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Monitoring of Industrial Electrical Equipment Using Iot

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ABSTRACT

Industries like petroleum, chemicals, oil, and gas have a high risk of fire outbreaks, leading to huge destruction, loss of property, and the vast majority of all, deficiency of lives. It is vital to have some system that can keep the premises secure and inform the authorized people within the specified time if any incident occurs. IOT and Arduino based industrial issue recognition project is intended to recognize fire (using smoke and temperature sensor) and LPG leakage (using LPG gas sensor). This project utilizes IOT and sends data to a site. Internet Of Things (IOT) is the network of 'things' by which the physical things can exchange data with sensors, electronics, software, and availability. These systems don't need any human association.

INTRODUCTION

In the field of the internet of things and smart devices [1] [2], a very important point is remote monitoring of large facilities, and the remote control of the system is in proper function[3][4]. Commonly behavior/malfunction detects the environmental health risk assessment and emergency management of the remote monitoring systems. The remote system monitoring industrial automation helps manufacturers reduce the overall amount by minimizing, improving productivity, and smooth moving support. The necessary parameters such as temperature and humidity are lined throughout the day to notify the moment. A parameter is sloping, tending outside of the unacceptable range. In this way, the equipment should reliability and productivities are increased, and maintenance costs are optimized. The monitoring systems may receive the sensors, telemetry streams, user inputs, and software procedures.

IOT (Internet of Things) creates a high platform of application in the fields. For example, we can write the medical system, traffic control systems, home automation, monitoring the environment, etc. In the field of computing, IOT is trying to take a high amount of change. For that reason, it is very much simple to understand that an energy management system using IOT is a great contributor to keep away from the destruction of power monitoring and controlling.

Embedded systems are electronic devices that can make into one microcontroller according to their implementation. The major purpose is to make a simplified system design and certain flexibility of a system. In a device, the microcontroller is used for removing the bugs, make certain modifications and new features to control the overall system. So we can easily understand that an embedded computer system is the system that added a microcontroller for performing the applications [3].

RELATED WORK

Picot, H. W et al. 2019 address some technological requirements for developing an IOT. Industrial monitoring network, whose use of wireless devices and the conventional wired method to enable a series of data capture and control operations in a network of nodes. To provide a platform to host these operations, the industry-standard field bus protocol mod bus TCP was used in conjunction with the LabVIEW development environment, where a graphical user interface was developed to provide the control and a visual representation of the collected data.

Shahzad K et al. 2018 have analyzed the design challenges associated with realizing IOT enabled with industrial condition monitoring, focusing on enabling end-devices in managing large amounts of acquired data. With the help of a vibration-based condition monitoring case study, the challenges are analyzed quantitatively, and possible alternatives are explored. The results suggest that the efficient and long term condition monitoring in the smart industry in the future improvements for enabling the technologies which required designing to optimize end-devices.

Acharya V et al. 2017 have proposed an IOT based efficiency monitoring system for biogas plants. An Arduino micro-controller system is deployed and tested to measure gas production and consumption. Android-based application is designed to act as an SMS gateway, which gives a free replacement of commercial solution. A dashboard plotting the usage statistics is designed to help the plant administrator to monitor the parameters.

Yavari A et al. 2019 have proposed an IOT-based solution that provides a real-time detection of hydrocarbon pollution generated by retail fuel outlets (which referred to a service or stations). Our solution includes a low-cost and highly accurate fiber optic sensor that can detect hydrocarbons in ground water and be easily deployed to the existing monitoring system.

D'Aloia, M et al. proposed the module's design for remote and real-time monitoring of environmental

parameters. The architecture is based on the microservice and adopts the 2G data network communication.

Gan, S et al. 2018 present an IOT (Internet Of Things) based interactive system that combines non-invasive sensors and the data acquisition apparatus, robust communication networks, cloud-based data's and webserver to achieve real-time monitoring of energy usage in the industries. The energy consumption is collected from the data and published to the data center automatically through the wireless communication network using the MQTT protocol when a web server driven by the Apache is developed to provide a human-data interaction dashboard B/S (Browser / Server) structure.

Chaiwong K et al. 2019 have studied the investigation of the temperature by monitoring the gasification process of the stove by using an IOT system which comprises a Raspberry Pi 3 Model B as a single-board microcomputer that connected to the internet and operated along with the mobile application that acts as a system monitoring of the stove temperature in the real-time. The gasification process's production and efficiency were considered by the controlling airflow inlet to the stove that optimized for the conversion.

Alam, S. U. et al. 2019 provided an energy consumption monitoring system that provided real-time visualization energy at the device level. IOT added a new dimension that should control and monitor the system from anywhere.

