Contactless smart Infrared Thermometer using arduino, Android and also save and share results with pictures.

Mini project second review presentation.

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Content

INTRODUCTION

- The current COVID-19 scenario needs no introduction. It has become common to screen individuals for body temperature.The device that is used to do this is called a **Contactless Infrared Thermometer.**

- The objective is to design a Low cost, Easy to build **Contactless Thermometer** that can measure body temperature, log them into an excel along with the picture of the individuals so that the record can be easily shared with concerned authorities.

- **Contactless device to measure temperature**
- **Android app to conveniently use the device**
- **Website for storage and sharing of data to the concerned authorities**

Literature Review

Sl.no	References	Review
1	C.L. Hao, Y.W Shen, “Study on Production and Mercury Consumption of Clinical Mercury-Thermometers in China”, Research of Environmental Sciences , vol. 19,no. 1, 2006,pp.18-21.	• In order to realize the human body temperature fast and non-contact measurement, an infrared thermometer is designed. • The infrared human body temperature sensor is mainly used to convert the human body's infrared into voltage signal, an operational amplifier to amplify the signal, filter circuit to filter the signal, the analog signal into digital signal by the A/D conversion circuit, data processing by the MCU, LCD display and voice reporting body temperature and time, so the human body non-contact measurement is realized. • The experimental results show that: the device can realize the temperature and time of acquisition, the measurement error is not more than 0.5℃, voice broadcast and liquid crystal display the temperature and time, overrun alarm and other functions.
2	M. Yan, C.W. Peng, Y.H. Yan, etal ,“The principle of infrared temperature measurement and error analysis”, Journal of Hunan University,vol.31,no.5, 2004,pp.110-112.	• The study ameliorates the feasibility of IR thermometer, and to introduce a novel design with upgraded applications & functions. • The custom compact device (shape illustrates a Hadge") measures the surface temperature of a body and received data processed through a microcontroller (AtMega328P). The device functions in a way that if there is any thermal change from ambient temperature (D-1 m), the mode is activated and triggers a predefined alert. • For distance measuring, it measures the intensity of IR radiation emitted by a body from a particular direction. It also reads the temperature when it comes across a body. It will provide an optimum way in the primary healthcare instrumentation and helpful for noncontact, quick, and accurate measurement of moving and high temperature body.
3	A.J. Shan,“Application of SYN6288 Chinese Speech Synthesis Chip in Smart Sowing Monitor”, Agricultural Science & Technology and Equipment, total 216,no.6,2012, pp.43-44,47.	• Agricultural monitoring devices are electrically powered, but agricultural areas are broadly spread out geographically where electricity supply is not often available, hence the need for solar charger is clear. In this paper polycrystalline silicon solar • energy cell boards are designed to be controlled through a LM2596 switching regulator modules. Output voltage and charging status from a Holzer current sensor are detected by using SCM STC89LE52RC and analogue-to-digital conversion chip ADC0832. • The collected data are processed and displayed on an LCD screen. Experimental tests show that the charger can be used for normal USB charging, real-time voltage and current parameters are displayed on the LCD during charging, at the start and finish with interim state of charge indicated through the LED.

