

# Electronic Vaccine Monitoring System



P. Karthikeyan, C. Ashwin, R. Sai Vishnu, N. Ravi teja

**Abstract:** In today's world we tend to face with many several different types of emergencies within the indoor atmosphere. Response to such emergencies is important so as to shield resources together with human life and additionally we will save property from harm. During these Paper, we tend to gift wireless sensor network for Temperature observation. Which might report the emergency to the users in numerous forms, like as pop-ups on a visual display unit, SMS on their cell phones and then on. Because of this flexibility of coverage low value wireless sensor network ready for emergency response system of future. During this paper we tend to develop three wireless sensor nodes and that we need to place in numerous positions within the building and we need to inform to the master node or observation node regarding the temperature on the market at every sensor node. And that we additionally planning to specialize in wireless temperature observation and controlling the vaccine temperature.

**Keywords:** wireless sensor network (WSN), Temperature Monitoring, Sending SMS, Controlling.

## I. INTRODUCTION

The event of a Wireless Sensor Network System Observe the Vaccine Temperature. It can watch the values of temperature and it have some vary to be maintained. Suppose if the temperature is too high or low it sends a notification to the connecting device. Many medicines need to maintain storage between 2°C and 8°C. Some product is irreversibly degraded even by temporary periods at sub-zero temperatures, then observation of storage temperature is very important.

The temperature of the medicine refrigerator got to be monitored daily once it's in use – a maximum/minimum measuring device is usually suggested for this purpose. The measuring device ought to be scan and reset daily, and i.e. the maximum and minimum temperatures recorded. Whenever the temperature is out with counselled limits measures got to be introduced by the service to rectify this case a separate, secure associate degree and dedicated icebox ought to get on

the market place for medicines in services whenever there's an everyday would like for medicines to keep temperature between 2°C – 8°C. Whereas some medicines are going to be unaffected at temperatures consistently on high of 25°C. Temperature plays a vital role in medical treatment (both humans and animals), food, beverages, and agriculture. Our overall health is commonly dependent upon temperature in some ways still. Maintaining correct temperature levels in medical cold storage areas is important. Incorrect temperatures will compromise the medications or vaccines hold in medical refrigerators. Warmth and high humidness are the 2 most vital factors in drug degradation. Once exposed to these conditions, the medications will weaken. Moreover, you'll face fines or penalties if your medical refrigerators aren't performing properly.

Temperature observation Devices are classified by level of application it as follows: -

- Devices for Cold Rooms and Deep Freeze Rooms
- Devices for Transportation in Cold Boxes and antigen Carriers therefore on sustain antigen agent quality, it's essential to look at the temperature of vaccines throughout the availability chain. Effective observance and record-keeping achieve the subsequent objectives
  - a. storage temperatures are among the appropriate ranges of +2°C to +8°C in cold rooms and antigen refrigerators and -25°C to -15°C in freeze rooms and antigen freezers;
  - b. detection of out-of-range storage temperatures & transport temperatures so as that corrective action are usually sometimes taken;

## II. RELATED WORK

### A. Literature Review for Health Care: -

D. Mahesh Kumar developed an WSN using health care monitoring, it has been using in the health care process and it provides a tremendous effort in the recent years. And it was the most problem-solving researches, such as by using sensor the data can be processing, it gives the present state of the health and sent to the emergency messages by a remote server. transferring and maintaining the large scale of information from body sensors can take a lot of communication resource, and it brings a burden to the remote server and it delays the decision time and notification time. So, he implemented a prototype of a smart gateway. The gateway would be a inter connection and services management platform specially for the health care systems in home environment. By developing a connection between a wsn and public communication networks and it gives a comfortable with an on board information decision system and it was a light weight database,

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these smart gateway system is provide to make the patients' health state decisions in low power and low cost embedded system and it gets respond faster to the emergencies.

