1a) List name of bridges for RLC measurement with proper classification.[M-1]

Bridges for Measurements of R (Resistance)
1. Low Resistance : <1ohm- Kelvin Double Bridge
2. Medium Resistance: 1ohm – 100Kohm –Wheatstone Bridge
3. High Resistance: >100Kohm –Mugger(Mega ohm Meter)
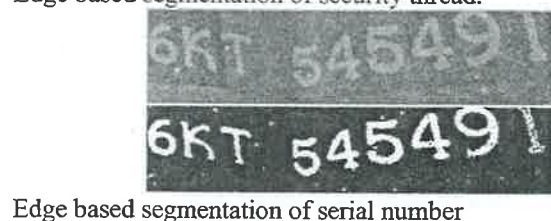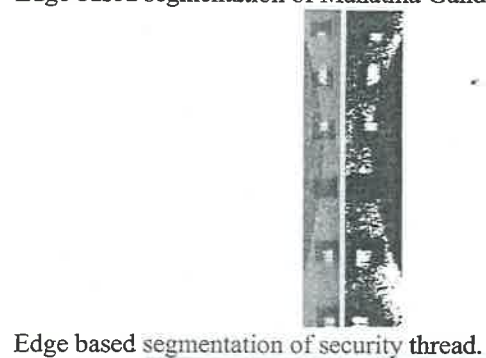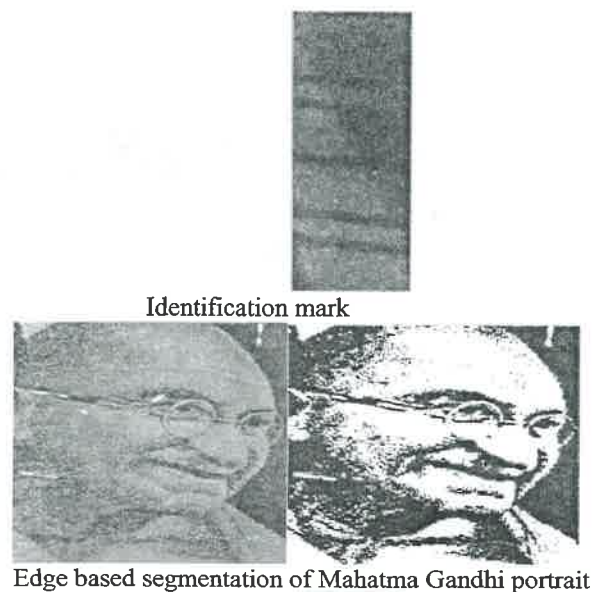
Bridges for measurements of L (Inductance):

1. Maxwell Bridge :1H-1000H, low Q
2. Hay Bridge :1uH-1H, High Q

Bridges For measurement of C (Capacitance):

1. Schering Bridge :100pf-1uf

1c) What is cold junction compensation in thermocouples. [M-2]

- For thermocouple copper is used as an element and constantan is used as an alloy of nickel and copper. Copper side is positive and constantan side is negative. The junction formed due to the contact of two dissimilar metals is the sensing junction.
- If two copper wires connect the thermocouple to the next stage, then the second copper constantan is formed. This junction acts as reference Junction.
- Reference junction generates seeback voltage. This seekback voltage opposes the voltage that is generated by the sensing junction.
- Whenever both the junctions are at the same temperatures, the output voltage will be zero. If the sensing junction is at higher temperature, then the output voltage is proportional to the difference between two junction temperatures.
- The temperature cannot be determined by the output voltage alone. It is subjected to the error that is caused by voltage produced by the reference junction. This error can be overcome by placing the reference junction in an ice bath to keep it at a known temperature. This process is called as cold junction compensation.

Identification mark

Edge based segmentation of Mahatma Gandhi portrait

Edge based segmentation of security thread.

Edge based segmentation of serial number

6) Now the process of calculation of intensity of each extracted feature is done. If the calculatedintensity is greater than the threshold of 70%, then it is classified as original note otherwise it isconsidered as fake one.
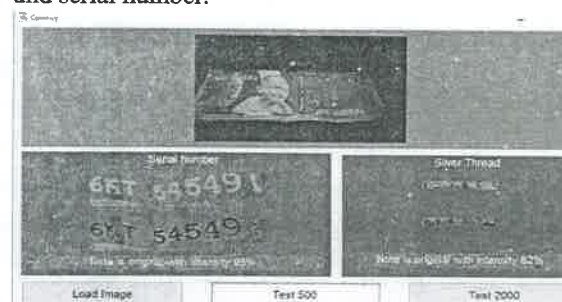
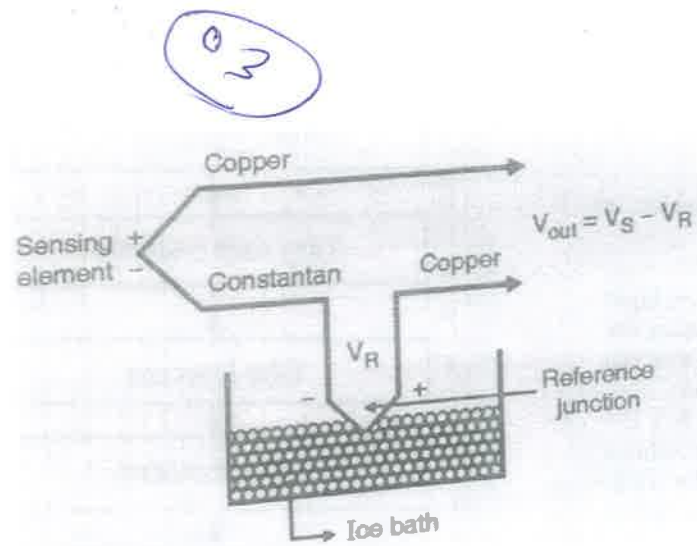7) The final decision depends upon the intensities of all extracted features.
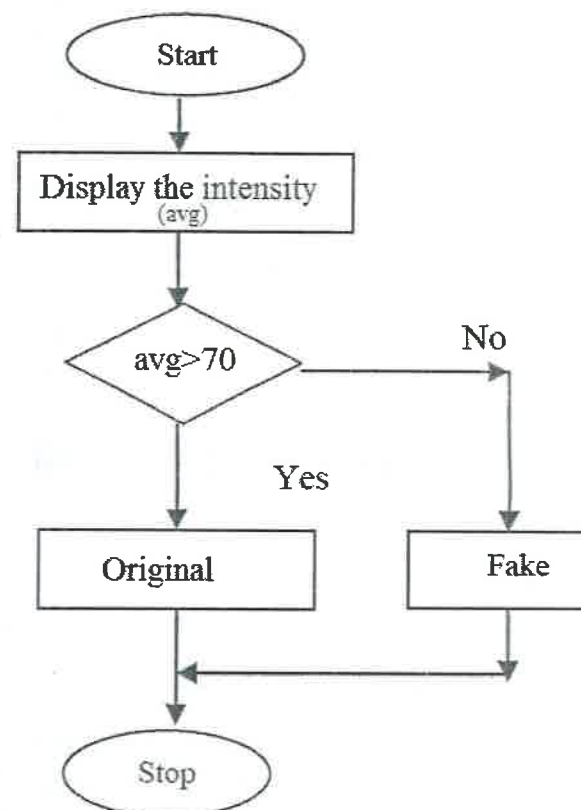