S. no	References	Review
4	Louis, Leo. (2018). Working Principle of Arduino and Using it as a Tool for Study and Research. International Journal of Control, Automation, Communication and Systems. 1. 10.5121/ijcacs.2016.1203.	• This paper explores the working principle and applications of an Arduino board. This also explores on how it can be used as a tool for study and research works. Arduino board can provide a quick tool in development of VLSI test bench especially of sensors. • Main advantages are fast processing and easy interface. Today, with increasing number of people using open source software and hardware devices day after day, technology is forming a new dimension by making complicated things look easier and interesting. • These open sources provide free or virtually low costs, highly reliable and affordable technology. This paper provides a glimpse of type of Arduino boards, working principles, software implementation and their applications.
5	Oinas-Kukkonen, Harri & Kurkela, Virpi. (2003). Developing Successful Mobile Applications. Journal of Computer Science and Technology - JCST.	• This paper discusses issues related to developing successful mobile applications both businesswise and in terms of user satisfaction. It shows that despite the many limitations mobile devices have, it is worthwhile considering developing them. Mobile commerce may become the key driving force for developing mobile applications, just as electronic commerce catalyzed the development of Web applications. • This paper puts special emphasis on goal-driven applications, and suggests seven key principles for developing highly goal-driven mobile applications. Finally, the importance of mobile usability evaluation is emphasized.
6	B. Marco, B. John, O.F. Brendan, H. Nicholas and D. Paul , “Low-power wireless liquid monitoring system using ultrasonic sensors”, International Journal on Smart Sensing and Intelligent Systems, vol. 8, no. 1, March 2015,pp. 26-44.	• Monitoring Systems are necessary to understand the changes that take place in environments. Remote monitoring and data collection systems are useful and effective tools to collect information from bulk storage tanks and to monitor the same. • The measurement of liquid inside the tank is most important and such systems are useful in industries which are categorized as safety critical systems. • This paper presents the architecture and initial testing results of a low power wireless system for tank level monitoring using ultrasonic sensors.

Proposed Methodology

Why TCRT5000 and Arduino Nano?

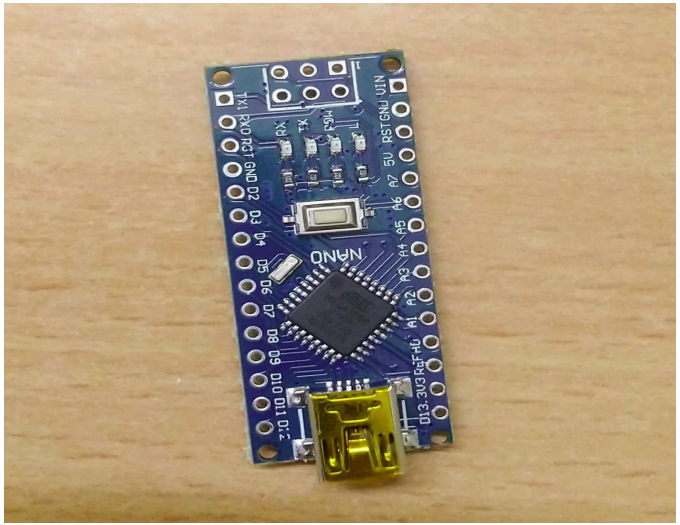


Figure: Arduino nano

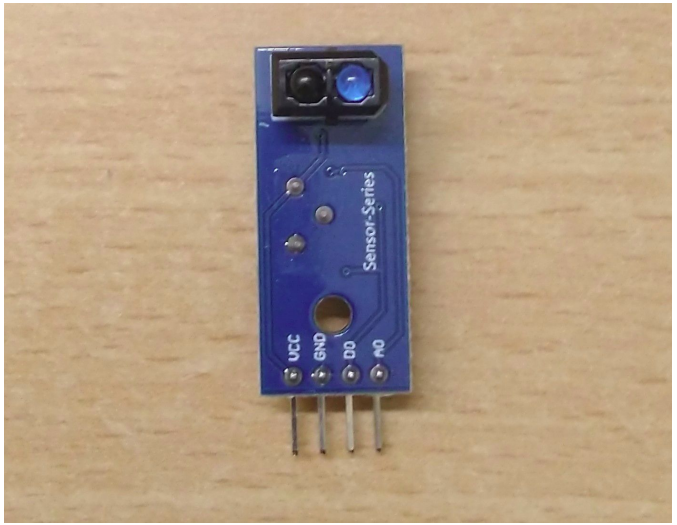


Figure: TCRT5000 infrared sensor

Temperature sensor MLX90614

Figure: MLX90614
Contactless R sensor

- ➔ very small in size-compact
- ➔ works well with arduino(no lag or glitch)
- ➔ resolution upto 0.2°C
- ➔ operation voltage = 3.3V
- ➔ scl-serial clock(for clock sync with arduino)
- ➔ sda-serial data(for temperature signal transfer)

Interfacing MLX90614 and TCRT5000 with Arduino

The circuit diagram of our project is very simple, we only have to connect the MLX90614 and TCRT5000 sensor with our Arduino nano board. The complete **circuit diagram for Contactless Body Thermometer** is given below.