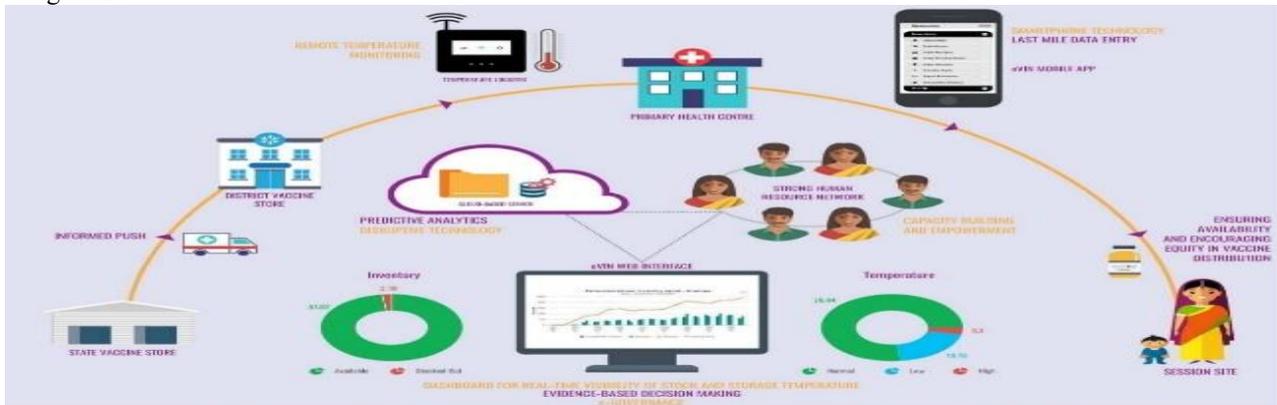
R. Rajeswari developed the system design for good tending mistreatment wireless detector network with GSM module and microcontroller. He develops the observation system to observe the physiological parameters like BP, blood heat and respiration so on...the organizer node has been connected on the body of patients for collecting the signal from sensors. So, these sensors send the signal to the base station. This detectors types known as the wireless body sensor network. Each node in wsn composed to the health care sensors and transfer the signal through radio frequency that sent knowledge to rear server. the sensing data of every patient area unit holds on in back-end server so each one having their own id and it easy to analyses the data by using id reference. So, the system will generate the messages of abnormality patients and sent mail to the medical man. conditions are needed to conform storage practices in community pharmacies. Comparative Investigation, Investigation'.

### B. Existing System

- ❖ Temperature readings ought to keep up maintain manual regular interval
- ❖ The temperature reading ought to be maintain in paper format, so it's hard to maintain.
- ❖ Periodic maintenance of the device is completed by the power of person.

#### Drawbacks of Existing System: -

- ❖ We have to be compelled to manually assess the temperature.
- ❖ Without creating awareness of any problems during holidays
- ❖ Transportation temperature unawareness
- ❖ Maintenance of the temperature records in paper format
- ❖ Chances of manual error



#### Architecture of proposed system: -

This survey helps to improve our knowledge related to this paper work and we easily sort out the existing system drawbacks which aids to us to develop a much more advanced WSN based on medicine monitoring system with an interactive user interface for the end users.

### III. PROPOSED SYSTEM

Our work has overcome most of the drawbacks in the existing system such as generating data in real time and predict the problems in advance or give early cautioning and prevent interlude, develop new opportunities and even plan better

- ❖ All readings are maintained periodically with the help of sensor without any man power.
- ❖ Sensor means which stimulus input like temperature and it converts into digital depends upon the types of sensor.
- ❖ Reading are the maintained in the database and also the temperatures are maintained through system.

#### Drawbacks of Proposed System: -

- ❖ Real time response Protect human life, property from damage.
- ❖ It has low cost.
- ❖ Autonomous early detection.
- ❖ Digital image and digital report generation.

The diagram will show the process of maintaining the temperature while transporting. It is the type of refrigerated vehicles by maintaining and controlling the temperature of vaccine so, except that vehicle itself merely moderates the temperature either by heating or freezing. While transporting the vaccine is mainly packed in the cold boxes or deep freezer and its passively shipping designed system, by using these designed systems it's easy to transferring the vaccine. The temperature-controlling process of atmosphere within the vehicle serves to increase the autonomy of the passive shipping system and defend the merchandise from temperature extremes. Caring process of the vaccine should be taken not to the subject of the packages to cold temperatures for extended periods as a result of this risks temperature reduction the package contents. Ideally, each effort ought to be avoid exposure of active and passive packaging to temperature below +15°C.

