

# INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

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**HEALTH MANAGEMENT SYSTEM INTEGRATED GLUCOSE MANAGEMENT SYSTEM**

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**ABSTRACT**

*Diabetes mellitus was perceived as the problem of the developed world but currently developing countries like Ethiopia are suffering chronic diseases of which diabetes is the major one. The objective of the project is to provide easy access for the patient to check their blood glucose level in their own premises without wasting their valuable time at hospitals. The patient will be informed about the action they have to perform in accordance with their glucose content it will be related to their medicine they have to consume. In the rural areas the people would be having only limited access of clinics so by this paper explain the patient can anytime measure their glucose level with proper suggestions. In the existing glucometric technique the patient would only measure the glucose level but for the suggestion they have to consult with the doctors or physicians but in this setup the machine would itself suggest for what are the measures they have to take to make glucose level under control. In addition to this the rate of diabetes in urban and rural area will be investigated using random sampling method.*

**KEYWORDS**

health management system, integrated glucose management system.

**I. INTRODUCTION****BACKGROUND**

**D**iabetes is a chronic disease characterized by high or low blood glucose levels, which results from the pancreas not working properly and not producing enough insulin or when the body cells do not respond to it in the correct way. There are three types of diabetes:

1. Type 1 diabetes is also known as juvenile diabetes because it is typically diagnosed in children and young adults. In this type of diabetes, the body does not produce insulin. 5% of the population particularly in African countries with diabetes has this type of illness.
2. Type 2 diabetes is the result of the body not producing enough insulin or the cells not using insulin properly. This is the most common form of diabetes. 90% of the population with diabetes has this type.
3. Gestational diabetes is high blood glucose levels first diagnosed during pregnancy. This does not mean that the woman will have diabetes after she gives birth or that she had it before she conceived, but it is a risk factor for type 2 diabetes in the future.

A glucose meter is a medical device used to determine the concentration of glucose in the solution. It is a key element of home blood glucose monitoring (HBGM) by people with diabetes mellitus or hypoglycemia. A small drop of blood, obtained by pricking the skin with a lancet, is placed on a disposable test strip that the meter reads and uses to calculate the blood glucose level. The meter then displays the level in mg/dl or mmol/l.

**2. LITERATURE REVIEW**

In 1962, Leland Clark and Champ Lyons at the Medical College of Alabama developed the first glucose enzyme electrode. It relied on a thin layer of glucose oxidase on oxygen of oxygen consumed by the enzyme. Another early glucose meter was the Ames Reflectance Meter by Anton H. Clemens. It was used in American hospitals in the 1970s. A moving needle indicated the blood glucose after about a minute.

Home glucose monitoring was demonstrated to improve glycemic control of type 1 diabetes in the late 1970s, and the first meters were marketed for home use around 1981. The two models initially dominant in North America in the 1980s were the Glucometer, introduced on November 1981 whose trademark is owned by Bayer and the Accu-chek meter (by Roche). Consequently, these brand names have become synonymous with the generic product to many health care professionals. In Britain, a health care professional or a patient may refer to "taking a BM": "Mrs. X's BM is 5", etc. BM stands for Boehringer Mannheim, now called Roche, who produced test strips called 'BM-test'.

Test strips that changed color and could be read visually, without a meter, were also widely used in the 1980s. They had the added advantage that they could be cut longitudinally to save money. As meter accuracy and insurance coverage improved, they lost popularity. However, a generic version of the BM is marketed under the brand name Glucoflex-R. There is a UK Pharmaceutical company (Ambe Medical Group) who have the

At least in North America, hospitals resisted adoption of meter glucose measurements for inpatient diabetes care for over a decade. Managers of laboratories argued that the superior accuracy of a laboratory glucose measurement outweighed the advantage of immediate availability and made meter glucose measurements unacceptable for inpatient diabetes management. Patients with diabetes and their endocrinologists eventually persuaded acceptance. Some health care policymakers still resist the idea that the society would be well advised to pay the consumables (reagents, lancets, etc.) needed.

**3. METHODOLOGY****3.1 OVERVIEW**

This section will discuss about the method that was used to design the Glucose measurement with Health management system. Help the patient to know about their diabetes and how to manage hyper and hypoglycemia. This design is also used for the physician to track the patient location which helps him to treat the patient dynamically. Several steps were followed in order to accomplish this task.

**3.2 PROCEDURE**

In order to get best out of our project, we have followed different phases of engineering design steps and activities performed in each phase is listed below.