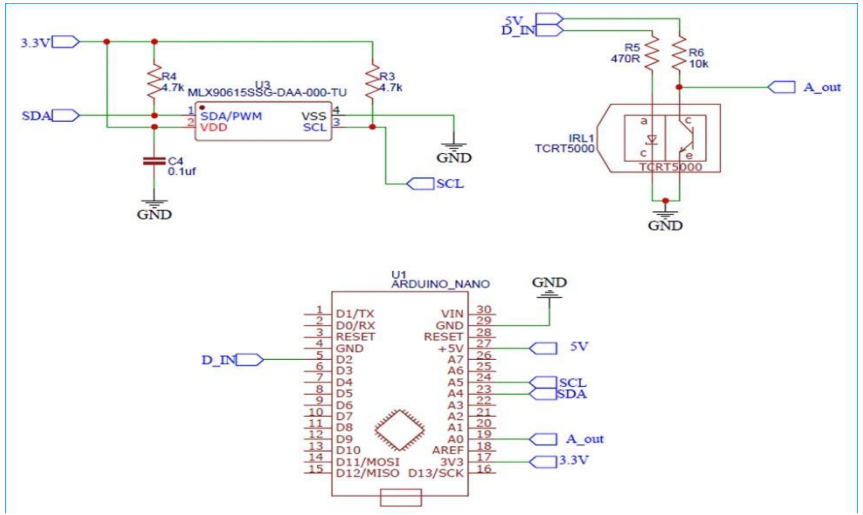


Figure: Circuit diagram for Contactless Body Thermometer

Android Application :

On a quick look, we can distinct some of the important parts on a thermometer, namely the IR temperature sensor, microcontroller, Display, Display driver, and the Battery.

For Low Cost and Easy Build

Today almost everyone has a good android phone with a decent camera. We can create a simple Android application that can communicate with our thermometer and perform other activities like data logging and image capture. This way we can not only make it work faster but can also increase its potential application by instantaneously sharing log results with pictures on WhatsApp, Gmail, or any other preferred platform. This is why we created our Android application called “Mini Project”. So the only material required for this project is-