Zhao, L et al. 2019 developed a high-speed IOT based monitoring system with recording functions and implemented a power system. Due to the high speed and reliability, an FPGA embedded controller is adopted in this system. The IOT platform provides remote visualization for the system operators in real-time.

Aalsalem et al. 2017 have proposed an intelligent IOT based monitoring system that involves smart objects for reliable and efficient monitoring. The smart IOT objects can sense important parameters like pressure, temperature, vibration, and reliability deliver the sensed data to the control center.

Balaji, Y et al. 2019 propose an IOT based monitoring system in the mid-stream, iLoLeak detect, that can improve the operation's quality by analyzing the field's data LoRaWAN enabled the sensors like flow meters, pressure, and temperature sensors.

PROPOSED SYSTEM

This system describes the design of the development and testing of a microcontroller. It should be monitoring the current and voltage of the devices. Our new system can control the technical condition of the industry in terms of their load. It helps define the warmest region, which can be evaluated as a dangerous zone for humans or production. Early diagnosis is one of the important operations in the industries. In this project, we provide a monitoring industry system that provided a real-time visualization of all the devices' sensor values. Here we used Arduino D1R1, which is a Wi-Fi board with ESP8266. A relay is used for switching purposes, which we can control from the server. A current sensor is used for sensing the current from the level of load. ADC is used to making the digital data type that we can easily understand. The user interface is developed by the wemos D1 R1 server, and the data will be uploaded to the server using the internet. The potential transformer work along with the principle of the transformers. It helps to convert the voltages from high to low. Here an amplifier is a circuit that can produce the output voltage, which is the input voltage product.

