

Automated Medical Vending Machine Using RFID Technology

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ABSTRACT:-Degrees of social status are closely linked to health inequalities. Those with poor health tend to fall into poverty and the poor tend to have poor health. According to the World Health Organization, within countries those of lower social economic strata have the worst health outcomes. Health also appears to have a strong social component linking it to education and access to information. The poor within most countries are trapped in a cycle in which poverty breeds ill health and ill health breeds poverty. Any Time Medicine Vending Machine is although not a new concept in its entirety, it could prove to be useful and hence important in developing countries like India where healthcare is almost critical. Now-a-days in this fast moving world, appliances which are completely automatic are preferred. This is the biggest advantage of this project. The system is fully controlled by the 16 bit micro controller. Automated dispensing machines decentralized medication distribution systems that provide computer-controlled storage, dispensing, and tracking of medications have been recommended as one potential mechanism to improve efficiency and patient safety, and they are now widely used in many hospitals.

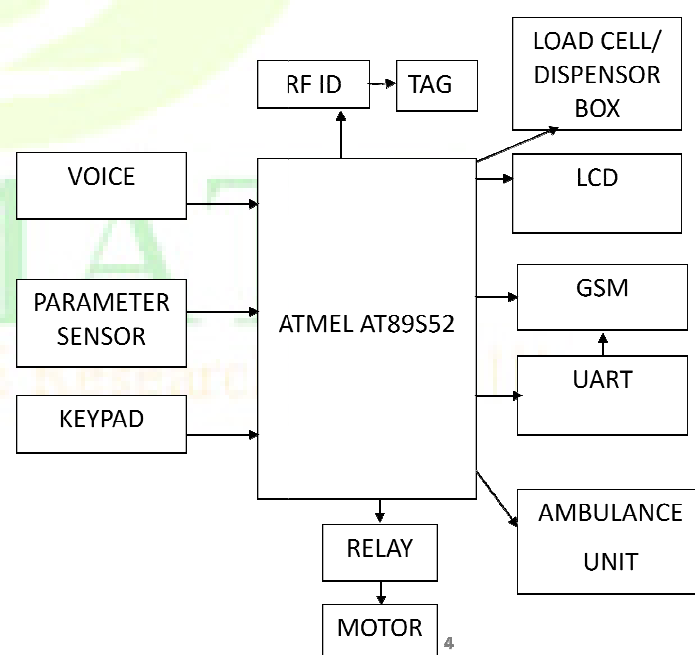
I.INTRODUCTION

Automatic medical Vending machine is an extension of automated teller machine which helps people to access medicine at anytime and anywhere. The main objective of the system is to provide an access over 24*7. Monitoring the corresponding person who buy the medicine. The system also paves the way for an area without having Medical shop facility. Many people suffer due to lack of medical facilities and also due to negligence of untrained hospital staff. Pharmacies are severely and service is also less at the night time and holidays. To overcome these problems

we come up with an idea called Automated Medical Vending Machine Using RFID Technology.

The concept of this proposed system has been evolved from the extension of normal vending machine. Previously it was used for applications such as weighing system, pen, chocolates; tin cans etc. This paved an idea for designing medical vending machine although a new system in its entry. Now-a-days in this fast moving world, appliances which are completely automatic are preferred. This is the biggest advantage of this project. This system is fully controlled by the 16 bit ATMEEL 89S52 micro controller. Automated dispensing medicines decentralized medication distribution systems that provide computer controlled storage, dispensing and tracking of medications have been recommended as one potential mechanism to improve efficiency and patient safety.