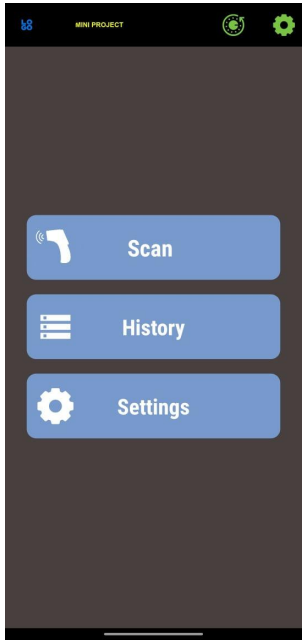
MLX90614 IR Temperature Sensor

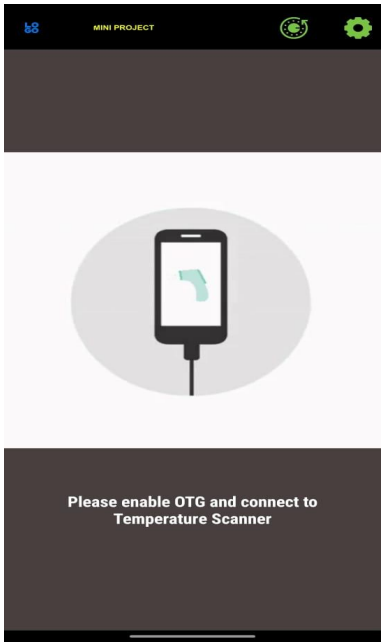
TCRT5000 IR Sensor

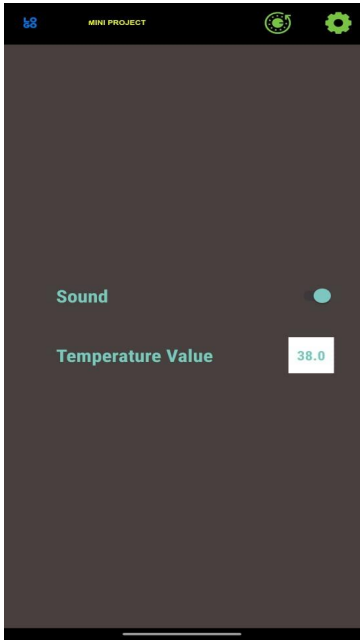
Arduino Nano

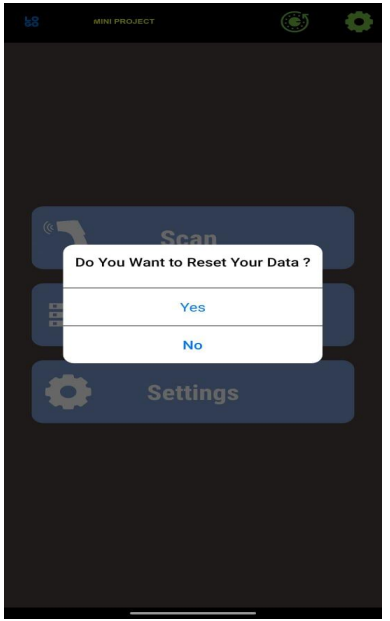
Contactless Smart Thermometer – Arduino Program

The most feature rich part of this project is the Easy Scan Android Application. As mentioned earlier, the Android application allows us to store all the temperature values with a photograph and also share it as an excel file through Whatsapp E-mail, etc. Few screenshots of the applications are shown below.



