

# Realization of an Instinctive Approach for Diabetics Convalescent

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## ABSTRACT

Diabetes is an incurable disease where it influences the body in several ways by prompting varied real sicknesses and untimely mortality. A glycemia level is a prime role in diabetic convalescent. The proposed framework is concerned with the advanced method of simulation that can be used to implement real insulin pump that can work in real-time to prevent the fatal effects of diabetes on health. This technique utilizes to detect the glucose level using a GSR sensor (galvanic skin response). In this system it helps more efficiently for glycemia monitoring from patient sweat. It detects the glucose level at regular intervals. If the glucose level is critical and then automatically insulin will be injected into the patient. This process balances entirely the safety-critical system aspect required to build a structure that has a direct effect on human life. The control algorithm adapts the glucose metabolic rate and determines the appropriate amount of insulin to be delivered into the body. To provide better insulin management to reduce the need for human supervision, we have proposed a control algorithm for the insulin pump to automate the delivery process.

**KEYWORDS:**PIC 16A Microcontroller, LM358 differential comparator, GSR sensor, Insulin control unit.

## I. INTRODUCTION

Diabetes is a chronic disease that appears when the pancreas does not produce insulin, or the body cannot metabolize it properly. Insulin is one of the hormones that regulate the glycemia in the body. Hyperglycemia is the result of a noncontrolled disease. In advanced stages of non-insulin-dependent diabetes or insulin dependent diabetes, the insulin infusion is required. The conventional therapy consists of the management of exogenic insulin, several times in a day with tight glycemia control, but this cannot prevent its consequences effectively. Insulin is a hormone produced by pancreas to process and regulate glucose level in human body. The irregularities in insulin production may lead to a group of metabolic disorder known as Diabetic Mellitus (DM). There are two variants of DM: Type-1 diabetes, where the body is incapable of producing adequate amount of insulin and Type-2 diabetes, where body is incompetent to make use of insulin in a proper manner [2]. In both cases the treatment includes insulin injection via a syringe or using an insulin pump. An insulin pump is a compact portable electronic gadget permanently connected to the body to deliver required amounts of insulin by means of a catheter set below the skin, usually abdomen area. The invention of insulin pump [9] was a relief for diabetic patients, as they could dispense insulin dosages self-reliantly.

## II. EXISTING METHOD

Hyperglycemia and hypoglycemia are the levels of diabetes convalescent. If a patient's level drops to hypo glycaemia, they experience some symptoms, such as Fatigue, Pale skin, Seizure, Loss of consciousness. A patient needs to inject glucagon into the skin of the lower abdomen, thigh or upper arm. If a patient's level drops to hypo glycaemia, they experience some symptoms such as frequent urination, increased thirst, blurred vision, fatigue. A patient needs to inject insulin into the layer of fat directly under the skin, known as subcutaneous tissue, with a small needle or a device. To avoid the Subcutaneous insulin injection. Un treated hyperglycemia can lead to serious health problems. Subcutaneous can cause redness, swelling, itching at the injection site. Hyperglycemia can damage the vessels that provide blood to vital organs, which can increase the risk of heart disease.

### III.METHODOLOGY

In this technique we are differentiating the units such as power unit, controlling and processing unit, sensing unit. The proposed system charged with solar panel 5V from a rechargeable circuit for increasing the voltage in Lipo battery from 3.7 volt to 5 volt for PIC 16A microcontroller power source CN6009 boosted voltage is used. Measuring the body temperature & Ph value using temperature sensor. GSR sensor measures sweat gland. If the glycemia level is greater than 250mg/DL the insulin automatically injects using insulin control unit.

