medication to take. This system can be helpful in similar cases. This system helps us in furnishing the correct cure of medicine on the right time to the person. In this paper, we've described the design of the system that sounds off a buzzer and an LED light is turned ON to indicate the time to take the medicine. A communication is transferred to his/her guardian through a GSM Module, if the medicine is still not taken after a certain quantum of time.*

Keywords: Microcontroller, Sensors, Driver circuits, Stepper motor, Servo Motor, GSM Module, Medication

I. INTRODUCTION

The advancement in the medical technology has led to the invention of further and further medications that help in curing the fatal conditions and protract the life of the person. But when the medicine is taken in wrong boluses or if the wrong medicine is taken there's a chance of it oppressively effecting the health of the person and in worst cases may indeed lead to death. The system proposed helps in precluding such a situation. This design can be enforced by making use of a microcontroller, detectors, motors and a GSM Module. This system is effective and also movable so it can be used anywhere like houses, hospitalsetc.

II. LITERATURE SURVEY

According to The National Coordinating Council for Medication Error Reporting and Prevention has defined drug error (ME) as "any preventable event that may beget or lead to unhappy drug us or patient detriment, while the drug is in the control of the healthcare professional, patient or consumer". In Indian, utmost of the cases of drug error are due to the unsound use of the drug. Annually, 7,000 deaths are reported due to the medical crimes. The Data traced back to the recent times shoes that the adverse medicine events was as important as in Delhi and the numbers show that5.2 million medical crimes do annually.

Type of medicine administration errors (*n*=126)

Type of error	Medicines	Number of medicines		
Inaccurate dose (*n*=72)		**Extra or high dose**	**Low dose**	
	IV fluid (24)	13	11	
	Multivitamins (18)	7	11	
	Furosemide (17)	10	7	
	Co amoxiclav (8)	4	4	
	Salbutamol (3)	1	2	
	Enalapril (2)	2	0	
Errors in dose interval (*n*=38)		**Early**	**Late**	
	IV Fluid (12)	4	8	
	Ceftriaxone (10)	2	8	
	Co-amoxiclav (5)	2	3	
	Metronidazole (3)	0	3	
	Mannitol (3)	1	2	
	Vitamin-D3 (2)	1	1	
	Insulin (2)	1	1	
	Gentamicin (1)	0	1	
Wrong route of administration (*n*=15)		**Oral to IV**	**IV to oral**	**Tablet to syrup**
	Zinc (9)	0	0	9
	Ranitidine (4)	1	3	0
	Paracetamol (2)	0	2	0
Wrong patient (*n*=1)	**Diagnosis**	**Wrongly administered**		
	Pneumonia	Calcium		

IV=intravenous

Table 2 Shows some data supporting the statistics

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It's observed that the number of error increase with a lesser number of drugs specified, analogous looking drugs, senior cases etc.

III. PROPOSED MODEL

The aim of this projectis to design an automatic medicine dispenser using ARDUINO UNO. The main intention behind this design is to help people take the right cure of drug at right time, especially senior people who forget to take their drug on time without any mortal intervention. In this design, we used a stepper motor for the movement of the compartment. We also used buzzers and LED lights as alarm systems. The temperature and the moisture of the place where the dispenser is placed is also displayed.

IV. BLOCK DIAGRAM

The automatic medication dispenser is used to monitor the medication of the person without any human intervention. The architecture of the Automatic medication dispenser is described in fig1. The alarm system which consists of buzzers and LED reminds the person to take medication at right time. This also includes periodical checkups of temperature rate and humidity. In the block diagram, we can see that the DHT11 sensor is connected, which is used to display the temperature and humidity values. A 5V power supply is given to all the components to activate them. IR sensor acts as an informer that intimates the identification of objects. A Stepper motor is used for the movement of the compartment, The buzzers and LED lights are connected to the ARDUINO UNO board. A servo motor is connected for the opening and closing of the door. A GSM module is connected for sending a message to the guardian of the person.

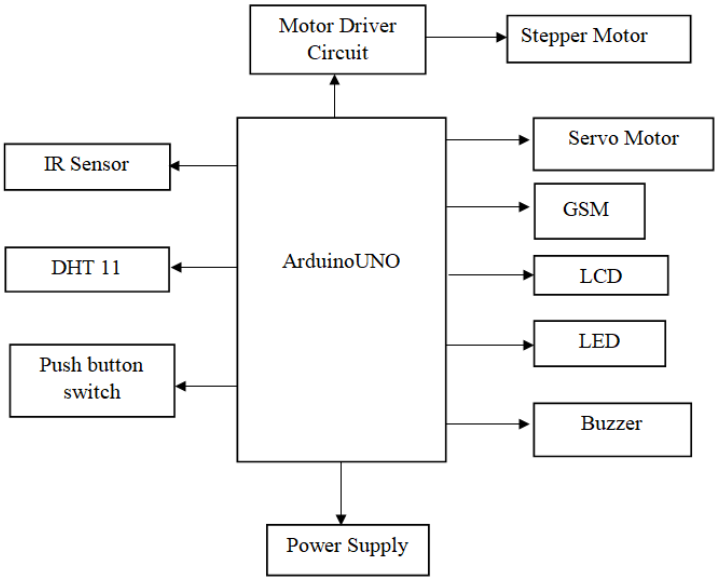

Figure-1 Block diagram of Automatic Medication Dispenser.

