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Automatic Anesthesia Injector Using Arduino Microcontroller

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Abstract- In hospitals, the surgery and severe medications are done at the unconcious conditions of the patients in order to avoid excess pain at the oparticular period of time. To make the person unconcious level, the anesthesia are given. These anesthesia are provided with accurate measurements of medicine and their components. If the medicine cross the limited content, it leads to sleep for a prolonged period of time. Hence the quantity of the medicine plays a significant role at the initial stages of surgery and treatments. To avoid errors in the medications and to save time, the automatic anesthesia injector is designed that are controlled and functioned based on the program and command proceeded by the microcontroller. Thus the proposed system enables to provide the anesthesia automatically by analysing the detecting the patients health conditions and done using arduino microcontroller.

Keywords: Anesthesia, surgery, arduino microcontroller, sensors, DC motors

I.Introduction

The embedded system plays a major significant role in versatile field with their various characteristics. This embedded system is a combination of hardware and software that are accumulated and programmed to function to obtain the desired results with accurate outcome [1].

The embedded system is composed of modular processor block with output. The processor in the embedded system is composed with flash storage and clock source. The sensors play a prominent role in the sensing and identification through the given instructions [2]. The anesthesia condition of the patients are depend based on the time duration of the surgery. If the surgery lasts for 4-5 hours, the anesthesia must remain for complete 5 hours. This proper function of anesthesia is much important to perform the surgery without any medical consequences [3]. The surgery cannot performed without anesthesia tobe given to the patients. This anesthesia is a kind of sleeping drug that tends to keep the body to reamin stable and lose the sense of feel and touch. If the anesthesia exceedes the prescribed limit, it leads to severe damages in th ebody and may affect the central nervous system to malfunction. Thus the amount of anesthesia is more important as it forms the basic initial part of the surgery [4].

To overcome these problems in the anesthesia steps, the automatic anesthesia injector is implemented using the arduino microcontroller. The amount of anesthesia given to th epatients are detected by the anesthetist and limited, the sensors detected the conditions of the patients and provides the anesthesia injector automatically [5]. The medicinal quantity requirements of the anesthesia varies from person to person based on the defects in the health conditions and the surgery that are taken to be done at that particular period of time. The figure 1 shows the embedded system model as shown below.

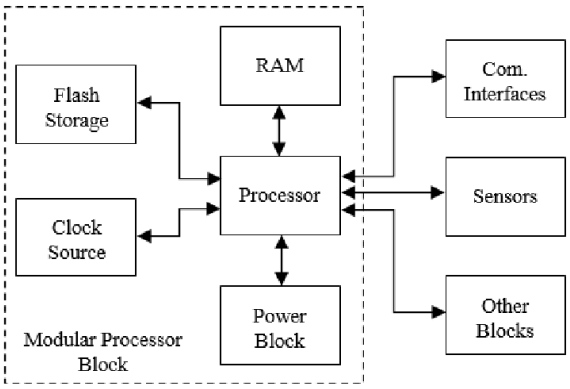

Fig 1: Embedded system

II.Proposed system

The proposed system is inculcated with the automatic anesthesia using the arduino microcontroller with stepper motor. The microcontroller can also be represented as one-chip solution. These microcontroller based anesthesia system is introduced to provide operation at the particular part of the hyman body without experiencing the pain for a particular period of time [6].

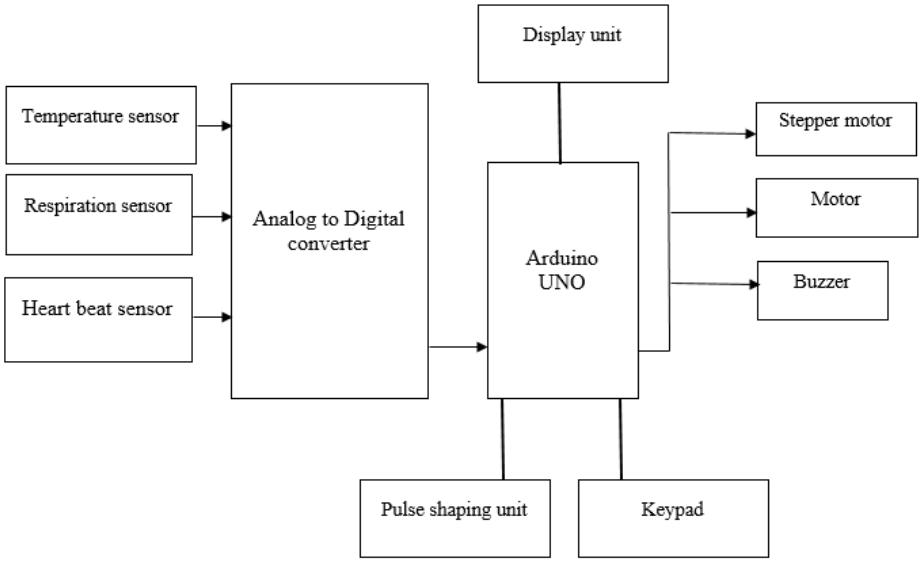

Fig 2: The proposed system

The figure 2 represents the automatic anesthesia injector controlled by the microcontroller. The system composed of temperature sensor, pressure sensor and heart beat sensor. These sensors are provided to the analog to digital converter and proceeded to the arduino. This monitored the system attached to the keypad and forwarded with the stepper motor and the buzzer indications.