**3.2.1 CONCEPTUAL DESIGN**

- Revising, referring and reading of previous glucose measurement related papers, journals and books
- Specifying the implementation of RFID tag and reader to track the patient.
- GSM modem to transmit the value to the physician.

**3.2.2 FINAL DESIGN**

After initial prototype the complete design is developed to integrate with glucose values of the patient and providing the clear information about the status of the disease and what are the precautions need to be taken and designing the microcontroller based RFID reader and patient RFID tag which helps the physician to track the patient location with limited distance, So that the physician can know the seriousness of the patient situation and provide the immediate attention towards the needy patient.

3.3 PROPOSED SOLUTION

3.3.1 INTRODUCTION

Present industry is increasingly shifting towards automation. Two principle components of today’s industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation. The proposed system “Design of blood glucose measurement with health management system” designed and developed to accomplish the various tasks in an adverse environment of an industry. This prototype system can be applied effectively and efficiently in an expanded dimension to fit for the requirement of industrial, research and commercial applications.

3.3.2 BLOCK DIAGRAM

FIGURE 1: BLOCK DIAGRAM OF PROPOSED METHOD

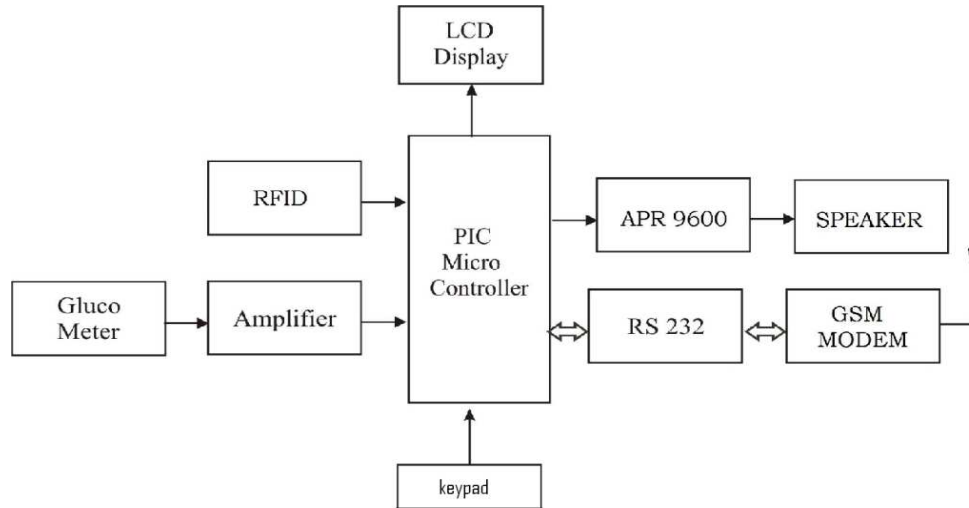
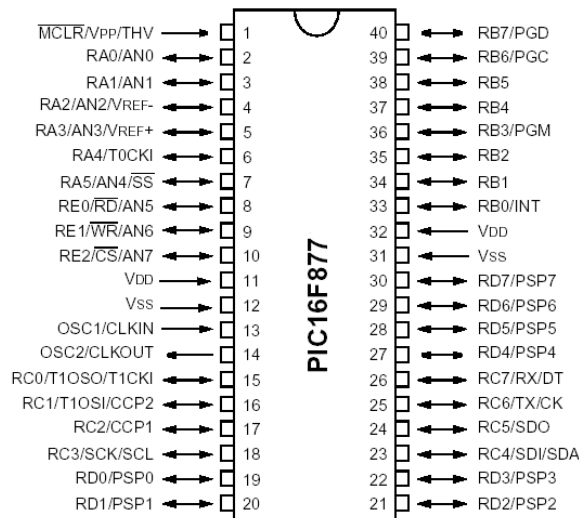


FIGURE 2: PIN DIAGRAM OF PIC16F877



3.4 HARDWARE USED

Develop a uniquely decoded ‘E’ strobe pulse, active high, to accompany each module transaction. Address or control lines can be assigned to drive the RS and R/W inputs.

Utilize the Host’s extended timing mode, if available, when transacting with the module. Use instructions, which prolong the Read and Write or other appropriate data strobes, so as to realize the interface timing requirements.

If a parallel port is used to drive the RS, R/W and ‘E’ control lines, setting the ‘E’ bit simultaneously with RS and R/W would violate the module’s set up time. A separate instruction should be used to achieve proper interfacing timing requirements.