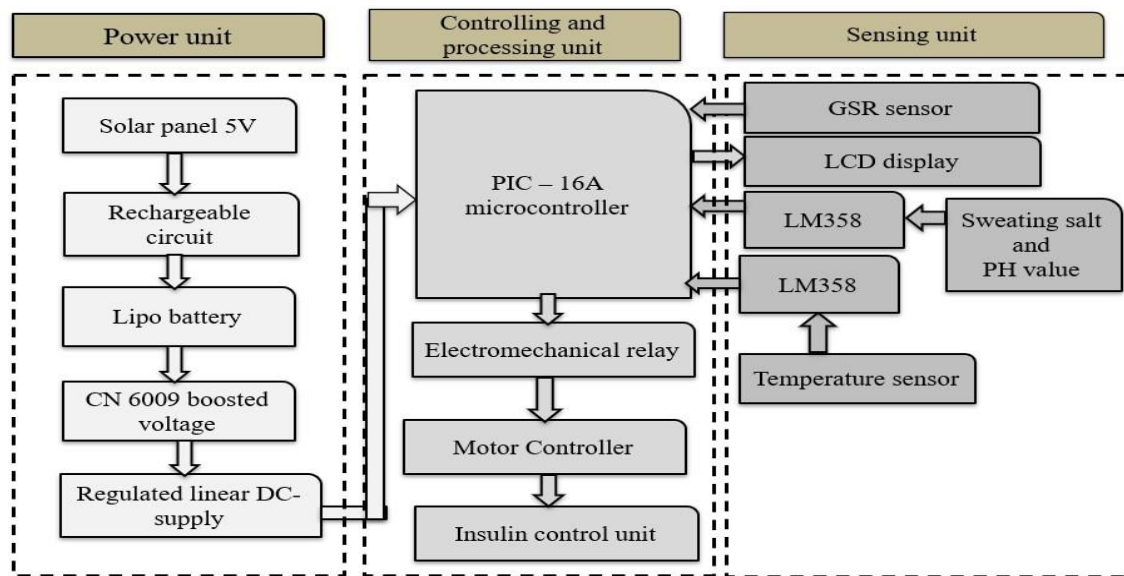
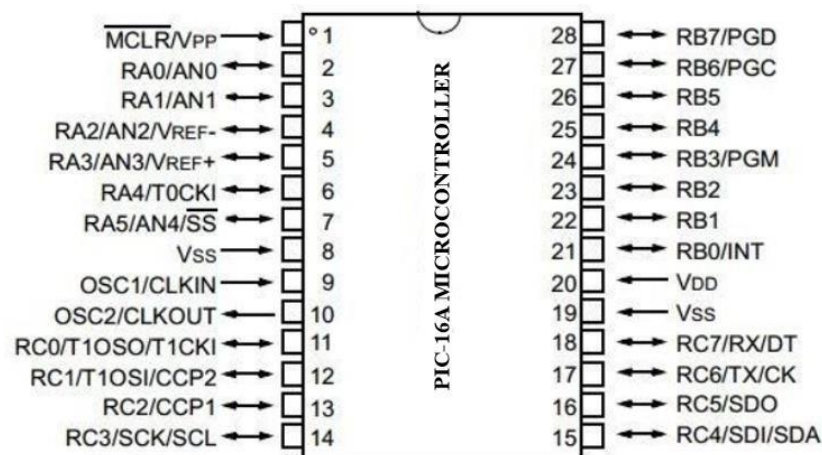


Figure 1: Block Diagram IV. WORKING PRINCIPLE

In this technique monitoring the glycemia level of the diabetic convalescent. Insulin will be injected automatically. In power unit using power from solar panel is converted into linear DC supply then the power stored in the lipo battery. The CN 6009 booster will be used for boosting the voltage from the battery. If the power supply is truncated the booster will boost the voltage at that time boosted voltage is designated to PIC 16A Microcontroller. Microcontroller controlled the whole device of this technique. Keep track on sensing unit for glycemia level of the convalescent by manipulate the GSR sensor. The GSR sensor monitoring the glucose range from the sufferer sweat. At this import temperature constrain, PH merit and salt estimate the sweating determines the sufferer glucose on a level is detected. The convalescent glucose level is continuously monitored. The glucose level will be displayed in the LCD. If the glucose level is valley in turn of peak the insulin will be injected automatically [9] by utilizing the insulin control unit.

