

Smart E Glasses for Voltage Measurement

Juhi Niswade¹, Rachi Hadke², Kamakshi Deshmukh³, Apurva Shende⁴

^{1,2,3,4}Department of Electronics and Telecommunication, S. B. Jain Institute of Technology, Management & Research, Nagpur (MH), India

Abstract - People usually have problems with electrical work / PCB testing/troubleshooting, placing samples at two points, and checking the exact time of the measurement circuit. This is also time-consuming and leads to incorrect/incorrect measurements. To solve this problem, the system integrates the virtual voltage and current display through the user's glasses while debugging/testing the system. This system relies on AURDINO NANO to process and display the output. The glass frame consists of an intelligently designed miniature frame. The frame is designed to fit OLED type displays, along with the circuits AURDINO NANO and display lenses used for the desired reflection of the glass frame. The system is designed to fit the human ear easily and you can see the circuit along with the measured voltage.

Key Words: voltage Measuring Circuit , Diagnose , HC-12 Wireless Serial Port Communication Module , OLED , etc

1. Introduction

It turns out that smart glasses are one of the most advanced processing devices that connect humans and machines. With a live control panel, it's inconvenient and sometimes even dangerous to get out of your hand to look up a multimeter. Estimating high AC voltage with a traditional digital multimeter is extremely dangerous as it can lead to actual glitches. This project represents a wearable wireless device that allows users to see measurements, which are smart glasses. When using these glasses, the measurements are displayed on the smart glasses, so the user does not need to watch the DMM show. Estimating electrical parameters such as voltage and current was tedious. While estimating the voltage and other parameters of smart glass, there are many issues such as accuracy. While the viewer is looking at the example at the same time as making a quote, they need to look at the smart glass to see what the reading is. During such an estimate, the test may be interrupted and the viewer may make an incorrect measurement.

2. Objective

1. Smart glass base voltmeter.
2. Wireless connectivity in smart glass unit and measuring unit.
3. Arduino mini base Smart E – glass voltmeter.
4. Small and portable device and easy to used.

3. Proposed System

This system consists of a dual circuit. That is the voltage measurement circuit and display circuit on the glass frame. This system solves the problems of traditional multimeters. The voltage sensor is connected to the Aurora Nano and the measured voltage is shown on the OLED display. The readings shown on the OLED display are reflected by the lens and the output is displayed right next to the glasses. This system helps reduce personnel and provides accurate measurements. The comparison cost for this project is not very high as it requires many sets. The lightweight also makes it easier for observers to wear smart glasses for extended periods of time. All circuits are housed in a plastic box, located just to the right of the smart glass frame. Therefore, the potential danger to people is reduced. There is no problem because it uses only 9V batteries. Since the test probe is located directly in front of the viewer and data glass, there is no problem with the test probe during measurement.

4. Block Diagram

4.1 Description :-

Shows a basic smart glass block diagram for voltage measurement. The voltage sensor for this project is an interface with the Arduino Nano and the HC-12 Wireless Serial Port Communication Module. The measured value of the voltage measuring circuit by the voltage sensor is transmitted by the HC-12 Wireless Serial Port Communication Module of the voltage measurement circuit. The HC-12 Wireless Serial Port Communication Module of the voltage measurement circuit functions as a transmitter, and the HC-12 Wireless Serial Port Communication Module of the display circuit functions as a receiver. The HC-12 Wireless Serial Port Communication Module used in the display circuit receives data from the voltage sensor device, connects it to the Arduino Nano, and displays it on the OLED display. The mirrors used in this system are the simple mirrors we use in our daily lives. Convex lenses are used to reflect OLED data. The reading/data from the convex lens is reflected by the reflector of the glasses. And finally, test and measure the required parameters.

4.2 Block Diagram

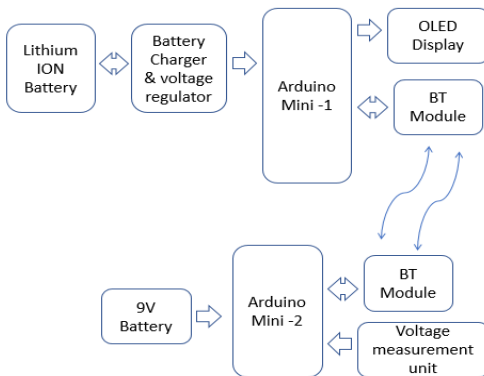


Fig 1. :- Block Diagram

5. FLOW CHART

5.1 Flow Chart Diagram

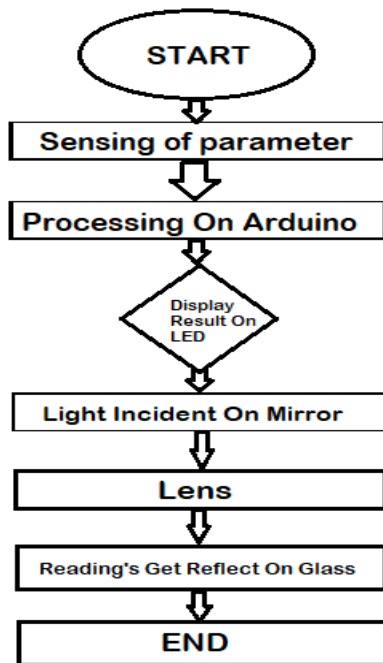


Fig 2. :- Flow Chart

5.2 Description

1. Start
2. Acquisition of electrical parameters using a voltage measurement circuit.
3. Processing specific data with Aurdino Nano
4. Shows the final reading on the OLED display
5. Incident light from the convex mirror