Flow chart for decision making

V. EXPERIMENTAL RESULTS AND DISCUSSION

The results are shown in a GUI made in MATLAB which shows extracted features like security thread and serial number.

Testing a 500 denomination note.

Testing a 2000 denomination note.

Copper

Sensing +
element −

Constantan   Copper

$V_{out} = V_S - V_R$

V_R

−   +

Reference
junction

Ice bath

1d) Draw block diagram for generalized Data Acquisition system and explains its components.[M-3]
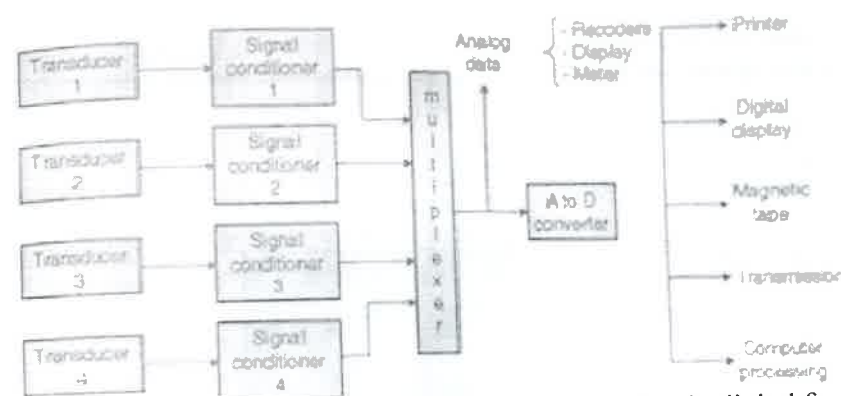
Data acquisition is the processes of collecting input data in digital form as rapidly and accurately and economically as necessary.

The first block is data acquisition system is transducer which converts the input signal into corresponding electrical signal.

The output of 1st stage has to be modified, this done by signal conditioners. It consists of amplifiers to amplify the output signals and filters to remove unwanted signals.

3rd block is multiplexer which a switch is basically. It connects only one of the inputs to the output. The analog data is displayed or recorded. Sometimes it is required to obtain the output in digital form; in that case analog to digital converter ADC is used. This digital output is recorded or displayed.

5. After segmentation, characteristics of currency note are extracted.
6. Intensity of each feature is calculated.
7. If the condition is satisfied, then the currency note is said as original otherwise fake.

In this method, characteristics of currencies are employed which are used by common people for differentiating for different banknote denomination. The characteristics that can be used to check the authentication of currency note are

A. Security Thread

It is a 3mm windowed security thread with inscriptions of India in Hindi, RBI and 2000/500 onbanknotes with color shift. Color of the thread changes from green to blue when the note is tilted.

B. Serial Number

Serial number panel with banknote number growing from small to big on the top left side and bottom right side.
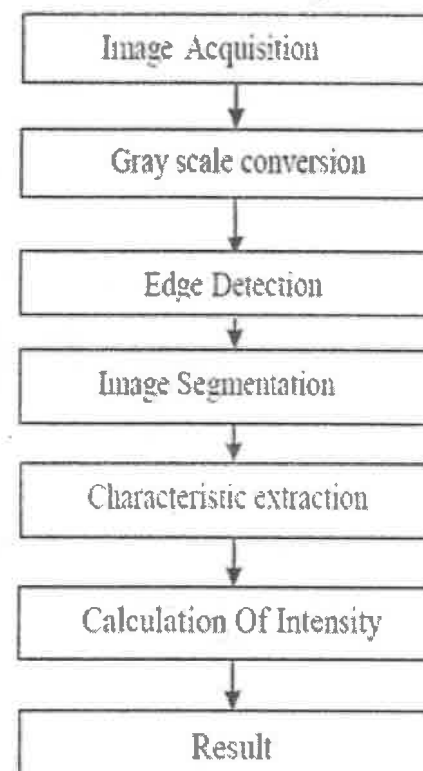
C. Latent image

A vertical band on front side of denomination at right hand size. It contains latent image showingnumeral of denomination when banknote is held horizontally at eye level.

D. Watermark

The portrait of Mahatma Gandhi, and multidirectional lines and a mark showing thedenominational numeral appear which can be viewed when held against light.

E.Identification Mark A mark with intaglio print which can be felt by touch, helps blind person to identify the denomination. In 500 denomination the mark is of five lines while in 2000 line themark is of seven lines.

The flow diagram of the process to be followed in the proposed system is as follows:-

Image Acquisition → Gray scale conversion → Edge Detection → Image Segmentation → Characteristic extraction → Calculation Of Intensity → Result

1) Image acquisition:

The image is kept under ultraviolet light and the image is captured through a simple digital camera

2) Image preprocessing:

It involves the operations required prior to data analysis and information extraction. Here imageresizing is done

.3) Gray scale conversion and edge detection:

The acquired image is obtained as RGB image which is now converted into gray scale image since it carries intensity information. This image is further processed and edges of gray scaleimages are detected..

4) Image segmentation:

It's the process of dividing image into multiple parts by cropping it.

5) Feature extraction:

Now the features are extracted using edge based segmentation.