IV. METHODOLOGY

The design comprises of two major parts i.e., the hardware and the software part. The idea of this system is to apportion the right quantum of medicine on the right time.This is done by making use of several hardware and software components. A Servo motor is used to open and close the door of the dispenser through which the medicine is dispensed. A Stepper motor is used to move the compartment tray that holds the medication and a DHT 11 sensor is used to indicate the environmental conditions of the place where the dispenser is placed. IR sensor is used to sense the presence of the container in which the medicine will be dispensed.

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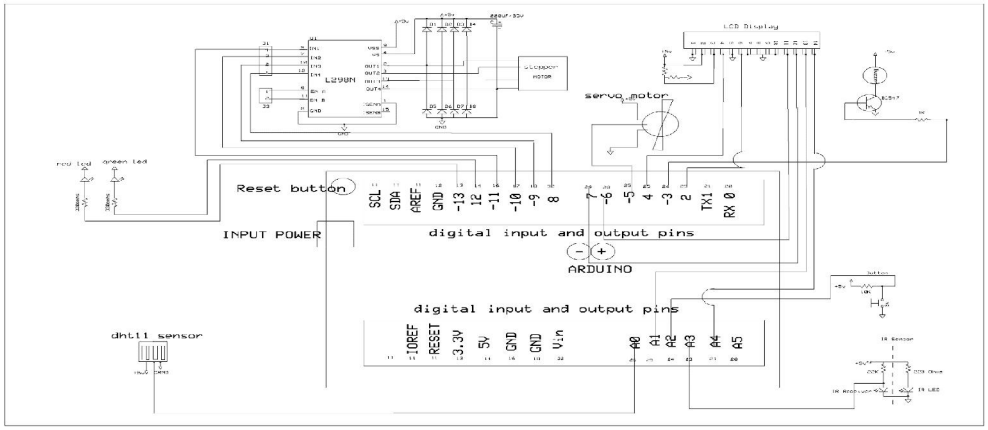

Figure-2 Design of Automatic Medication Dispenser

VI. RESULTS

After the system is activated and whenever it is the time to take the medicine,

1. The stepper motor rotates the compartment tray which contains the medicine and when we press pushbutton the door of the dispenser is opened by the servomotor and buzzer rings and red LED glows indicating the time to take the medicine.

2. Whenever the patient took the medicine, the green LED will glow. The IR sensor detects the object that is placed beneath the door of the dispenser and whenever the object is not found the LCD displays place the object and door of the dispenser will close or open. This working of the automatic medication dispenser is shown in Figure 3.

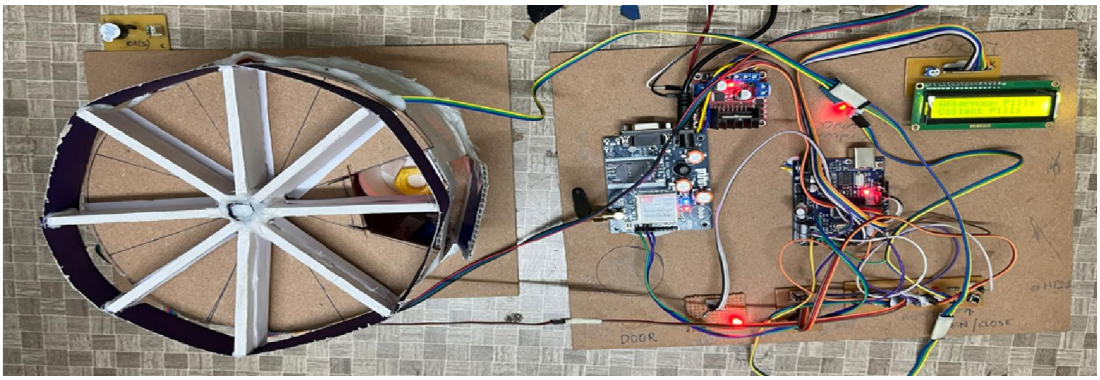

Figure-3 Displaying Internal working of the system

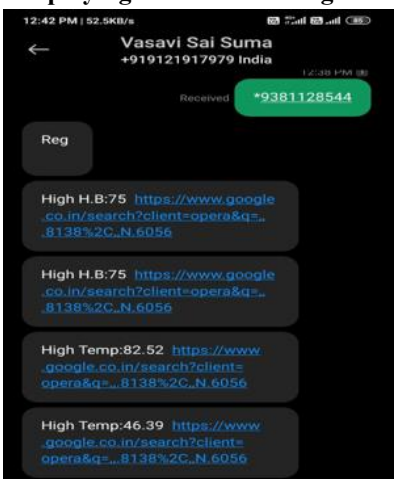

Figure-4 Displaying the messages received

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3.If the person does not take the medication at correct time when the buzzer rings, the buzzer will continue to ring and the LED is turned RED until the person presses the switch to take the medicine.
4.When the patient did not take the medicine, the alert message is sent to the guardian using the GSM as shown in Fig.4.

VII. CONCLUSION

In today's time there are issues concerning the ability of the people to remember to take and handle their medicine on their own especially the people in their old age. By making use of this system, we can reduce the risk of people missing their medication or even worse the possibility of over dose. This system would prevent the person from forgetting to take their medication, or accidentally taking the wrong medication, while giving person increased independence and a better quality of life.

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