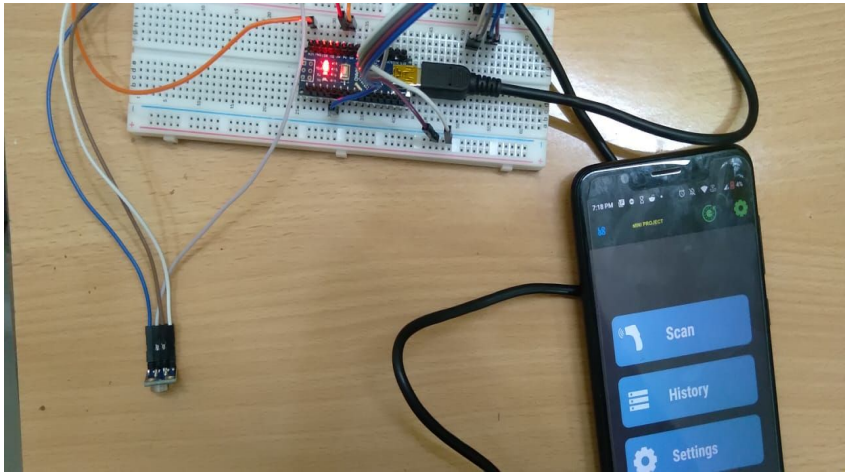


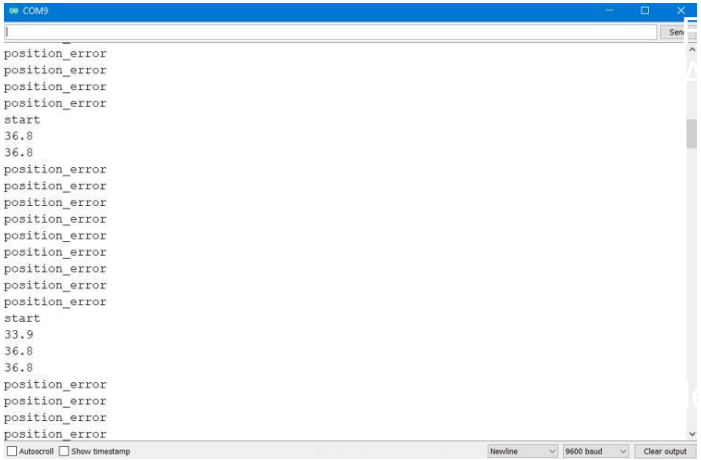




IMPLEMENTATION

- Once the hardware is ready, upload the Arduino code to the Arduino nano.
- If you bring your hand close to the sensor, you will see the value of temperature. This will help us make sure the hardware and program are working as expected.
- After that use an OTG connector and connect your device to mobile phone. Both mobiles, with Type-C and micro USB port, were tested and found to be working.
- Application can be installed using the APK, launch the Application.
- The application allows you to set threshold temperature, if the temperature is more than this threshold value, it will prompt you to take a picture.
- All the scanned records and be viewed on the application with time and date and can also be shared in Excel format for maintaining records.
- Also this data can easily be shared to the doctor using website which is also developed by us.



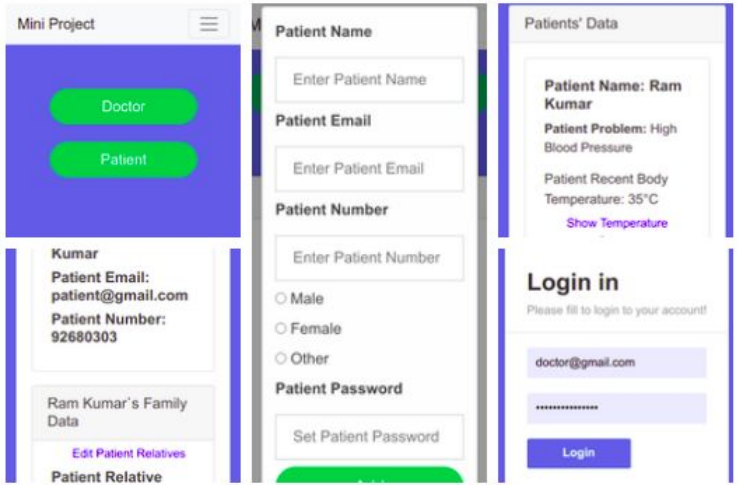


Non-contact thermometer

Developing Website for sharing content

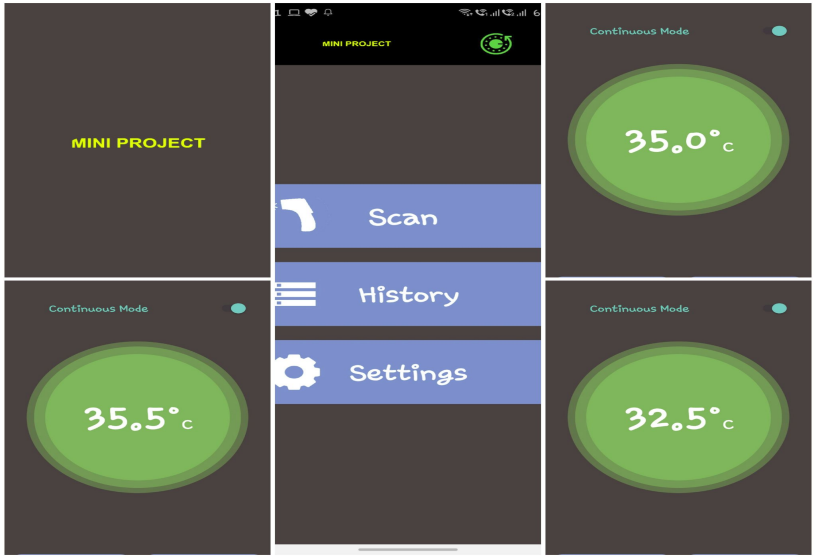
Once the application for recording data is ready we built a Website for both doctor and patient. This Website allows patients to share their data with their doctor with their temperature screenshots and contact them if needed. It shows the most recent data of patients to doctors and it is user friendly with easy login and secure.