III.Methodology

The proposed system works based on the inital setup by the anesthetics based on the body conditions of the patients. Then the microcontroller attached to the keyboard unit monitores the patients concious level, if it reduces the prescribed values then the microcontroller programs the system to function and giv ethe limited and fixed amount of the anesthesia through the injectors [7].

This automatic anesthesia injector helps in the diagnosis of the patients to remain in the drowsy conditions. If the anesthesia at the prescribed value gets lowered then the alarm gets on and indicated through the buzzer and displayed as notifications in the LCD display unit [8]. The system is developed with the temperature sensor to detect the temperature of the person at the moment of surgery [9]. The heart beat sensor is employed to record th eheat beat and the pressure sensor is used to detect the pressure of the patients and thus the overall functioning is controlled by the microcontroller. The movement such as the too and fro of the injection syringe is controlled by the stepper motor [10-12]. The circuit used to measure the temperature is shown in figure 3.

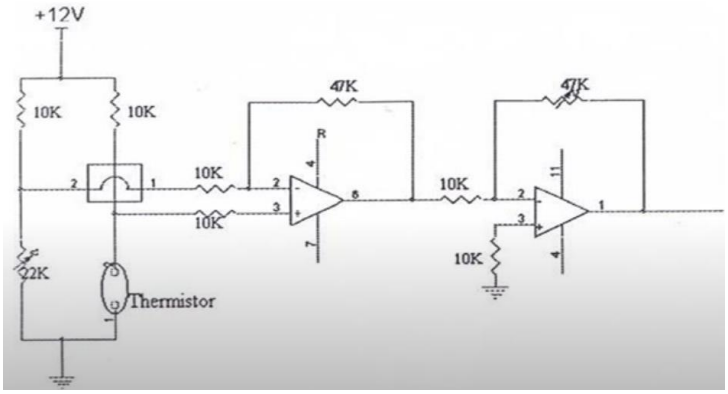

Fig 3: To measure temperature

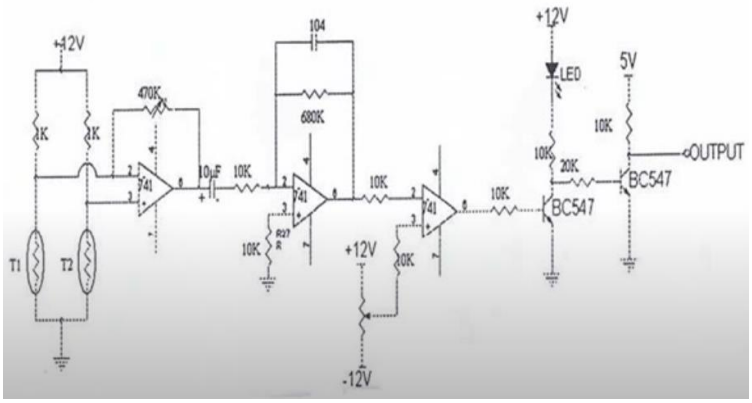

Fig 4: Circuit to measure respiration

The figure 3 and 4 represents the circuits to measure the pressure and temperature of the person at the particular period of time to provide anesthesia injection automatically.

IV.Simulation results

The simulation results are don eby developing the interface developed in the visual basic. This holds the basic information for furthur references. It includes respiration rates, trips given, temperature of the patient's body conditions and heart beat of the patients [13-15]. They are done through the microcontroller dollowed by the stepper motor. The automatic operation of anesthetic machine based on microcontroller is shown in figure 5.

