



Short Communication

Microcontroller based baby incubator

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Abstract

Low birth weight premature baby have inefficient thermoregulation. Thermoregulation is very important process which plays crucial role in development of baby. Baby incubator provides favorable environment for new born babies and protects them from pollutants and infection. Modern incubators are costly and difficult to handle. "Microcontroller based baby incubator" using ATmega 168 controls and monitor constantly the temperature and humidity. This incubator is low cost and user friendly. It provides the details of the project to design and develop an efficient, cost effective and environmental friendly incubator. It helps to avoid the death of premature infant due to lack of consistent heat. This decrease in temperature of infant is because of extremely low birth weight.

Keywords: Baby incubator, microcontroller, temperature, humidity, infant.

Introduction

Incubator is an instrument which provide favorable atmosphere for premature or new born babies¹. It helps the infant to maintain the body temperature as it in mother's womb. It protects them from infection² as well as pollution.

There is four ways in which baby losses its body's heat. They are as follows. i. Conduction: Heat loss by solid object which are direct in contact of baby or loss by touch. ii. Convection: Heat loss by air in contact. iii. Evaporation: Heat loss by sweat and urine. iv. Radiation: Radiant loss of heat from body. e.g., loss due to heart beat or functions of internal organ.

The high death rate in newborn babies is due to lack of proper thermo regulation which is an important physiological function which is essential for proper growth of babies^{3,4}. In premature and low birth weight babies' thermoregulation is not carried out efficiently^{5,6}. If we supply nutrition externally to the baby, energy gain by babies will be utilizes to maintain the thermo regulation and not use for babies growth. So if we keep the baby in incubator we can reduce the heat loss due to above four ways which helps to maintain thermo regulation constant and hence it helps to improve babies' growth.

In our project we tried to overcome this problem by designing low cost instrument which can be affordable by people of low socio-economic background. The product of our project is not creating harmful gases so that there is no adverse effect on environment.

Medical background of baby incubator: According to medical expert the relation between age, weight and

corresponding range⁷ of temperature we prepare an incubator using following materials and methods.

Materials and methods

Components: Micro Controller AT MEGA 168⁸, Humidity Temperature Sensor DHT11⁹, Load Cell AND HX711¹⁰, LCD (Liquid Crystal Display), Voltage Regulator IC 7805, Transformer, Bridge Rectifier W10, MOC 302, Triac BTA 06, Buzzer, Fan, Heater, Acralic sheet, resistors and capacitors.

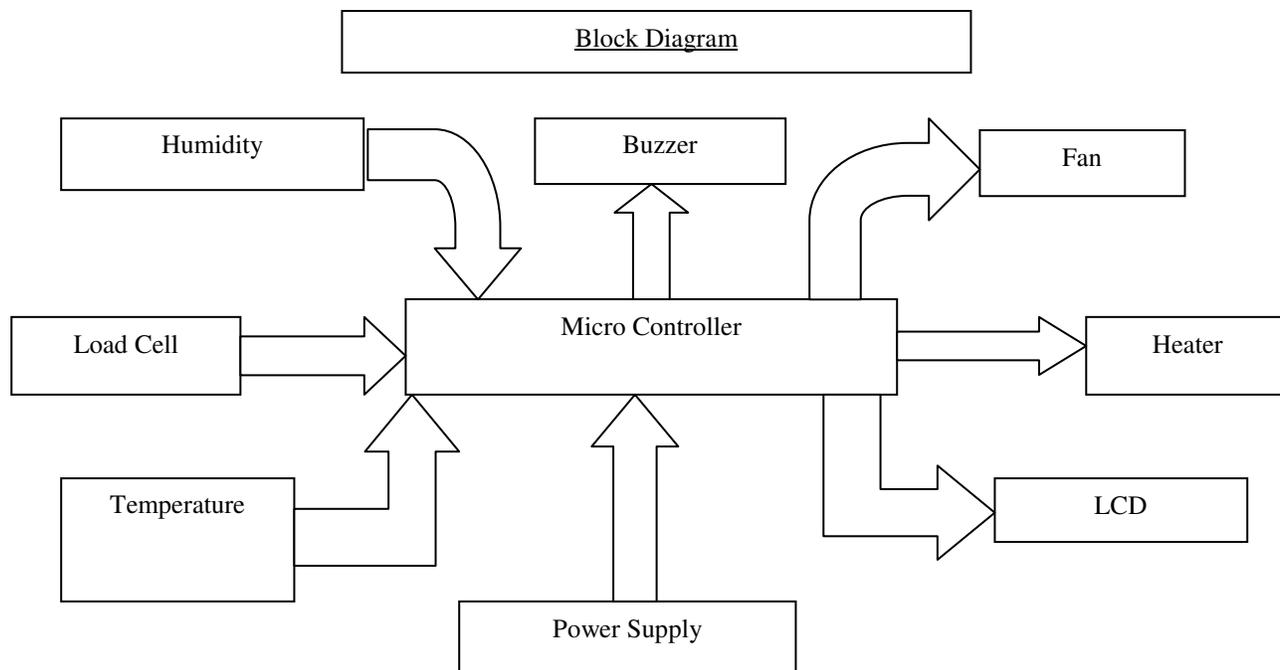
To build this baby incubator we use above components according to experimental need. For programming arduino software is used because it is open source.

Working: Microcontroller is heart of device which is connected to different components, mainly sensors such as humidity, temperature and load cell which are inputs and buzzer, fan, heater, LCD which are outputs. Power supply is power house of the circuit.

The analog data received by the sensor is fed to microcontroller and the microcontroller is programmed to give required output.

Load cell measures the weight of the baby and send the signal to the microcontroller so that it controls temperature and humidity of the incubator with the help of heater and fan according to medical chart. Temperature sensor and humidity sensor display the current values of the temperature and humidity of incubator on the LCD screen.

Microcontroller sends signals to fan and heater to keep checks on temperature and humidity inside the incubator.



Main features: The main feature of this instrument is to maintain appropriate temperature inside the incubator with low resources. It helps to control the death rate of new born babies. This incubator is portable so easy to transport anywhere e.g. in emergency case from rural area to urban area. Due to inbuilt alarm system necessity of manual inspection decreases.

Conclusion

Taking into account the medical facilities available in rural areas we undertake this project. Our instrument is lifesaving machine for infants those are underweight. We use very simple components which can be easily assembled by technicians and it designed such a way to provide suitable area to keep baby safely inside the incubator. This incubator maintains appropriate temperature inside it as per the requirement. In future the heart beat counter can be added to this incubator. There is no harmful effect on the environment due to this incubator.

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