2a) Explain Kelvin's double bridge and its application in very low resistance measurement. [M-1]

Kelvin Double Bridge

The ratio $\dfrac{R_1}{R_2}$ is kept same as $\dfrac{R_a}{R_b}$

The Galvanometer reading is zero when potential at k & f are equal

For zero deflection $E_{ek} = E_{kmp}$

$$E_{ek} = \frac{E \times R_2}{R_1 + R_2} \qquad \qquad —(1)$$

$$E = I\left[R_k + (R_y \| (R_a + R_b)) + R_3\right] \qquad —(2)$$

Substituting eqn (2) in eqn (1)

$$E_{ek} = \frac{I\left[R_k + (R_y \| (R_a + R_b)) + R_3\right] \times R_2}{R_1 + R_2} \qquad —(3)$$

By

$$E_{kmp} = I\left[R_3 + \frac{R_b}{R_a + R_b} (R_y \| (R_a + R_b))\right] \qquad —(4)$$

But $E_{ek} = E_{kmp}$

system is also interfaced with input device CCD camera and output device LCD display

4. Fake Currency Detection Using Image Processing and Other Standard Methods

Fake currency detection using image processing and other standard methods by using various methods like watermarking, optically variable ink, florescence, security thread, intaglio printing, latent image, micro lettering and identification mark. By combining two various components of two images then, the variation will be decreased. But by using layman method the fake note is detected. This paper presents the design and implementation.

5. Paper Currency Verification System Based on Characteristic Extraction Using Image Processing

The paper currency verification system based on classification extraction using image processing. It is done get getting the image and converting it to gray scale and the edge is detected. Then the image is segmented and the characteristics are extracted and it is compared and the output is shown. It uses four techniques including identification mark, security thread, latent image and watermark.

6. Indian Paper Currency Authentication System using Image processing

In this paper, the currency will be verified by image processing techniques. In this article, six characteristic features are extracted. The approach consists of a number of components including image processing, edge detection, image segmentation, characteristic extraction, comparing images. The characteristics extraction is performed on the image of the currency and it is compared with the characteristics of the genuine currency. The Sobel operator with gradient magnitude is used for characteristic extraction. Paper currency recognition with good accuracy and high processing speed has great importance for banking system. [Sobel operator or Sobel filter is used in image processing and computer vision, particularly within edge detection algorithms where it creates an image emphasising edges].

7. Feature Extraction Parameters for Genuine Paper Currency Recognition & Verification

The paper gives the algorithm with low computational complexity, which canmeet the high speed requirement in practical applications. It needs to be noted that the proposed technique may not beable to distinguish counterfeit notes from genuine notes. Indeed, techniques use infrared or ultraviolet spectra may before discriminating between genuine and counterfeits notes.

8. A Review Paper on Currency Recognition System, International Journal of Computer Applications

The review presented by suggests a widespread review of study on paper currency recognition system. A number of techniques applied by a diversity of researchers are proposed briefly in organize to evaluate the condition of art. Here, the author focuses primarily on currency detection system

including different steps like image acquisition, feature extraction and categorization system uses different algorithm. The classification result facilitates the recognition of fake currency mainly using serial number extraction by implementing optical character recognition (OCR). It is found that the proposed method gives superior results.

9. Survey of Fraud Detection Techniques, IEEE International Conference on Networking, Sensing & Control

This paper presents the survey on Fraud Detection Techniques by using performance metrics. The various fraud detections like credit card fraud, computer intrusion and telecommunication fraud are surveyed. The main methods behind the credit card fraud detections and computer intrusion are neural networks and model based reasoning, some with data mining. In telecommunication fraud detection, the visualization methods are used. This paper presents a summary on Next-Generation Intrusion Detection Expert

III. PROPOSED SYSTEM

The system will work on two images, one is original image of the paper currency and other is the test image on which verification is to be performed. The proposed algorithm for the discussed paper currency verification system is presented as followsA. Image of paper currency will be acquired by simple scanner in .jpg extension. B. The image processing will be implemented on this image. C. The various characteristics of the paper currency will be cropped and segmented. D. After segmentation, the characteristics of the paper currency will be extracted. E. The extracted characteristic of test image then undergoes classification. F. On the basis of classification the result is generated.

In the proposed method characteristics of paper currencies are employed that are used by people for differentiating different banknote denominations. Basically, at first instance, people may not pay attention to the details and exact characteristics of banknotes for their recognition, rather they consider the common characteristics of banknotes such as the size, the background color (the basic color), and texture present on the banknotes. So we are implementing some different way or typical features of currency detection

IV. METHODOLOGY

The system proposed here work here on the image of currency note under ultraviolet light acquired by a digital camera. The algorithm which is applied here is as follows
1. Acquisition of image of currency note under ultraviolet light by simple digital camera or scanner.
2. Image acquired is RGB image and now is converted to grayscale image.
3. Edge detection of whole gray scale image.
4. Now characteristics features of the paper currency will be cropped and segmented.

$$I\left[R_e + \left(R_y \parallel (R_a + R_b)\right) + R_3\right]\frac{\times R_2}{R_1 + R_2} \approx I\left[R_3 + \frac{R_3}{R_a + R_b}\ldots(R_a\ldots\right]$$

$$I\left[R_3 + \frac{R_m}{R_a + R_b}\left(R_y \parallel (R_a + R_b)\right)\right]$$

$$\frac{R_a + (R_a + R_b)R_y}{\ldots} + R_3 = R_1 + \ldots$$

$$R_e = \frac{R_1 R_3}{R_2} + R_1 R_N R_a$$

$$R_{3L} = \frac{R_1 R_3}{R_2} + \frac{R_1 R_a R_y}{R_1(R_a + R_b + R_y)} \qquad \frac{R_1 R_y}{R_e + R_b + R_y}$$

$$R_{3L} = \frac{R_1 R_3}{R_2} + \frac{R_1 R_y}{R_a + R_b + R_y}$$

It is given $\dfrac{R_1}{R_2} = \dfrac{R_a}{R_b}$, $\dfrac{R_1}{R_2} - \dfrac{R_a}{R_b} = \ldots$

So 2nd term becomes 0.

$$R_{3L} = \frac{R_1 R_3}{R_2} \quad /\!/$$

Fake Currency Detection Using Image Processing

Prof Deepak S. Shete
Electronics and
telecommunication
Thakur college of engineering
and technology,mumbai
deepak.shete@thakur.org

Rana Satyamev Singh
Electronics and
Telecommunication
Thakur College of engineering
and technology,mumbai
Satyamev021@gmail.com

Risabh singh
Electronics and
Telecommunication
Thakur College of engineering
and technology,mumbai
Rishabhsingh0807@gmail.com

Siddharth Singh
Electronics and
telecommunication
Thakur college of engineering
and technology,mumbai
Siddharthsingh367@gmail.com

Abstract—The advancement of color printing technology has increased the rate of fake currency note printing and duplicating the notes on a very large scale. Few years back, the printing couldbe done in a print house, but now anyone can print a currency note with maximum accuracy using a simple laser printer. As a result the issue of fake notes instead of the genuine ones has been increased very largely. India has been unfortunately cursed with the problems like corruption and black money .And counterfeit of currency notes is also a big problem to it. This leads to design of a system that detects the fake currency note in a less time and in a more efficient manner. The proposed system gives an approach to verify the Indian currency notes. Verification of currency note is done by the concepts of image processing. This article describes extraction of various features of Indian currency notes. MATLAB software is used to extract thefeatures of the note. The proposed system has got advantages like simplicity and high performance speed. The result will predict whether the currency note is fake or not.