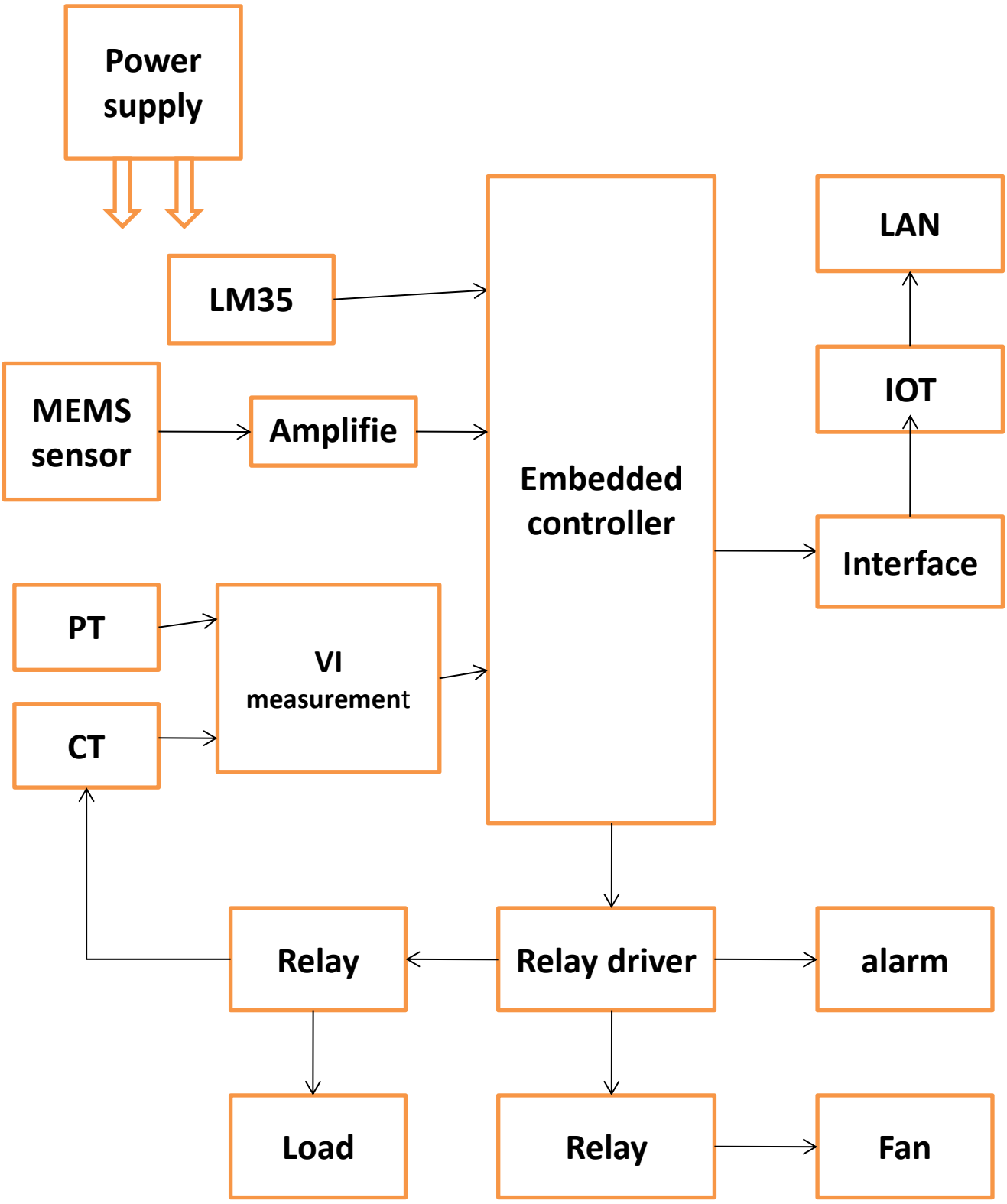

Figure: Industrial Equipment Architecture

The industrial equipment architecture of the proposed system is shown in the above figure. It continuously measured the voltage and the current signals obtained from the sensors. The measured signal is described in 3 sections that transmit a remote access point and controls the system. The proposed method is easier to implement, and it provides the method that uses wired communication systems while accepting the data from the server.

RESULTS

In this section, the result and discussion of our project are simulated and figured in the following.

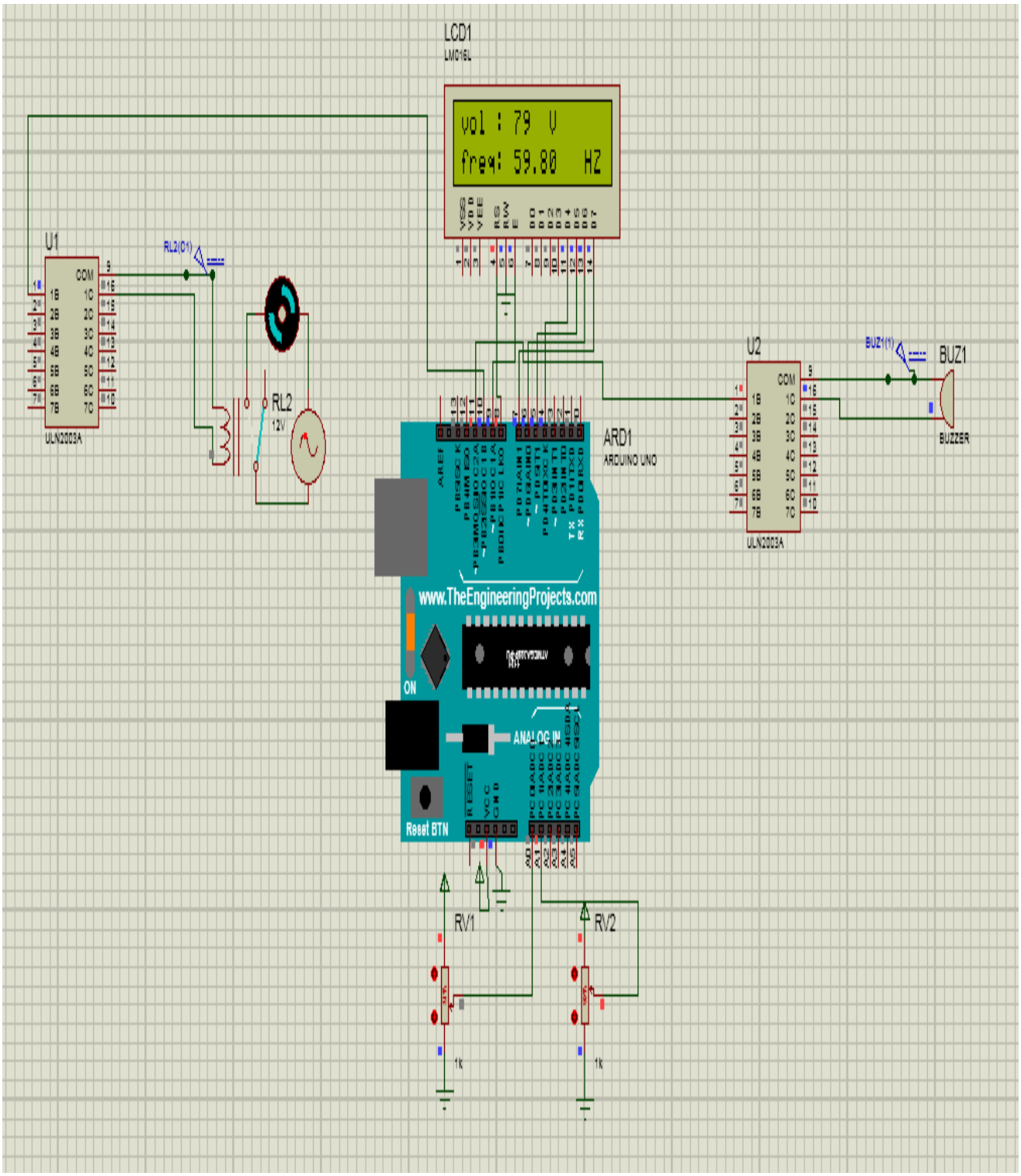

Figure: low voltage and frequency

The figure shows that the project's simulation results and in the LCD display the voltage and frequencies.