#### A.List of Modules

- Read the Temperature Value
- Transmit the Value Using Radio Frequency
- Data Saving and Connecting Process to the Server
- Analytics and Login Process
- Alert System

### 3.1. Read the Temperature Value

By monitoring the temperature value of the medicine by using sensor, the data of these can be displayed in the website. The temperature can be monitored if the vaccine temperature could be warmth or cool and the data should be sent to the website. And it generated the associate degree of the vaccine, and it permitting us to senses the value of that degree phase change to that temperature maintained and it would be either an analogue or digital output. So, here it has a tendency to use the sensor device DS18B20 for correcting the temperature of the vaccine. And it finally displays the value in screen.

### 3.2. Transmit the Value Using Radio Frequency

nRF24L01 may be a transmitter which might transmit and receive information on the frequency vary of two, 4GHz. Radio modules have 2 type of antenna: ceramic antenna and antenna trace. Some module contains a transformer that supports 5V and 3.3V, however but this module doesn't have regulator therefore he will only support 3.3V. First, we'd like to transfer and install the rf24 library that makes the programming easier.

### 3.3. Data Saving and Connecting Process to the Server

Microcontrollers have tiny internal memory that isn't enough to avoid wasting sensors generated information for a while, either you have got use some external storage device or will save the information on some cloud using internet.

Correct and comprehensive temperature records are a key element of fine storage and distribution practices. It shows whether or not vaccines are consistently being exposed to damaging temperatures and permits instrumentality performance issues to be identified and self-addressed. Where potential, the method of recording temperature information ought to be automatic. Once collected, the information should be keep stored in a systematic manner in order that they will simply be accessed. Paper-based temperature charts and chart-recorder disks ought to be filed in date order.

The real time databases information can be used in this situation wherever we have a tendency to simply need to interface some controller which might be connected to internet and might be ready to exchange data with cloud server. The server information is helpful in watching real time system behavior, database analytics, statistical analysis and process, and interpretation for future use case.

### 3.4. Analytics and Login Process

Graphic representation be another kind of analyzing the numerical data and it would be shown the values in the graphical manner. A graph may be a different type of chart that applies the data and it would be predicted the values with in the type of lines or curves drawn over the co-ordinate's points throughout on its surface. Graph representation should be enabled to useful in learning and it can easy to identify the cause in the process and it impact the relationship between the two variable or points. It can facilitate to help measure the extent of modify in one variable and another variable changes to the particular amount. It is an efficient and economic device for the representation of graph by using the values, understanding the flow of process using the graph and maintain the data without any interrupt.

### 3.5. Alert System

when the temperature of the medicine is not in the limited range it's sent a message to the user. It means the temperature should not be in the high or low, it has some range to maintain the vaccine in storage not every medicine has not in the range some medicine has high range and low range it depends on the vaccine type. So, the range of the vaccine should be in +2°C to +8°C, if the range is not maintained it send a message to the user.

## IV. EXPERIMENTAL PROCEDURE

### A. Hardware Development: -

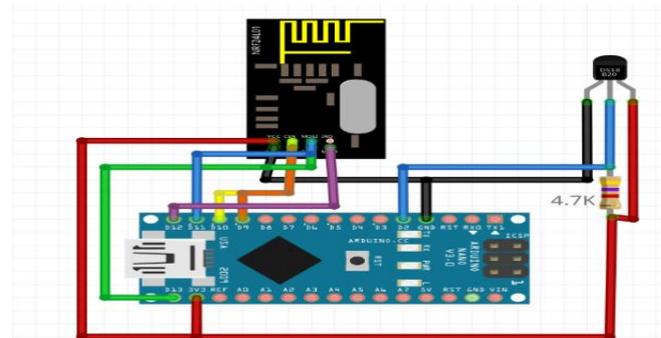


Fig1. Connection diagram

It is an affiliation diagram for connecting the transmitter, Arduino Nano, Arduino mega. it transmits the data using the radio frequency. Using the nRF24L01 IC, many manufacturers started developing the nRF24L0 transceiver module boards that contain the specified components elements and pins for implementing a radio system.