Keywords-Counterfeit notes, Image Processing, Image Segmentation, Binarization.

I. INTRODUCTION

Technology is growing very fast these days. Consequently the banking sector is also getting modern day by day. This brings a deep need of automatic fake currency detection in automatic teller machine and automatic goods seller machine. Many researchers have been encouraged to develop robust and currency detection machine [1-5]. Automatic machine which can detect banknotes are now widely used in dispensers of modern products like candies, soft drinks bottle to bus or railway tickets. The technology of currency recognition basically aims for identifying and extracting visible and invisible features of currency notes. Until now, many techniques have been proposed to identify the currency note.But the best way is to use the visible features of the note. For example, color and size. But this way is not helpful if the note is dirty or torn. If a note is dirty, its color characteristic are changed widely.So it is important that how we extract the features of the image of the currency note and apply proper algorithm to improve accuracy to recognize the note.we apply here a simple algorithm which works properly. The image of the currency note is a digital camera. The hidden features of the note are highlighted in the ultraviolet light. Nowprocessing on the image is done on that acquired image using concepts like image segmentation, edgeinformation of image and characteristics feature extraction. MATLAB is the perfect tool work, and analysis. Feature extraction of images is challenging task in digital image processing. It involves extraction of invisible and visible features of Indian currency notes. This approach consists of different steps like image acquisition, edge detection, gray scale conversion, feature extraction,image segmentation and decision making. Acquisition of image is process of creating digital images, from a physical scene. Here, the image is captured by a simple digital camera such that all the features are highlighted. Image is then stored for further processing.

1.1.Process of Edge detection
It is a basic tool in image processing. It is widely used in area of feature detection and extraction. This process aim at identifying point in digital image at which image brightness sharply changes.

1.2 Process of Image segmentation
This process sub divides image into it sub regions. The level of division depends on the problem.Segmentation algorithm for images which are monochromatic is based on properties of images likediscontinuity and similarity

II.LITERATURE SURVEY

1."Design and Implementation of Indian Paper Currency Authentication System Based on Feature Extraction by Edge Based Segmentation Using Sobel Operator"
The method in this paper is inspired by the analysis of hidden marks on the image of the paper currency. The algorithm applied here is very simple and works properly. The image of the paper currency is acquired through camera by applying white backlighting to the paper currency so that the hidden marks of currency is appeared on the image. Now the image is further processed by applying the image processing techniques like image preprocessing, edge detection, image segmentation, characteristics extraction.

2. Authentication of currencies using image processing by B.SaiPrasanthi, Rajesh Setty
In this approach we extract the general attributes of the paper currency that is shape including identification mark, security thread and watermark etc.. These features are extracted by detecting the edges and estimating the gradient of the image at every point to generate a gradient image and thresholding the gradient image to accomplish image segmentation.

3. An automatic recognition of fake indian paper currency note using MATLAB
In this project they have made fake currency note detection technique using MATLAB and feature extraction with HSV color space and other applications of image processing. The

4a) ii) what is multiplexing? Compare FDM and TDM. [M-3]

Multiplexing is the process of simultaneous transmitting two or more individual saga over a communication channel

TDM	FDM
1.Time division Multiplexing	1.Frequency division Multiplexing
2. Signals are multiplexed in time domain. Different signals are sent in different time slots.	2. Signals are multiplexed in frequency domain. Different signals which are sent are assigned different frequency spectrum.
3. TDM is preferred for digital signals	3. FDM is preferred for anaolg signals
4. Synchronization is required.	4. Synchronization is not required.
5. TDM circuit is very simple.	5. FDM circuit is very complex.
6. TDM has less noise.	6. FDM has more noise, due to signal cross talk.

4C)Explain the working of strain gauge and its application in load measurement. [M-2]]

Strain gauage is a passive resistance transducer which converts the mechanical elongation and compression into resistance change. This change in resistance takes place due to variation in length and cross sectional area when external force act on it.

If the metal is subjected to positive stress , its length increases while it area of cross section decreases. The resistance of the conductor is directly propotional to its length and inversly propotional to its area of cross section. Thus the resistance of the conductor increases with positive strain.

The resistance of a conductor is expressed as,

$$R = \frac{\rho \times l}{A}$$

Where, ρ : Specific resistance of the material in Ω-m.

l : Length of the conductor in m.

A : Cross-sectional area of conductor in m^2.

The characteristics of a strain gauge are described in terms of its sensitivity which is called as the gauge factor of the strain gauge.

Gauge factor (G.F) is defined as the unit change in resistance per unit change in the length of the strain gauge wire.

Mathematically, $GF (K) = \frac{\Delta R / R}{\Delta l / l}$ ...(22)

Where,   K = gauge factor

ΔR = change in the initial resistance in Ω's.

VIII.REFERENCES

1) Ahmed ElShafee, Karim Alaa Hamed "Design and Implementation of a WiFi Based Home Automation System"*Vol:62012*
   http://waset.org/publications/5037/design-and-implementation-of-awifi-based-home-automation-system

2) Dept. of Computer Engg MAEER's MITCOE Pune, India Mohd. Mohsin ·Student Dept. of Computer Engg MAEER's MITCOE Pune, India"Home Automation and Security System Using Android ADK." *Volume 3 (March 2013)*
   http://www.ijecct.org/v3n2/(382-385)0302M22.pdf

3) Santoso Budijono, Jeffri Andrianto, Muhammad Axis Novradin Noor,Bina Nusantara University, Indonesia. "Design and implementation of modular home security system with short messaging system" *EPJ Web of Conferences 68,00025(2014),Published by EDP Science(2014)*

4) Azid, Sheikh Izzal, and Sushil Kumar. "Analysis and performance of a low cost SMS based home security system." *International Journal of Smart Home 5, no. 3 (2011).*

5) International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) *Volume 3 Issue 9, September 2015*

Strain is defined as the change in length divided by the original length.

$$\sigma = \frac{\Delta l}{l}$$

...(23)

σ : strain in the lateral direction.