## A) PIC 16A MICROCONTROLLER

PIC (Programmable Interface Controllers) microcontrollers are the world smallest microcontrollers that can be programmed to carry out a huge range of tasks [9]. These microcontrollers are built in several electronic devices such as phones, computer control systems, alarm system, embedded systems, etc. These microcontrollers are programmed and manufactured by circuit-wizard software. The PIC microcontroller is an integrated chip and it consists of CPU, RAM, ROM, timers, and counters, etc. The microcontroller supports the protocols such as SPI, CAN, and UART for interfacing with other peripherals. Presently PIC microcontrollers are highly used for industrial purpose due to low power consumption, high performance ability and easy of availability of its supporting hardware and software tools like compilers, debuggers and simulators.



**Figure 2: Pin diagram of PIC 16A Microcontroller**

## B) LIPO BATTERY

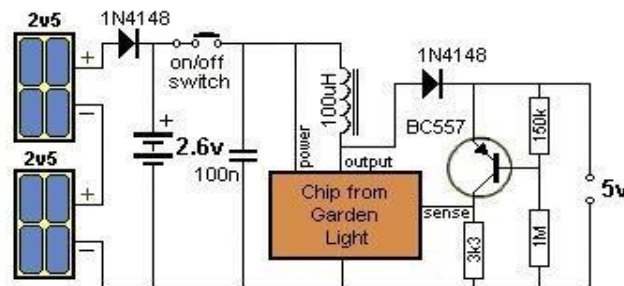
A lithium polymer battery is also called as rechargeable battery. If the voltage of a lithium-ion cell drops under a certain level, it's ruined. Lithium-ion batteries age. These batteries provide high specific energy used in applications where weight is a critical characteristic, such as mobile devices, radio-controlled aircraft and some electric vehicles.



**Figure 3: Lipo battery**

### C) SOLAR PANEL

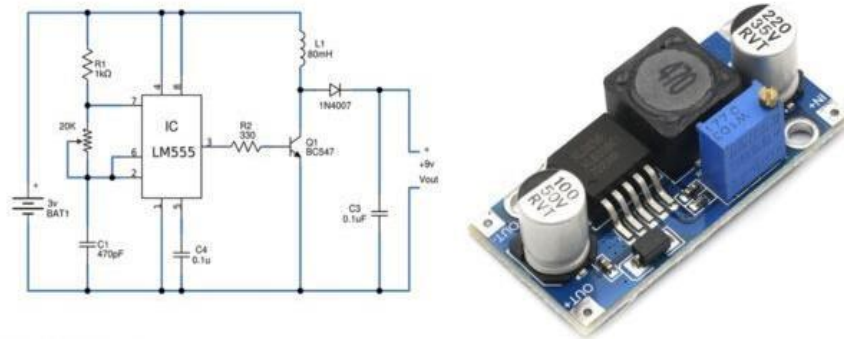
Solar power is harnessed using Solar Photovoltaic (PV) technology that converts daylight (Solar radiation) into electricity by victimisation semiconductors. once the sun hits the semiconductor among the Photovoltaic (PV) cell, electrons are freed and bus bars collect the running electrons which ends up in current.



**Figure 4: Solar Panel**

### D) CN6009 BOOSTER

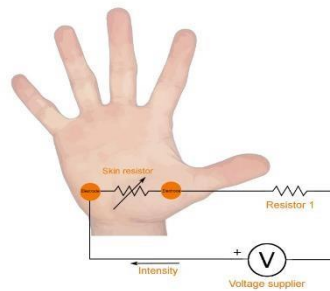
The board encompasses a calibration, loads of revolving electrical device for accurately setting the output voltage. The device will increase the input DC voltage from 3 to 32V associate with output transformer which will vary from 5 to 35V. This device of standard sort will be used as a little power supply, charger, power a range of electronic devices. Such a device may be a smart resolution for powering circuits with a larger distinction between the input and stable voltage (voltage drop). The module has low current consumption and low heat generation.