3.4.1 WORKING OF RFID

- Reader gets and executes commands from the back-end system.
- Reader emits radio frequency (RF) waves via its antenna.
- Waves travel through air and “energize” a passive transponder.
- Tag responds and transmits data signal via its antenna.
- Reader captures the tag data signal.
- Reader processes data signal.
- Reader delivers the processed information to the back-end system.

3.4.2 TRANSPONDER

The Transponder or tag is fixed on to the baggage to be tracked in the airport. When this tag comes within the range of the reader or integrator, the tag is energized. Now, this tag transmits the data to the reader.

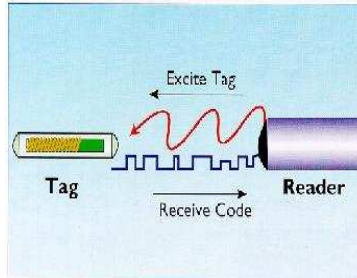
This data is automatically sent to the micro-controller for further processing. The time at which the tag is sensed is sent to the micro-controller from the RTC (Real Time Clock). These details are displayed on LCD (Liquid Crystal Display). The same is sent to the EEPROM (Electrically Erasable and Programmable Read Only Memory), which is used as a backup. It can be stored, and retrieved.

**3.4.3 PASSIVE TAG AND READER**

Passive tags are those energized by the reader itself, they contain no power source, typically have very long lifetimes (near indefinite) a drawback over active tags is the read range, typically 2cm (1in) to 1.5m (4.5 ft), a strong positive is individual tag cost. RFID Passive tag is composed of an integrated electronic chip and an antenna coil that includes basic modulation circuitry and non-volatile memory.

**3.4.4 INTERACTION BETWEEN RFID TAG AND READER**

**FIGURE 3: INTERACTION BETWEEN RFID TAG AND READER**



The reader powers the tag (transponder), by emitting a radio frequency wave. The tag then responds by modulating the energizing field. This modulation can be decoded to yield the tags unique code, inherent in the tag. The resultant data can be the passed to a computer from processing. Tags have various salient features apart from their physical size: Other available features are: Read Only, Read Write, Anti-Collision.

**4. RESULT AND DISCUSSION**

Research result in Black lion and Limmu genet Hospital indicates that currently the hospital is using glucometer without health management system and tracking of the patients which make difficult for the physician to identify the patients about their severity. In addition to this the discussion result of different diabetic patients need to be educated about their sugar level by the way of diet, exercise and knowing their status of glucose level whether it is low, very low, normal, high and very high.

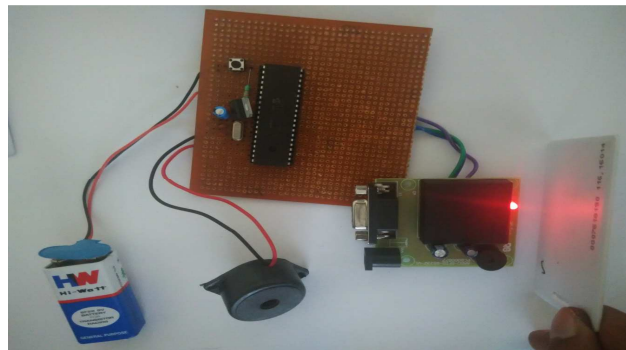
The final design of our project has following steps.

1. Designing of Microcontroller based RFID reader and tag system for the patients
2. Designing of database system and which will be display in the glucometer about the patient current status as well as information about the diet and medicine details need to take.
3. Designing of GSM modem to send the information to the physicians, due to non-availability of GSM modem we unable to proceed further.

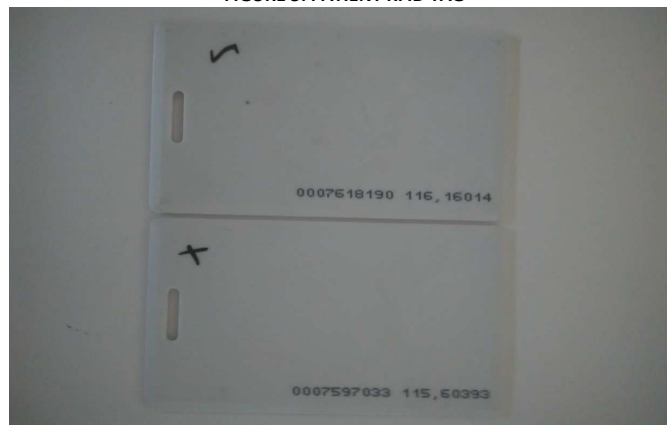
**4.1 RFID READER AND TAG**

The programme has been loaded in the microcontroller about the details of the particular RFID tag and when the patient those RFID has been loaded passing near to the RFID reader produces alarm so the physician can have understood about his patient. We recommend the future work of transferring the information of about the patient through GSM modem to the physician.