Equation (22) can be written as,

$$K = \frac{\Delta R / R}{\sigma}$$

...(24)

The resistance of a conductor with uniform cross-section is,

$$R = \rho \frac{l}{A}$$

$$R = \rho \frac{l}{\pi r^2}$$

But, $r = \frac{d}{2}$, $\therefore r^2 = \frac{d^2}{4}$

$$\therefore R = \rho \frac{l}{\pi d^2 / 4}$$

...(25)

Where, ρ : specific resistance of the conductor.

l : length of the conductor

d : diameter of the conductor

The tension on the conductor causes a change in its length. The length of the conductor increases by factor Δl and in turn the diameter decreases by a factor Δd. Thus, the resistance of the conductor changes to,

$$R' = \rho \frac{l + \Delta l}{\pi/4 \, (d - \Delta d)^2}$$

$$R' = \rho \frac{l + \Delta l}{\pi/4 \, (d^2 - 2d\Delta d + \Delta d^2)}$$

$\because$ Δd is small, hence Δd^2 can be neglected.

$$\therefore R' = \frac{\rho \, (l + \Delta l)}{\pi/4 \, (d^2 - 2d\Delta d)}$$

$$\therefore R' = \frac{\rho \, (l + \Delta l)}{\frac{\pi}{4} d^2 \left(1 - \frac{2\Delta d}{d}\right)} = \frac{\rho \, l \left(1 + \frac{\Delta l}{l}\right)}{\pi/4 \, d^2 \left(1 - \frac{2\Delta d}{d}\right)}$$

...(26)

The buzzer is connected to microcontroller via transistor 548 and 1k resistor for monitoring the current flow. According to the programming logic, the output of buzzer will be given high or low by microcontroller. One port of buzzer is connected to the 12V DC supply. Pin No. 25, 26, 27, 28 are connected to relay.Pin no.32 to 39 are connected to LCD.[4]

Temperature and gas level reading will be notified to user via Android application. Fig 4.1 is shown below In case of emergency situations like gas leakage or fire hazards, user will be given immediate notification in the form of simple text message. When IR sensors will detect that no one is present in the room, it will automatically turn OFF appliances, and user will have full control of appliances via Android Application.
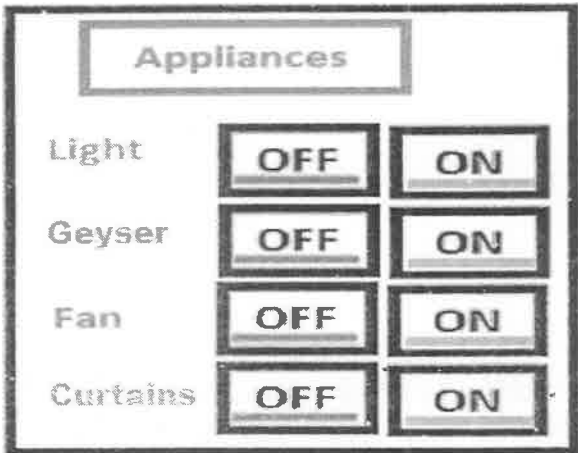
Appliances

Light	OFF	ON
Geyser	OFF	ON
Fan	OFF	ON
Curtains	OFF	ON

Fig4.2 Application Layout

V.RESULT

After connecting the components as per the circuit diagram, the results were as follows: When we were placing our hands in front of the IR proximity sensor , the buzzer starts buzzing and status was displayed on the LCD screen as ON. As soon as we used to move our hands or any obstacle away from the sensor , the buzzer stops and the status on the LCD screen is updated to 'OFF'. When we used to tap on the glass break sensor, the buzzer starts buzzing and status was displayed on the LCD screen as ON. As soon as thevibration stops, the buzzer stops and the status on the LCD screen is updated to 'OFF'. When we spray butane/propane in front of the Gas sensor, the buzzer starts buzzing and status was displayed on the LCD screen as ON.
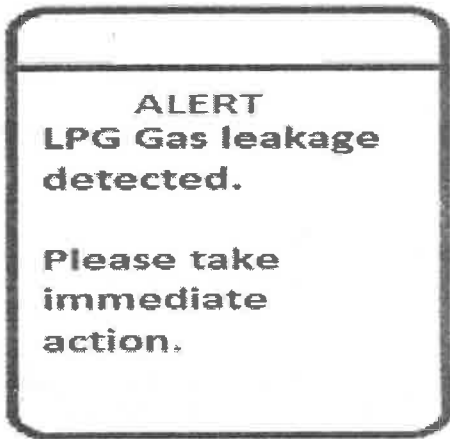
ALERT
LPG Gas leakage
detected.

Please take
immediate
action.

Fig5.1 Alert Message

VI. Conclusion

This project is capable of detecting fire, gas leakage, glass break and unauthorized movement at any place. Same project can be implemented in industry or educational
institutes for solving out problems listed above. Implementation of this system will enable us to ensure safety at home/ industry etc. Necessary action can be taken in a quick span of time without causing more damage. We can send this data to a remote location using GSM module or WIFI. Tracking the location of any such accident reported on mobile using GSM module. We can add the module of voice alarm system to indicate unauthorized entry or gas leakage.

VII.FUTURE SCOPE

The present study has been made to suggest and develop some tools which will eventually be useful to the governments, industries, owners and/or contractors for timely and accuratemeasurements of large infrastructure projects at areasonable cost and of a specified quality. This has revolutionized the area of home automation with respect to an increased level of affordability and simplicity through the integration of home appliances with smart phone and tablet Connectivity.

$$\therefore \quad \mu = \frac{\Delta d / d}{\Delta l / l}$$

$$\therefore \quad \frac{\Delta d}{d} = \mu \cdot \frac{\Delta l}{l}$$

Substituting in Equation (26) we get,

$$R' = \frac{\rho l \, (1 + \Delta l / l)}{\pi / 4 \, d^2 \, (1 - 2\mu \Delta l / l)}$$

$$R' = \frac{\rho l \, (1 + \Delta l / l)}{\frac{\pi}{4} d^2 \left(1 - 2\mu \frac{\Delta l}{l}\right)} \times \frac{(1 + 2\mu \, \Delta l / l)}{(1 + 2\mu \, \Delta l / l)}$$

$$R' = \frac{\rho l}{\frac{\pi}{4} d^2} \left[\frac{1 + 2\mu \, \Delta l / l + \Delta l / l + 2\mu \, \Delta l^2 / l^2}{1 - 4\mu^2 \, \Delta l^2 / l^2} \right]$$