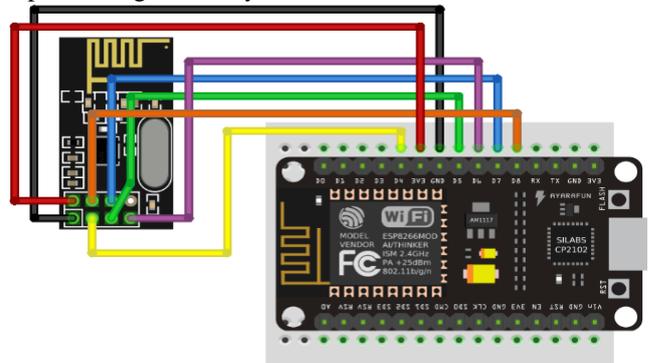


Fig2. Connection with Arduino

The nRF24L01 Transceiver Module boards typically consists of the nRF24L01 Transceiver IC, a sixteen Mega Hertz Crystal, associate degree Antenna Trace, for communication using Pins and power and a several passive components. Coming back to the pin configuration of the nRF24L01 Transceiver Module, it has eight pins. They're VCC, GND, MOSI, MISO, SCK, IRQ, CE and CSN.

- **VCC:** Supply Power Pin. Only 3.3V ought to be lean.
- **GND:** the power supply pin.

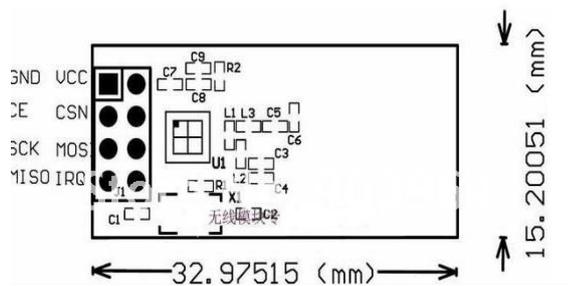
- **SCK:** SPI Clock Pin.
- **MOSI:** SPI Slave information Input Pin.
- **MISO:** SPI Slave information Output Pin.
- **IRQ:** Active LOW Interrupt Pin.
- **CE:** Chip Modify Pin.
- **CSN:** SPI Chip choose Pin.

so, it connects with Arduino Nano and Arduino mega for transferring the data using radio frequency signal. And later we tend to should always connect the temporary detector during this for locating the temperature of vaccine therefore we tend to use DS18B20



Fig. Temperature sensor

NRF24L01+ Module: -



- VCC -> 3v3
- GND -> GND
- CSN -> D10
- CE -> D9
- MOSI -> D11
- SCK -> D13
- IRQ isn't needed for our use case, it's an associate with the interrupt pin that goes LOW whenever a packet arrives, a packet is shipped or the most hear count for sending a packet is reached.
- MISO -> D12

a) **DS18B20 Thermometer:** -

- GND->GND
- D->D2
- VDD -> 3v3

Place a 4.7KΩ resistor b/w D and VCC.

The DS18B20 is a kind of versatile. It will be steam-powered through the information line, it operates in a range 3.0v to 5.5v, it measures temperature from -55 c to +125 c. And it connects to the Arduino device and it watching the temperature value of the vaccine the below diagram will show the connection of the temp sensor.

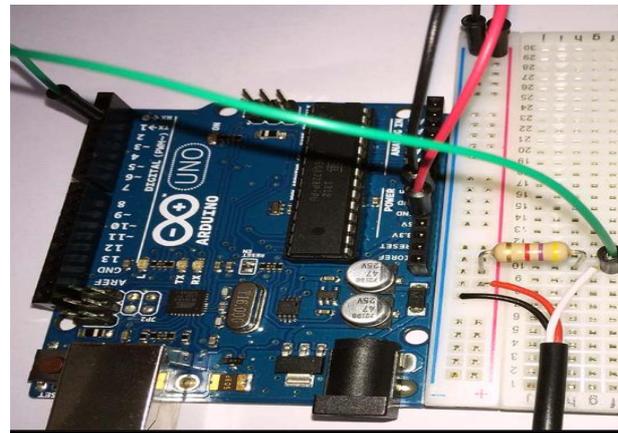


fig:-Arduino and sensor connection

- Wiring Arduino and DS18B20

The wiring could be a 1-wire interface and it's a straight forward to attach.