6. Transfer the readings in the form of light through the lens
7. Reading is reflected in front of the glasses

6. List of components

Sr no.	Component	Specification	Qantity
1	Arduino Nano	atmega328p	2
2	OLED Display	128x64	1
3	HC-12 Wireless Serial Port Communication Module	HC 12	2
4	Voltage sensor	B25	1
5	9V battery	9v, 200mA	1
6	Lithium-ion battery	3.7v,500mA	1
7	Battery Charger unit	TP4056	1

7. RESULT AND DISCUSSION

7.1 Circuit Diagram

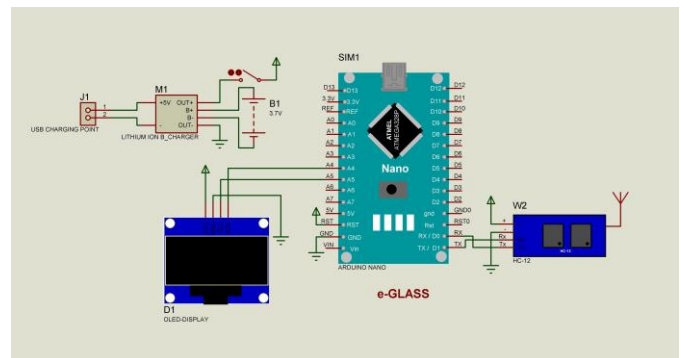


Fig 3. :- E Glass Circuit

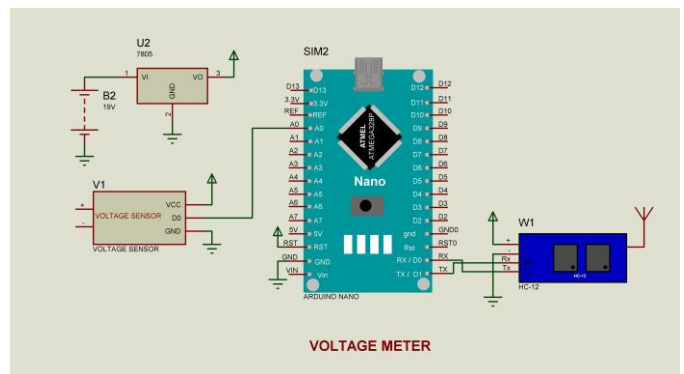


Fig 4. :-Voltage measuring Circuit

7.2 Project Image

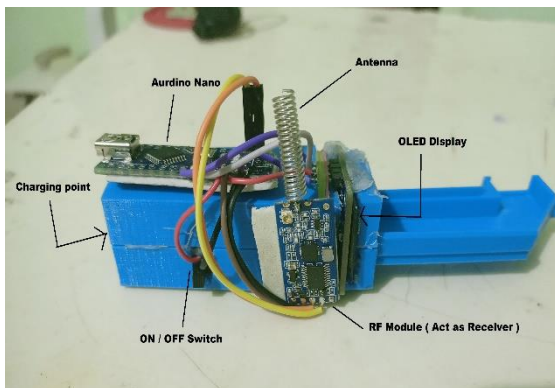


Fig 5. :- E glass Circuit

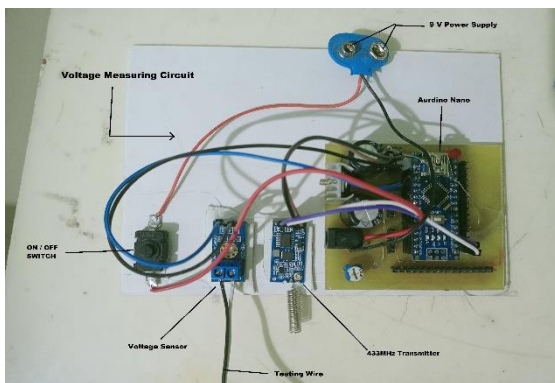


Fig 6. :- Voltage Measuring Circuit

7.3 Advantages

1. This system is lighter than traditional systems Easy-to-use multimeter.
2. It improves the mobility of this system. You can move it Easy from here and there.
3. This system is more convenient for observers.

8. Conclusion

This smart glass accurately responds to the estimation of electrical parameters. This system contains a lot of information about many things. This system provides information via programming software such as Arduino. By making this task, numerous progressions saw during voltage estimation. Since it is extremely troublesome yet intriguing to gauge the electrical parameters utilizing samples and shows their values on your glasses.

References:

1. Rajalakshmi, B., Aparna, V., Divyaswathy, G. and Pooja, R., 2022. Voltage and Other Parameters Monitoring System Using Smart E-Glass.

In Futuristic Communication and Network Technologies (pp. 747-757). Springer, Singapore.

2. Kim, J., & Han, J. I. (2014). Effect of liquid crystal concentration on electro-optical properties of polymer dispersed liquid crystal lens for smart electronic glasses with auto-shading and auto-focusing function. *Electronic Materials Letters*, 10(3), 607-610.
3. Face Detection and Recognition for Smart Glasses Constantino, Alvarez Casado, Miguel Bordallo Lopez, JukkaHolappa and MattiPietikainen, Center for Machine Vision Research University of Oulu Oulu, Finland.
4. Recent Advances of Smart Glass Application Security and Privacy Buti Al Delail, Chan YeobYeun Department of Electrical and Computer Engineering Khalifa University of Science, Technology and Research Abu Dhabi, UAE {buti.aldelail,cyeun}@kustar.ac.ae
5. Ackerman, E. (2013). Could Google Glass Hurt Your Eyes? A Harvard Vision Scientist and Project Glass Advisor Responds. *Forbes*