$\Delta l \ll 1$. Hence neglecting higher powers of Δl we get,

$$R' = \frac{\rho l}{(\pi / 4) \, d^2} \, [1 + 2\mu \Delta l / l + \Delta l / l]$$

$$R' = \frac{\rho l}{(\pi / 4) \, d^2} \left[1 + \frac{\Delta l}{l} (1 + 2\mu) \right]$$

From Equation (25) we know,

$$R = \frac{\rho l}{\pi d^2 / 4}$$

Also $\quad R' = R + \Delta R$

$$\therefore \quad \Delta R = \frac{\rho l}{(\pi / 4) d^2} \, (\Delta l / l) \, (1 + 2\mu)$$

$$\therefore \quad \Delta R = R \cdot (\Delta l / l) \, (1 + 2\mu)$$

$$\therefore \quad \frac{\Delta R / R}{\Delta l / l} = 1 + 2\mu$$

But, $\quad K = \frac{\Delta R / R}{\Delta l / l}$

$$\therefore K = 1 + 2\mu$$

IV.METHODOLOGY

IR proximity sensor consist of IR333C sensor,PT333C sensor & LM348 Osensor,PT333C sensor & LM348 O-pamp. IR 333C acts as an infrared amp. IR 333C acts as an infrared transmitter and PT 333B acts as a receiverand PT 333B acts as a receiver. IR 333C will transmit infrared radiation and . IR 333C will transmit infrared radiation and PT 333C will receive it by reflection. PT 333B is made up of dark optical filter which PT 333C will receive it by reflection. PT 333B is made up of dark optical filter which PT 333C will receive it by reflection. PT 333B is made up of dark optical filter which will prevent visible light to interfere with the IR radiations. LM358 is a differential will prevent visible light to interfere with the IR radiations. LM358 is a differential will prevent visible light to interfere with the IR radiations. LM358 is a differential OPAMP acting as a comparator. One OPAMP acting as a comparator. One point of pt333c is connected to +5v display and point of pt333c is connected to +5v display and other is connected to ground via resistor 5k. PT 333 C is connected as an input to the other is connected to ground via resistor 5k. PT 333 C is connected as an input to the other is connected to ground via resistor 5k. PT 333 C is connected as an input to the LM348 comparator at pin no.3. Pin no.2 is connected to ground via 10k resistor. 5v dc supply is given on pin no.8 of OPAMP and pin no.4 is connected to ground. Pin no.1 is the output pin. Lm358 acts in a non-inverting mode. As soon as there is interruption in the IR transmission, the input to the LM358 Op-amp will be high which is 5V and output of the LM358 will be high. This high input will be given to the micro-controller 8051.If there is no interruption in the infrared transmission the output of LM358 will be low which will b given to microcontroller.

The glass break sensor consist of NE555 timer IC, PIEZO PLATE and BC548 transistor. Ne555 acts as a Monostable vibrator with one stable state. Piezo plate has two ports. One port is connected to 5v supply and other is connected to ground. The output from piezo plate will be for few nano-seconds which will be difficult for NE555 to recognize. So we use transistor as a mediator. The collector terminal is connected to the pin no.2 of NE555. Pin no.1 is grounded and pin no.3 is connected to the input of the microcontroller. Pin no.6 and 7 is connected between vcc via 100k resistor and ground via 10micro farad capacitor. Pin no.5 is connected to ground via 100nf capacitor and pin no.4 is connected to Vcc. Piezo plate will convert vibrations to electrical energy. If piezo plate feels vibrations, the output of piezo plate will be high which will be given to the transistor. Pin no.2 input will be high due to the presence of the pull up resistor. The input of pin no.2 will be dragged down to logic '0' when piezo plate will feel the vibration due to transistor acting as a switch. The output of Ne555 will go high which will be given to the microcontroller 8051.

LPG gas sensor consist of MQ6 sensor & LM348 Opamp.MQ6 sensor is used to detect alcohol vapour, LPG gas and fire. LM358 is a differential OPAMP acting as a comparator. One point of mq6 is connected to +5v display and other is connected to ground via resistor 5k.Mq6 is connected as an input to the LM348 comparator at pin no.3. Pin no.2 is connected to ground via 10k resistor. 5V DC supply is given on pin no.8 of OPAMP and pin no.4 is connected to ground. Pin no.1 is the output pin. LM358 acts in a non inverting mode. As soon as the mq3 sensor detects the presence of LPG gas, the input to the LM358 OPAMP will be high which is 5V and output of the lm358 will be high. This high input will be given to the micro-controller 8051.[3]

Fig 4.1 Circuit Diagram

Microcontroller 8051 takes input from 3 sensors.All pins of port1 and port3 are used for input where as pins of port0 and port2 are for output.pins1.0 to 1.7 is connected to output from a/d converter.pin 3.0 to 3.7 is connected to output from the three sensors.Reset logic is connected to pin no.9.pin 11 &12 is used for transmission and reception from wifi module.Clock frequency is provided in the pin no. 18 & 19 respectively with the help of 11.0592Mhz crystal. Pin 20. Is grounded and VCC is given at pin no. 40. Pin no.28 act as a input pin to buzzer.

5b) Draw and discuss Hay Bridge and its application for measurement of inductance. [M-1]

The Hay bridge, shown in Fig. 11.23, differs from Maxwell's bridge by having a resistance R_1 in series with a standard capacitor C_1 instead of a parallel. For large phase angles, R_1 needs to be low; therefore, this bridge is more convenient for measuring high-Q coils. For $Q = 10$, the error is ± 1% and for $Q = 30$ the error is ± 0.1%. Hence Hay's bridge is preferred for coils with a high Q and Maxwell's bridge for coils with a low Q.
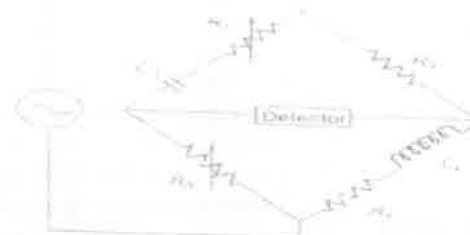