**FIGURE 4: RFID READER RECOGNIZING THE TAG.**



**FIGURE 5: PATIENT RFID TAG**

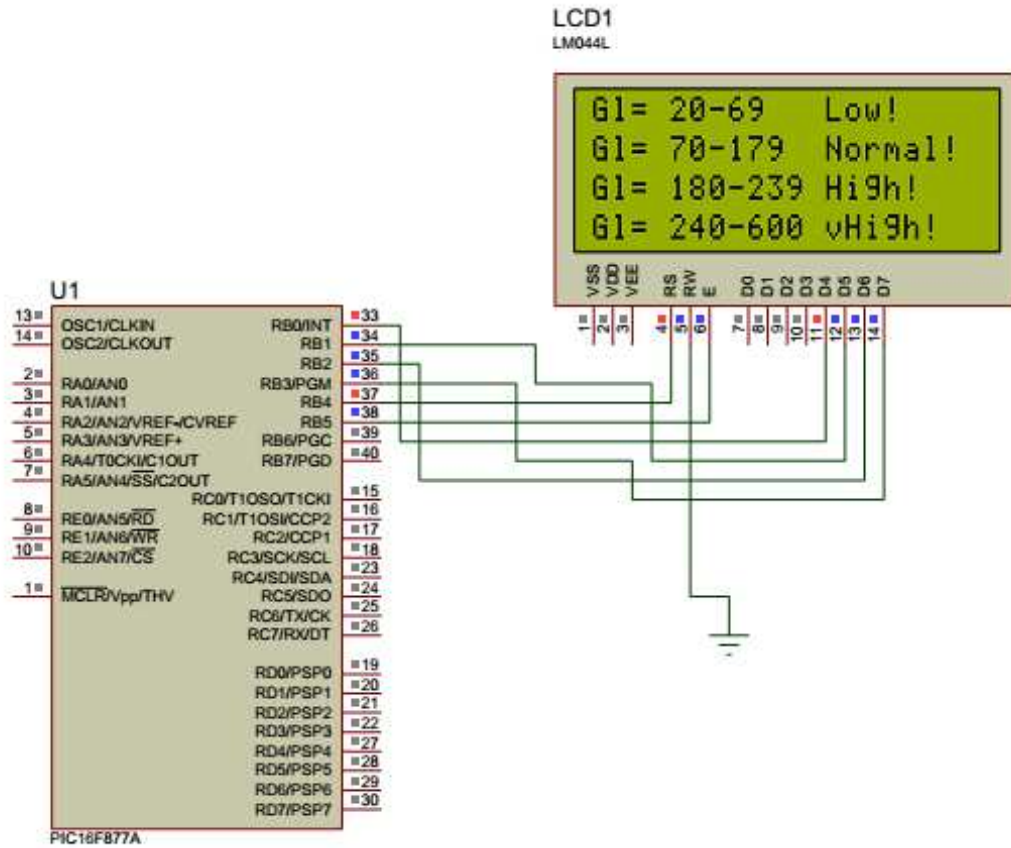


**4.2 HEALTH MANAGEMENT SYSTEM**

By using the glucose strip the patient glucose level has been measured. When the patient blood enters in the strip the machine started working automatically and displays the values (normal value is 80 to 120 mg/dl). When the values of glucose is very low 20-69mg/dl the blue light in the equipment will on and the alarm will

starts continuously. If the glucose value is high (180 – 239 mg/dl) the red led will on and there is one beep of sound. If the glucose level is very high (240 – 600mg/dl) the red led will be on and there is continuous alarm will start.

FIG. 6



**CONCLUSION AND RECOMMENDATION**

The proposed system based on Atmel microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can have extended for other purposes such as commercial & research applications. Due to the probability of high technology (Atmel microcontroller) used this “**Design of blood glucose measurement with health management system**” is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

The programme has been loaded in the microcontroller about the details of the particular RFID tag and when the patient those RFID has been loaded passing near to the RFID reader produces alarm so the physician can have understood about his patient. We recommend the future work of transferring the information of about the patient through GSM modem to the physician. This can be implemented in the hospitals as home care device which really improve the patient’s awareness about the diabetes and it can be extended to other critical diseases also.

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