**Figure 5: CN6009 Booster**

### E) GSR SENSOR

The conductive voltage of skin indicates completely different states of person's emotions viz. stressed or relaxed. The conductive voltage depends on sweat made by the sweat glands that are controlled by nervous system. The conduction of the skin changes will be sweat secretion and consecutively its voltage. The voltage is measured to work out states of emotions in human, while operating of [4] galvanic skin response device.



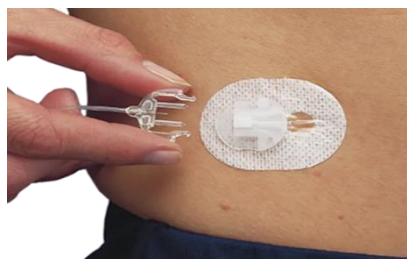
**Figure 6: GSR Sensor**

In the relaxed condition of the person, sweat isn't secreted and thus resistance of the skin is high. This results into lower conductive voltage. In the physical arousal condition of the person, sweat is secreted and thus resistance of the skin is low. This results into higher conductive voltage.

### F) INSULIN CONTROL UNIT

An internal secretion pump could be a medical system that simulates the operation of the duct gland (an internal organ). The software package is associate with embedded system that collects information from a sensing element and controls a

pump [6] that delivers a controlled dose of internal secretion to a diabetes convalescent.



**Figure 7: Insulin Control Unit**

## **V.RESULT AND DISCUSSION**

This system monitors the glycemia level of the diabetic convalescent continuously. By monitoring the blood sugar to maintain the normal in glycemia level. If the glucose level is valley in turn of peak the insulin will be injected automatically by utilizing the insulin control unit[1]. This system can help delay or prevent diabetes complications such as heart attack, stroke, kidney diseases etc.

## **VI.CONCLUSION**

This paper presents the information about the use of automatic glucose monitoring for diabetic patients. So, the patient can track the glucose level continuously and keep up the glucose level. The continuous monitoring of glycemia level is used to prevent the complications diabetics convalescent.

## REFERENCES

- [1] Lucaccioni, L. &Iughetti, L. Issues in Diagnosis and Treatment of Diabetes Mellitus in Childhood. *Journal of Diabetes Mellitus* 6, 2 (2017) 175-183.
- [2] Pratley, R. E. The Early Treatment of Type 2 Diabetes. *The American Journal of Medicine* 126, 9 (2018) 2–9.
- [3] Padma priya, S. Wireless sensor networks to monitor Glucose level in blood. *International Journal of Advancements in Research & Technology* 2, 4 (2019) 322–326.
- [4] Jayanthi, A. N., Nivedha R. &Vani, C. Galvanic Skin Response Measurement and Analysis. *International Journal of Applied Engineering* 10, 16, 12447–12452.
- [5] Bjorklund, S., Ruzgas T. &Nowacka, A. Skin Membrane Electrical Impedance Properties under the Influence of a Varying Water Gradient. *Biophysical Journal* 104, 2 (2018) 2639– 2650.
- [6] P. Grant, "A new approach to diabetic control: Fuzzy logic and insulin pump technology", *Medical Engineering & Physics*, vol. 29, no. 7, pp. 824-827, 2007.
- [7] S. Kaveeshwar, "The current state of diabetes mellitus in India", *Australasian Medical journal*, vol. 7, no. 1, pp. 45-48, 2014.
- [8] A Ramachandran, AK Das, SR Joshi, CS Yajnik, S Shah, KM Prasanna Kumar, "Current Status of Diabetes in India and Need for Novel Therapeutic Agents", *SUPPLEMENT TO JAPI*, Vol. 58, pp 7- 9, June 2010.
- [9] Kayalvizhi, S. Balamurugan, C. Ramachandradurai and R. Rakesh, "Design and Analysis of Automatic Insulin Delivery System Using Pic Microcontroller", *International Journal of Bio-Science and Biotechnology*, vol. 8, no. 3, pp. 271-278, 2016.