Fig. 11.23 — Hay's Bridge

At balance $Z_1 Z_x = Z_2 Z_3$, where

$$Z_1 = R_1 - j/\omega C_1$$
$$Z_2 = R_2$$
$$Z_3 = R_3$$
$$Z_x = R_x + j\omega L_x$$

Substituting these values in the balance equation we get

$$\left[R_1 - \frac{j}{\omega C_1} \right] (R_x + j\omega L_x) = R_2 R_3$$

$$R_1 R_x + \frac{L_x}{C_1} - \frac{jR_x}{\omega C_1} + j\omega L_x R_1 = R_2 R_3$$

Equating the real and imaginary terms, we have

$$R_1 R_x + \frac{L_x}{C_1} = R_2 R_3$$

and

$$\frac{R_x}{\omega C_1} = \omega L_x R_1$$

Substituting for L_x and R_x, we have, $R_x = \omega^2 L_x C_1 R_1$
Substituting for R_x in Eq. (11.16):

$$R_1 (\omega^2 R_1 C_1 L_x) + \frac{L_x}{C_1} = R_2 R_3$$

$$\omega^2 R_1^2 C_1 L_x + \frac{L_x}{C_1} = R_2 R_3$$

Multiplying both sides by C_1 we get

$$\omega^2 R_1^2 C_1^2 L_x + L_x = R_2 R_3 C_1$$

Therefore,

$$L_x = \frac{R_2 R_3 C_1}{1 + \omega^2 R_1^2 C_1^2}$$

Substituting for L_x in Eq. (11.17)

$$R_x = \frac{\omega^2 C_1^2 R_1 R_2 R_3}{1 + \omega^2 R_1^2 C_1^2}$$

Arduino Uno. The app on your smartphone sends data when you click on buttons or feed voice commands.[2]

3. Home Automation Using Android and Bluetooth :

Automation include centralized control of lighting, HVAC (heating, ventilation and air conditioning), appliances, security locks of gates and doors and other system.[5]

4. IoT based Home Alert System using Wi-Fi and Cloud Technologies:

Design home security system based on wireless sensor network using Wi-Fi and Cloud technologies. It can detect the theft, fire, leakage of gas or smoke and sends an autogenerated email remotely to intimate the owner.[6]

5. Remote Controlled Home Automation Using Android Application via WiFi Connectivity:

It involves design and prototype implementation of home automation system that uses Wi-Fi technology and Android operating system. An attractive market for Home Automation System is for busy families and individuals with physical limitations.

III. PROPOSED SYSTEM

A. Working Principle

The Entire project consists of two main phases i.e. Hardware and Software. User has the central control over home appliances by using Android phone application. User commands through Android application whose signal is given to PC via Wi-Fi. PC has the sever program deployed on it. Server is configured to handle both hardware and software modules. Microcontroller using serial communication port interacts with server. As per user's command particular appliance is operated (ON/OFF). Server keeps record of log information which is provided to user on demand and temperature readings regularly updated on user's application.

(LM35), LPG sensor (MQ6), Relays and IR sensors.

Fig 3.1 is shown below has a microcontroller is a 40 pin IC having four ports namely P0, P1, P2 and P3 each with 8 I/O pins (P X.0-P X.7). The LPG sensor is connected to pin P0.0. Two Relays to pin P0.3 and P0.4, Temperature sensor to pin P1.0, IR sensors to pin P1.1, Buzzer to pin P2.7 and USB-TTL to pin P3.0 and P3.1. On AC power supply of 230V, the Bridge rectifier (D1) converts it into DC. To get a constant output voltage of 9V DC, voltage regulator 7809 is used since relay circuitry requires 9V supply whereas 7805 regulator is used for microcontroller working. Capacitors, (electrolytic or ceramic) and resistors with their specific values are mounted as per the requirements. mounted on the circuit indicates whether the circuit is working properly. The software design is nothing but designing of graphical user interface on Android application.. On successful establishment of connection, user can either operate devices (ON/OFF) or acquire log information (energy consumed by each device) about devices. Further, temperature reading will be constantly notified to user via Android application. In case of emergency situations like gas leakage or fire hazards, user will be given immediate notification in the form of simple text message When IR sensors will detect that no one is present in the room, it will automatically turn OFF appliances, and this information will be sent to Android Application.
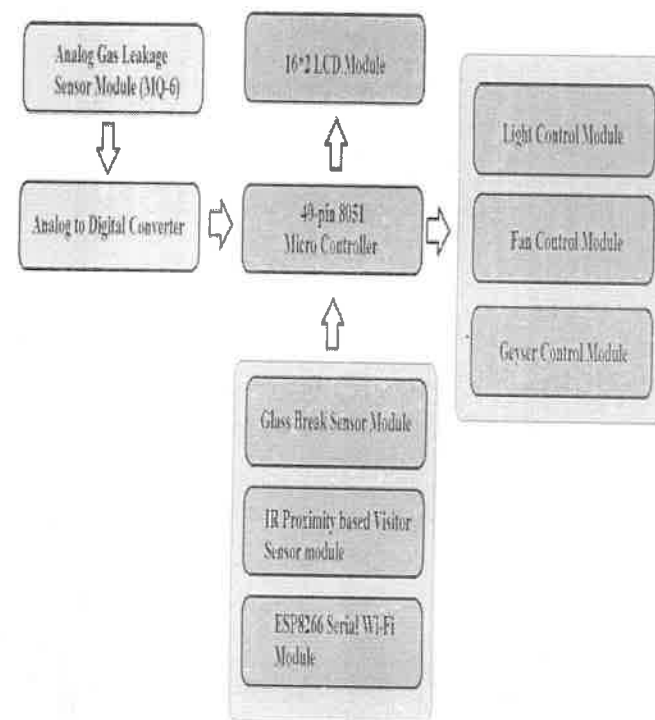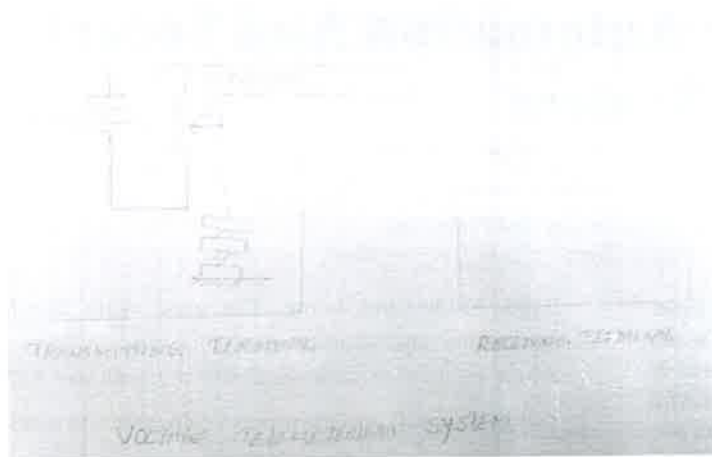
B. Block Diagram