II.BLOCK DIAGRAM



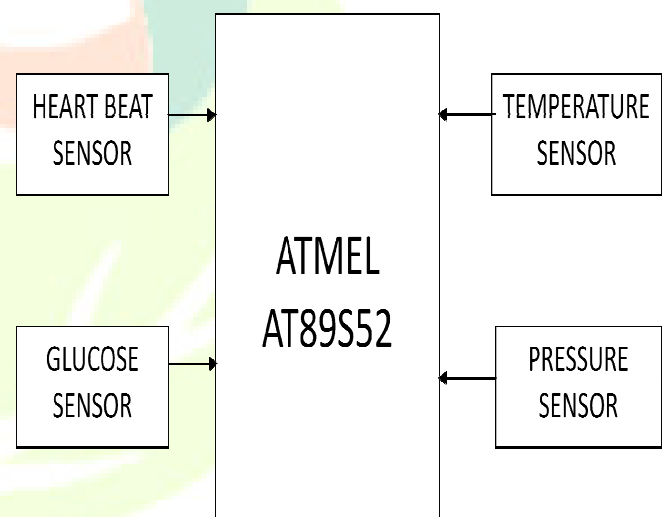
III. RFID READER

RFID system are a wireless identification system containing readers and tags. Different from Active tags, passive tags can communicate with a reader without a battery. The readers power the tags by transmitting electro magnetic waves and enable it to send back information stored on the chip. This is a low frequency (125 KHz) RFID reader with serial output with at range of 8-12cm. It is a compact units with built in antenna and can be directly connected to the PC using RS232 protocol. Its features are Serial and TTL output, along with two RFID cards. Excellent read performance without an external circuit. Compact size and cost-effective. Applications are Access control handheld readers Asset management. The tag reader is responsible for powering and communicating with a tag. The tag antenna captures energy and transfers the tag's ID (the tag's chip coordinates this process). The encapsulation maintains the tag's integrity and protects the antenna and chip from environmental conditions or reagents. The encapsulation could be a small glass vial or a laminar plastic substrate with adhesive on one side to enable easy attachment to goods. Two fundamentally different RFID design approaches exist for transferring power from the reader to the tag: magnetic induction and electromagnetic (EM) wave capture. These two designs take advantage of the EM properties associated with an RF antenna—the near field and the far field. Both can transfer enough power to a remote tag to sustain its operation—typically between 10 W and 1 mW, depending on the tag type. (For comparison, the nominal power an Intel X Scale processor consumes is approximately 500 mW, and an Intel Pentium 4 consumes up to 50 W.) Through various modulation techniques, near- and far-field-based signals can also transmit and receive data.



III. PARAMETRIC SENSORS

Measuring Parameters such as Glucose, Pressure, ECG, EEG, EMG, Temperature and many more is also one of the important features of this machine. It paved the way not only for taking medicines and also for testing parameters of human which helps in the area where testing laboratory is not available. These parameter sensors are connected to Micro controller where the results are processed and then it is displayed on the display. This system diagnosis the condition and report the current situation of the human beings and also suggest respective medicines to take care. It is connected to GSM module where the test result is send to the respective persons as a message. It is also stored in the server of the hospital as a record. This system helps to self diagnosis and also reduces labor for testing the individuals.



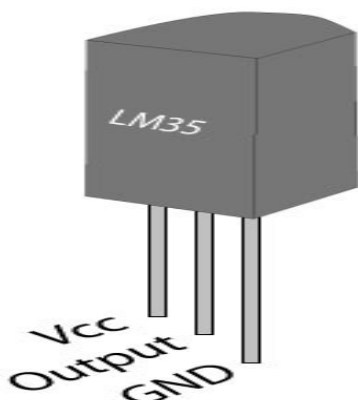
IV. TEMPERATURE SENSOR

The measurement of temperature is one of the fundamental requirements for environmental control, as well as certain chemical, electrical and mechanical controls. Many different types of temperature sensors are commercially available, and the type of temperature sensor that will be used in any particular application will depend on several factors. For example, cost, space constraints, durability, and accuracy of the temperature sensor are all considerations that typically need to be taken into account. Various types of temperature sensors are known including liquid-in-glass (LIG) thermometers,

bimetallic thermometers, resistance thermometers, thermocouples, and radiometers. Depending upon the temperature to be measured, the required accuracy of the measurement, and other factors such as durability or cost, one type of temperature sensor may be preferable over another. Some temperature sensors provide a wide range of temperature measurement, whereas other temperature sensors may only provide temperature information for a small temperature range. In addition to the temperature range sensed, the sensitivity and the accuracy of temperature sensors may also vary widely. Additionally, some temperature sensors work at high voltages while others only work at low voltages.

There're many types of devices that can be employed as temperature sensors. They include integrated circuits (ICs), pyrometers, resistance temperature detectors (RTDs), thermostats, thermocouples, electromechanical & volume (EMV).