- The association method is going to be the GND pin of the DS18B20 goes to GND on the Arduino.
- The Vdd pin of the DS18B20 goes to the +5v on the Arduino.
- The information pin of the DS18B20 goes to a digital pin of your choice on the Arduino. The wiring presented higher than is that the simple way of wiring the DS18B20 with the Arduino.

## V. SOFTWARE DEVELOPMENT

By maintaining the information and storing we have a tendency to use Arduino IDE.

It is a straight forward to put in writing code and upload it on the board. It runs on windows, Mac OS X, and Linux. The surroundings are written in java and supported the process and different open source software system. The software system is often with any Arduino board. The Arduino development atmosphere contains a text editor for writing code, a message area, a text console. Once the code was written within the software system and it'll be developing the method the below diagram will show clearly. ..

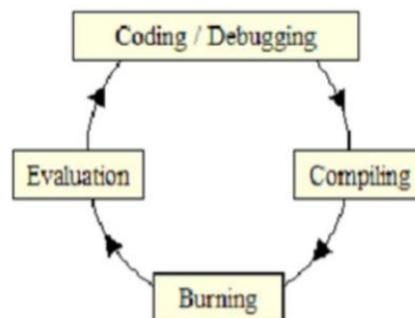


Fig. Software development steps

And a tool bar with buttons for common functions and a series of menu. And it connects to transfer programs and communicate with them

The choosing method in Arduino IDE is: - initially select the board once after inserting the code within the Arduino IDE

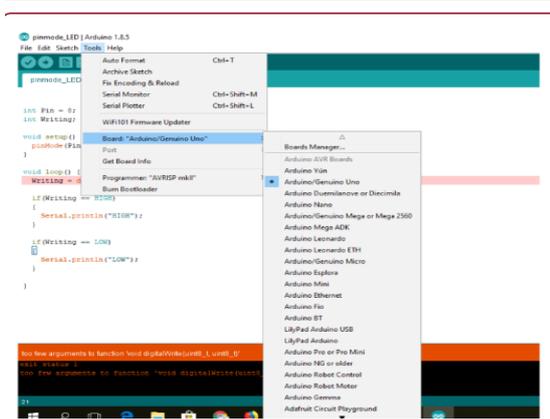


Fig. Select board to Arduino

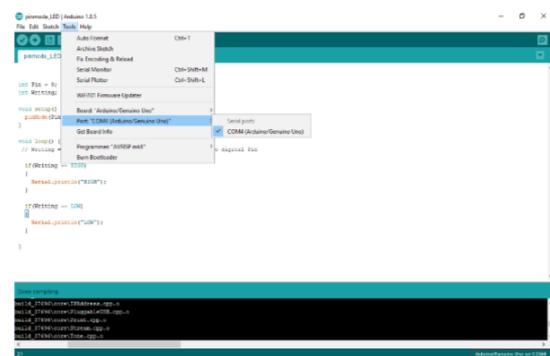


Fig . Select port after selecting the board.



Fig. Data logger (or) temperature data

Software system written using Arduino are known as sketches. It has options features for cutting and looking text. The message offers feedback whereas saving and exporting and additionally displays errors the console displays text output by the Arduino setting together with complete error messages and different data. The toolbar buttons enable you to verify and transfer programs, create, open and save sketches and open the serial monitor.

**VI. EXPERIMENTAL RESULT**

The result of our project is clear and it will perform perfectly in any situation because we used to store the data in database and it is easy to access by using the user id. And the data is sent from the Arduino nano to Arduino IDE and from there the data will be stored and it is easily identifiable.

And here, the temperature of the vaccine monitored by using the sensor and the data will show in the graphical representation



Fig:- graph representation by using data  
And also, when the temperature is not in the limited range automatically, it sends a message to the user like:



Fig: - Alert System Process

**VII. CONCLUSION**

Our work helps to maintain the temperature of the vaccine and no need of the person use to monitor the vaccine temperature, by using this process the temperature of the vaccine should be monitor by using the sensors. The sensors can monitor the temperature in the cold boxes or deep freezers and so on. It can be monitor while transporting the vaccine also but the temperature not in stable while transporting by using sensors the temperature can be monitor and it can be easy to controlling the temperature. And here we also implementing the alert system process, if the temperature not in the particular range it sends a message to the user. it helps to maintain the vaccine from the damage. so, we introduce our paper to control and maintain the temperature of the vaccine.

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