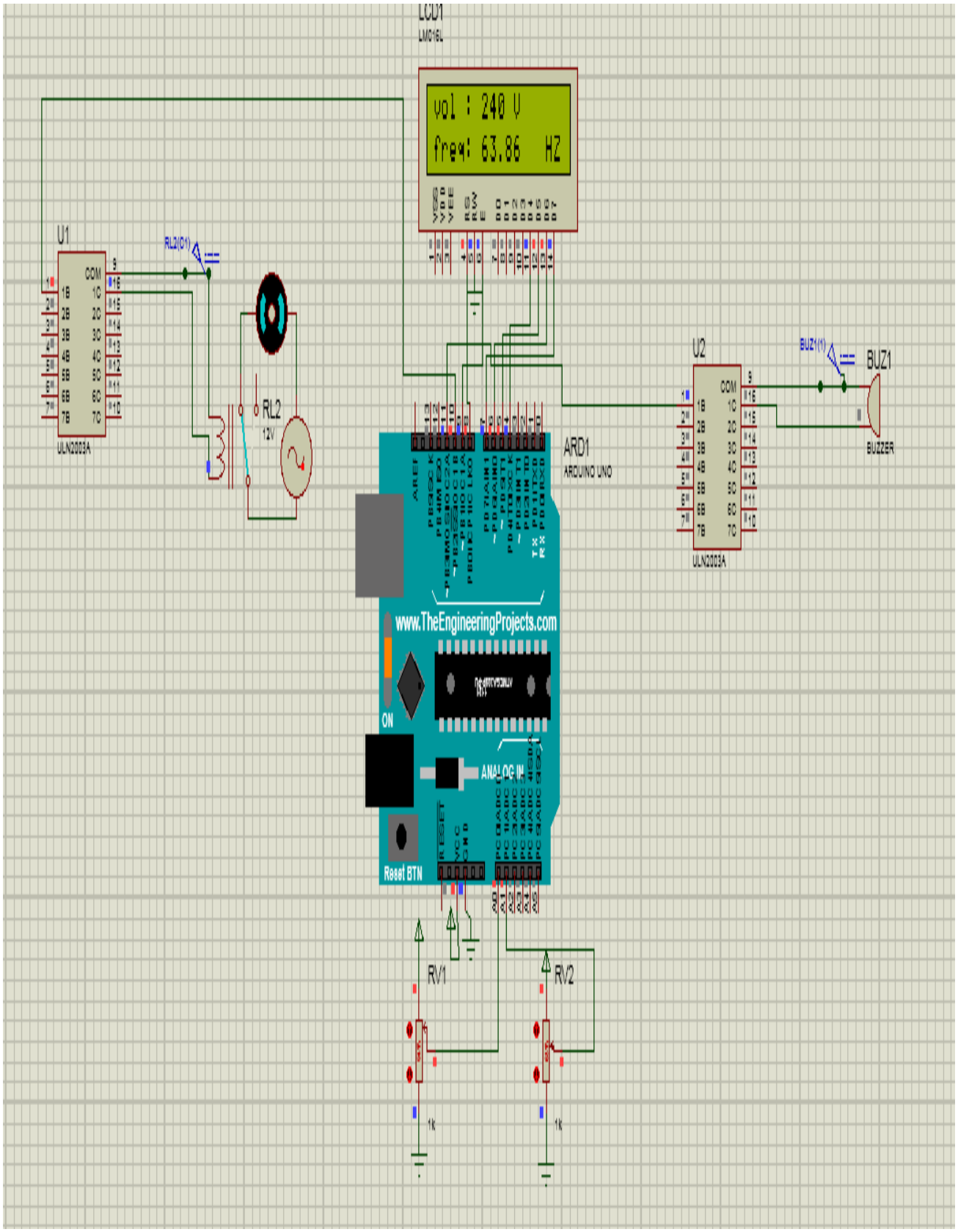

Figure: High voltage and frequency

The figure shows that the project's simulation results and in the LCD display the voltage and frequencies.

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