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermostat. It also possess low self heating and does not cause more than 0.1 °C temperature rise in still air. The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every °C rise/fall in ambient temperature, *i.e.*, its scale factor is 0.01V/°C.



V.BLOOD GLUCOSE METER

A **blood glucose meter** is an electronic device for measuring the blood glucose level. A relatively small drop of blood is placed on a disposable test strip which interfaces with a digital meter. Within several seconds, the level of blood glucose will be shown on the digital display. Needing only a small drop of blood for the meter means that the time and effort required for testing is reduced and the compliance of diabetic people to their testing regimens is improved. Although the cost of using blood glucose meters seems high, it is believed to be a cost benefit relative to the avoided medical costs of the complications of diabetes.

Recent advances include:

'Alternate site testing', the use of blood drops from places other than the finger, usually the palm or forearm. This alternate site testing uses the same test strips and meter, is practically pain free, and gives the real estate on the finger tips a needed break if they become sore. The disadvantage of this technique is that there is usually less blood flow to alternate sites, which prevents the reading from being accurate when the blood sugar level is changing.

'No coding' systems. Older systems required 'coding' of the strips to the meter. This carried a risk of 'miscoding', which can lead to inaccurate results. Two approaches have resulted in systems that no longer require coding. Some systems are 'auto coded', where technology is used to code each strip to the meter. And some are manufactured to a 'single code', thereby avoiding the risk of miscoding.

'Multi-test' systems. Some systems use a cartridge or a disc containing multiple test strips. This has the advantage that the user doesn't have to load individual strips each time, which is convenient and can enable quicker testing.

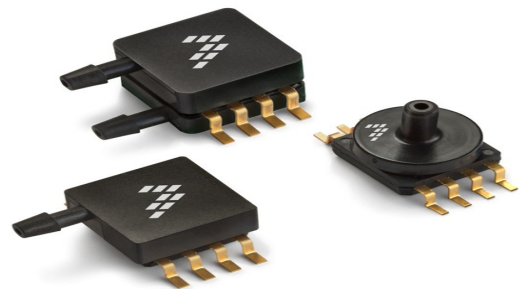
'Downloadable' meters. Most new systems come with software that allows the user to download meter results to a computer. This information can then be used, together with health care professional guidance, to enhance and improve diabetes management. The meters usually require a connection cable, unless they are designed to work wirelessly with an insulin pump, or are designed to plug directly into the computer.

VI. Pressure sensor

A pressure sensor measures pressure, typically of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical. Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators and piezometers, manometers, among other names.

Pressure sensors can vary drastically in technology, design, performance, application suitability and cost. A conservative estimate would be that there may be over 50 technologies and at least 300 companies making pressure sensors worldwide. There is also a category of pressure sensors that are designed to measure in a dynamic mode for capturing very high speed changes in pressure. Example applications for this type of sensor would be in the measuring of combustion pressure in an engine cylinder or in a gas

turbine. These sensors are commonly manufactured out of piezoelectric materials such as quartz. Some pressure sensors, such as those found in some traffic enforcement cameras, function in a binary (on/off) manner, i.e., when pressure is applied to a pressure sensor, the sensor acts to complete or break an electrical circuit. These types of sensors are also known as a pressure switch.



Types of pressure sensors Gauge pressure sensor, Absolute pressure sensor, Vacuum pressure sensor, Differential pressure sensor, Sealed pressure sensor. *Piezo - electric sensor:* If the crystal is cut in a special way and placed between two plates, then the electro motivated force (e.m.f) set up between the plates will be a measure of the pressure applied to the crystal. This property of crystal is called piezo-electric effect. By measuring this e.m.f. setup, the applied pressure can be indicated and transmitted. Traditional transducer: The principle of this system is that the pressure on a diaphragm is arranged to control the flow of air into, or out of, a chamber on the opposite side of the diaphragm, until a balance is obtained. The balancing pressure is an indication of the measured pressure. In this case, the measured signal is transmitted in a pneumatic circuit through the air pipeline.