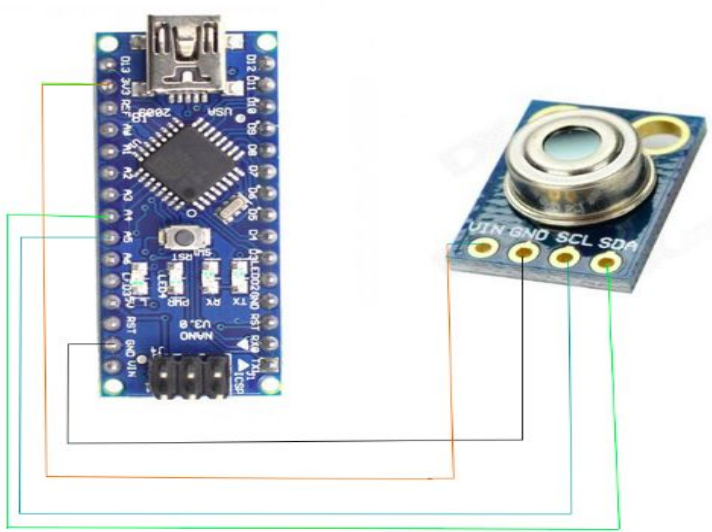
Website link: https://mini-project-server.herokuapp.com/



Conclusion

We have built a mobile based thermometer using Arduino-Nano and we have also developed an android application and website for a smooth interface.This project can help a lot of people in this tough times of COVID-19 for self analysis and easy content sharing with doctors across the world.





Failure Scope

1. MLX90614 IR Temperature Sensor connections should be tight otherwise it might provide wrong readings.
2. Position of the TCRT5000 IR Sensor should not be much away from Temperature Sensor to maintain accuracy.

Reference

[1] C.L. Hao, Y.W Shen, “Study on Production and Mercury Consumption of Clinical Mercury-Thermometers in China”, Research of Environmental Sciences , vol. 19,no. 1, 2006,pp.18-21.

[2] M. Yan, C.W. Peng, Y.H. Yan, etal ,“The principle of infrared temperature measurement and error analysis”, Journal of Hunan University,vol.31,no.5, 2004,pp.110-112.

[3] Y. Cui, H.F. Li, “The principle of infrared temperature measuring instrument and Application Guide”, Automation & Instrumentation , total 14,no.6,2009,pp.103-107.

[4] J. Li,M.D. Liu, Y.K. Zeng, etal, “Study on non contact infrared temperature measurement ”, Piezo- electrics & Acoustooptics,vol.23,no.3,2001, pp.202-205.

[5] W. Chen, “The Intelligent Monitoring System for Piglets Based on Automatic Control Algorithm”,Hangzhou Dianzi University,2012.

[6] W.P. Liu, “Measurement and Control Node of oil Automation System Design and Implementation”, He Fei University of Technology,2007.

[7] J.Z. Li, “Principle and Practice of Micro controller unit”, Publishing House of Xidian University,Second Edition, 2008.

[8] W. Wang, S.R. Li, “Temperature acquisition and wireless transmission based on 8051 MCU ”, Modern electronic technology,vol.34,no.1, 2011, pp. 146-149.

[9] B. Marco, B. John, O.F. Brendan, H. Nicholas and D. Paul , “Low-power wireless liquid monitoring system using ultrasonic sensors”, International Journal on Smart Sensing and Intelligent Systems, vol.8, no. 1, March 2015,pp. 26-44.

[10] Z.H. Xin, G.L. Chen, H. Li, Q.X. Song, L.Y. Hu, etal, “The smart home system based on the IAP15f2k61s2 and GSM”, International Journal on Smart Sensing and Intelligent Systems, vol. 7, no. 4, December 2014,pp. 1789 – 1806.

[11] D.G. Yang, T.y. Liu , C.Y. Hu, “Design of an intelligent car for searching track and avoiding obstacles”, International Journal on Smart Sensing and Intelligent Systems, vol. 8, no. 2, June 2015,pp. 1354 – 1378.

[12] A.J. Shan,“Application of SYN6288 Chinese Speech Synthesis Chip in Smart Sowing Monitor”, Agricultural Science & Technology and Equipment, total 216,no.6,2012, pp.43-44,47.

THANK YOU!