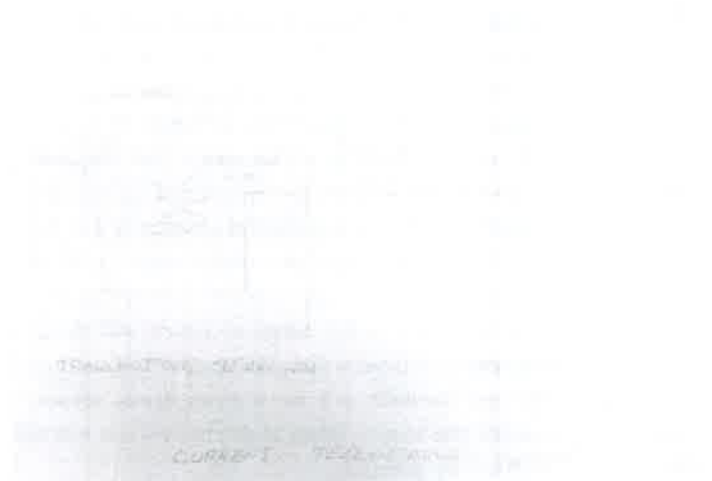Fig.3.1-Block Diagram Of Home Automation

C. Other Accessories:

Opamp .(LM358). IC NE555, Crystal oscillators

Buzzer, Piezo plate. Xpress PCB

Resistors and capacitors, Relay circuit

Electric Motor

6ai) Explain landline telemetry and discuss about any one landline telemetry system. [M-3]

Voltage telemetry

Current telemetry

Position telemetry

IOT Based Home Automation And Security System

Student Adarsh Dubey[1],Raj Mishra[2],Avinash More[3]

Asst.Prof. Mrs Aradhana Manekar[4]

Thakur College of Engineering and Technology.

ABSTRACT- *Home Automation System (HAS) has been designed for mobile phones having Android platform to automate an 8 bit wifi interfaced microcontroller which controls a number of home appliances like lights, fans, bulbs and many more using on/off relay. This project presents the automated approach of controlling the devices in a household that could ease the tasks of using the traditional method of the switch.In this project, we have made an attempt to deal with problems like trespassing, gas leaks, and fires. Multi-sensor Home Security System is a system that gives a warning to the user if any of the above threats occur. Wherever you may go, you will have the power to monitor your security system, window blinds, and even your lights inside your home. The good thing about ring home automation and security system is that it allows you to do things inside your home regardless of where your location is. Keywords:Android , Wifi module , trespassing , multi sensors.*

I.INTRODUCTION

Home automation is a modern technology that modifies your home to perform different sets of tasks automatically. Today, automation technology is gaining more recognition among people not just for home modification but in industrial and business sectors too. Home automation technology is constantly improving its flexibility by incorporating modernized features to satisfy the increasing demands of people.

Homes require sophistication control in its different gadgets which are basically electronic appliances . This has revolutionized the area of home automation with respect to an increased level of affordability and simplicity through the integration of home appliances with smart phone and tablet connectivity. Smart phones are already feature-perfect and can be made to communicate to any other devices in an ad hoc network with a connectivity options.

This project allows an individual to automate all the devices that one has in his or her home. You can actually control all the devices that you have at home regardless of what part of house you are currently in. Even if you are inside your bedroom, you can easily control your microwave and coffee maker inside your kitchen. Wherever you may go, you will have the power to monitor your security system, window blinds, and even your

lights inside your home. The good thing about ring home automation and security system is that it allows you to do things inside your home regardless of where your location is.[2]

Our system will provide proper notifications to users for any type of theft or accidents in house and alert them via sending messages on their mobile phone with a central control of all appliances in the house. Smart home is a very promising area, which has various benefits such as providing increased comfort, safety and security to peopleHome security system project consists of four basic modules. First is IR transmitter and receiver module which works for the safety of doors. When the IR sensors are interrupted, a buzzer is turned on indicating someone has entered into the house. Second module is LPG gas sensor. It is provided to detect LPG gas leakage. A buzzer is turned on when gas is detected by the sensor. The third module is a fire detector, which will detect if there's a fire. When it detects fire, the sensor will activate the buzzer. The last module will be a glass break sensor, which will activate the buzzer when it detects violent vibrations (caused by breaking glass).

II.LITERATURE SURVEY

1.Home Automation System Using Android and WiFi

It is a system, which implements on Android System, which is very much ubiquitous and profoundly available. It has some disadvantages, which will be listed, in some upcoming section. The goal of the paper was to design a system, which should be easy to implement, and short ranged. The project is implemented through onboard Wi-Fi. which is inbuilt in the mobile phones having an Android as its system.[1]

2.Home Automation System Using a Simple Android App BY- Karthik Rajasekaran:-

Home automation system using a simple Android app, which you can use to control electrical appliances with clicks or voice commands. Commands are sent via Bluetooth to

In Landline telemetry system, information is directly transmitted through cables and transmission lines. The telemeter channel is a physical link between transmitter and receiver.

In Voltage telemetering system, measured variable is transmitted as AC or DC voltages. In current telemetering system, measured variable is transmitted as AC or DC current. In position telemetering system, measured variable is transmitted as change in resistance. Need to explain any one of the three.

6b i)Compare the temperature transducers Thermistors & thermocouples on the basis of principle, characteristics, ranges & applications. [M-2]

Comparison of Thermistor and Thermocouple

Sr No:	Thermistor	Thermocouple
1	Thermal Resistor	Pair of two dissimilar metals
2	Passive	Active
3	Thermo-resistive: Resistance of metal decreases with increase in temperature.	Thermoelectric: direct current pass through pair of thermocouple with junctions maintained at different temperature is called as thermoelectric effect.
4	Negative Temperature Coefficient (NTC)	-
5	Made up of semiconductor	Made up of Metal + Semiconductor
6	Characteristics are Non-linear	Characteristics are Linear
7	Operate over small temperature range -100C to 300C	Operate over wide temperature range- -270Cto2700C
8	Low Cost	High Cost

Increased Voltage Regulator Circuit