VII. HEART BEAT SENSOR

PULSE OXIMETER SENSOR is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

Features:

Heart beat indication by LED

- Instant output digital signal for directly connecting to microcontroller

- Compact Size
- Working Voltage +5V DC

Applications

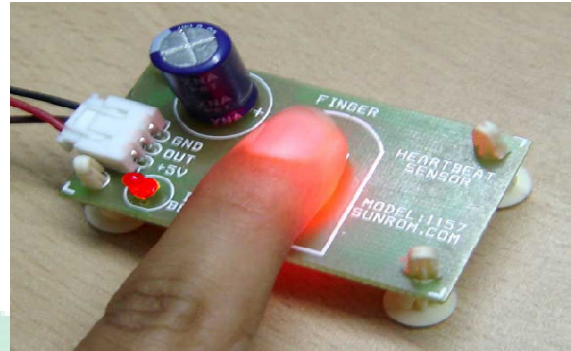
- Digital Heart Rate monitor.
- Patient Monitoring System.
- Bio-Feedback control of robotics and applications.

Working

The sensor consists of a super bright red LED and light detector. The LED needs to be super bright as the maximum light must pass spread in finger and detected by detector. Now, when the heart pumps a pulse of blood through the blood vessels, the finger becomes slightly more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified and triggered through an amplifier which outputs +5V logic level signal. The output signal is also indicated by a LED which blinks on each heart beat. The pulse signal is applied to the P1.0 input of U2 that is AT89S52 (Can be any 8051 type) which is monitored by the program whenever this input goes high. Internally to U2, there is a counter which counts how many 1ms intervals there are between two high going heart beat pulses. This number is then divided by 60,000 and the result is the pulse rate. For example, if the pulse rate is 60 BPM (beats per minute) there will be a pulse every second. The duration of one heart beat will be one seconds or $1000 \times 1\text{ms}$. Dividing 60,000 by 1000 will give the correct result of 60 which is shown on the display. If there is invalid result ($\text{BPM} > 200$) it is invalid and waits for next cycle.

SENSOR PRINCIPLE:

The sensor consists of a super bright red LED and light detector. The LED needs to be super bright as the maximum light must pass spread in finger and detected by detector. Now, when the heart pumps a pulse of blood through the blood vessels, the finger becomes slightly more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified and triggered through an amplifier which outputs +5V logic level signal. The output signal is also indicated by a LED which blinks on each heart beat.



VIII.WORKING FUNCTION

Every person has to have the respective RFID card similar to ATM card which is the only source to access the machine. Each person has a unique code like ATM pin number which is stored in the tag which is read by the RFID reader. Whenever the person wants to use the machine, he has to put his card and the system generates an OTP which is sent to the respective person mobile using GSM technology. Then he has to enter the OTP to proceed which acts as a security system. No one can access our card without our permission. Then different Medical options are available such as Medicines, Ambulance, Measuring Parameters, and also to contact with nearby doctors, or hospitals for any clarification regarding medicines. We can also check the balance amount in our account. At each action the message will be generated and sent to the user and also stored in the data base which acts as a record.

IX.APPLICATIONS

- The project can be installed in bus stands, railway stations and other public places. It will be very much useful for public.
- The medicine system will be very useful to public where the medical availability is limited.
- Our system describes only basic medicines, but it can also implement with other miscellaneous medicines in those places which are least accessible to medical facilities in future.
- It also paved a way to support medical access in the highways, rural areas.
- It minimizes the medical shop dependency and also testing laboratory.

X.FUTURE ENHANCEMENT

- Using GSM technology when the medicines are on stage to be limited the GSM message can will be initiated to the prescribed person. So that he can fill the tablets before over.
- GSM Technology also helps to prevent the other persons accessing the medicines. Only the prescribed person can access it.
- The Bar code Scanner can also be used to check the whether medicines expired are not.
- Using Image processing it is way to find and differentiate coins. And no confusion takes place.

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XI.CONCLUSION

The drastic need for health care, doctors and medicine will be satisfied by using RFID technology based Medical Vending Machine. This can be modified according to the environment. Example for schools and colleges it can be modeled for general and first aid medicines. In the highway it is designed with all parameters and ambulance call, online doctors call system which helps the accident zones with immediate first aid care. Thus the system paves a great way in securing human life under miserable situations.

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