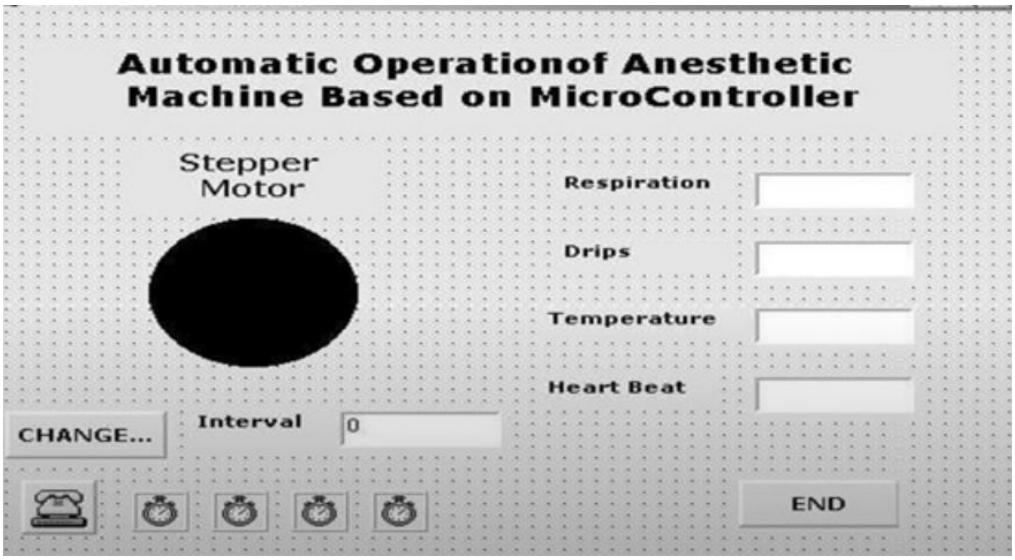

Fig 5: Automatic anesthesia machine

V.Hardware representation

The hardware representation of anesthesia injector is represented in the figure 6 and 7 as shown below.

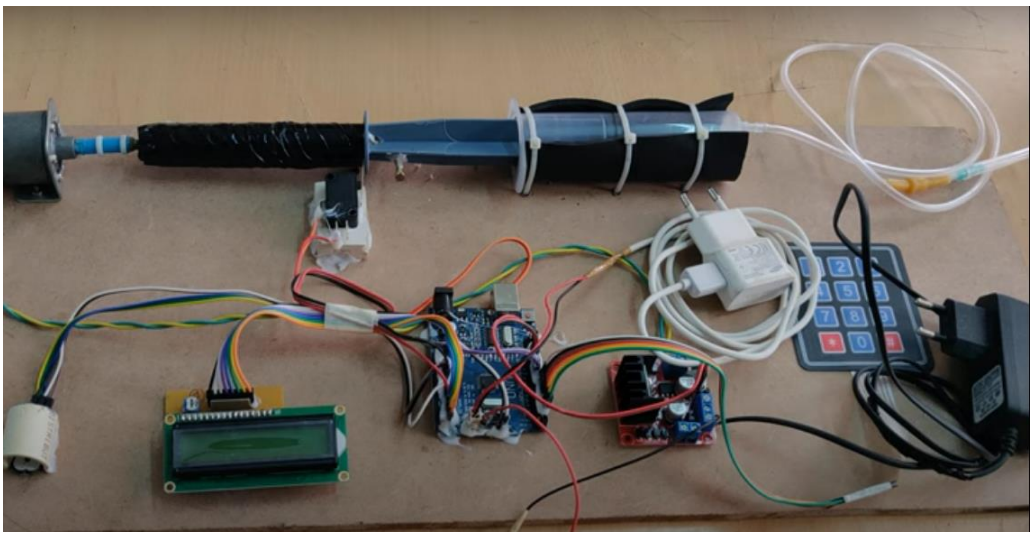

Fig 6: Hardware Implementation

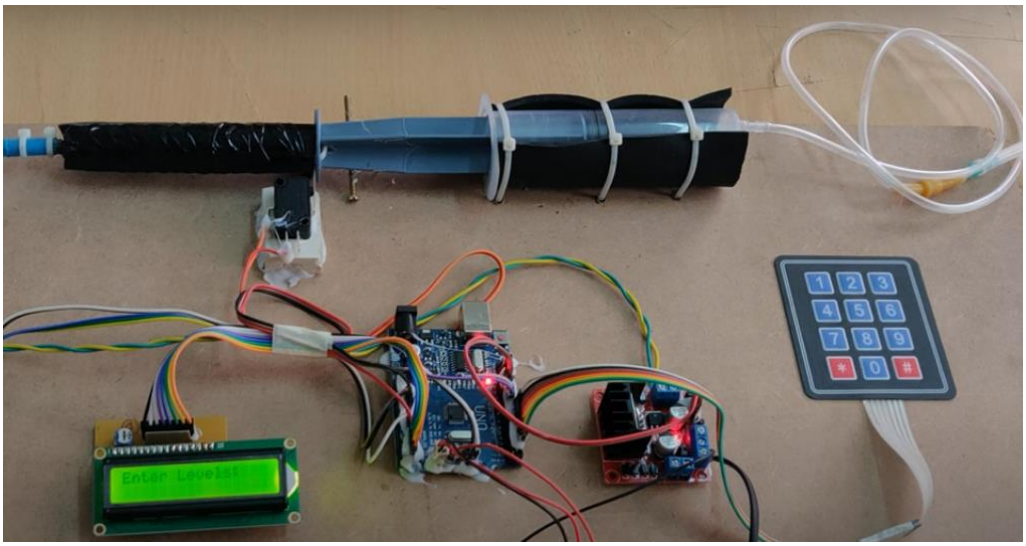

Fig 7: Monotoring anesthesia level detected in LCD display

VI.Conclusion

The main objective of the project is to implement a automated anesthesia injector to avoid careless mistakes. This system enable with microcontroller that controls and monitor the system with stepper motor control with LCD display with buzzer for indication. Thus the automated anesthesia injector is implemented by using the arduino microcontroller to obatin higher efficiency and produce accurate medications without any deviations.

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