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Smart Performance of Virtual Simulation Experiments Through Arduino Tinkercad Circuits

Badri Narayan Mohapatra
Department Instrumentation, AISSMS IOIT, Pune, India, badri1.mohapatra@gmail.com

Rashmita Kumari Mohapatra
Department ECE, TCET, Mumbai, India

Vaishnavi Jagdhane
Student of Instrumentation Department, AISSMS IOIT, Pune, India

Chanakhekar Ashwini Ajay
Student of Instrumentation Department, AISSMS IOIT, Pune, India

Siddhi Sambhaji Sherkar
Student of Instrumentation Department, AISSMS IOIT, Pune, India

Vaishnavi Suhas Phadtare
Student of Instrumentation Department, AISSMS IOIT, Pune, India

Abstract: As due to rapid evolution of technology, now a days there are different tools and applications available for the instructor, teacher and for the student user. Where it is very easy to analyse, process, share, store and display the result output. As different video tutorials and videos on operational concept and educational concept make more demand on the open source software and hardware tools. Before going to the physical connection, one can make sure about dealing with simulation environment to reduce the possibilities of errors or difficulties. This paper aims at the Tinkercad environment so that user can apply different plan of assembling different configuration on electronic components like, sensor, breadboard, resistors and with all kind of active and passive components with the control board like Arduino and Raspberry Pi.

Keywords: Tinkercad; Teaching tool; Arduino; Virtual simulation

I. INTRODUCTION

Now the system of teaching technology, is adopting more in digital design by using C programming. The major challenge while using certain free tool can help students for connecting like physical hardware like some switches, wires, LED lights and building their own plan with different equipments without need of any setup of any equipments. Tinkercad is the simulator tool which will help at different level of users like school, college and undergraduate students. As simple programming language is easily implemented. In simulation student can easily redesign and reprogram very fast even if the circuit size is large. So such type of digital tool can help the learning skill of different components and also bridge the gap in current education system in covid19 situation, where student can learn from home. Tinkercad can be coded very first and its easy and enjoyable [1]. It is also best open source web-based simulation [2].

By presenting the basic environment, Tinkercad makes the best experience in order to learn different sensor concept and applications with the use of Arduino and Raspberry pi virtual devices. Different models designed by this environment can be stored in the cloud and under it is easy to find any kind of fault by the supervision process of the instructor or academic staff. Project based learning can be possible through Tinkercad learning tool [3]. Different sensors are available to perform prototype circuits [4].

To teach the fundamental model with the current advanced technology concept make the students more interested in the subject. Collaborative project work can be possible through Tinkercad open source tool [5].

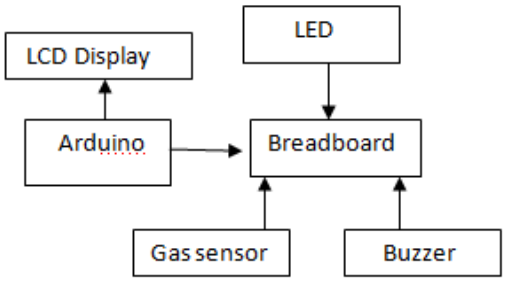

Fig 1. Basic block for Gas sensing element

II. CIRCUIT DESIGN

Many health issues occur due to leakage of gas. For this immediate action is required. In daily life good environment and healthy condition is very essential for our health. Presence of these dangerous gases can be detected by the gas sensor, so gas sensor is very helpful for detection. The complete circuit makes an alarm alert system for the awareness of dangerous gas. Here we are using Arduino board with LCD display, buzzer and the Gas sensor. The basic block diagram for gas detection circuit is shown in Fig. (1) Many gas detector circuits can be easily monitored by using Arduino UNO which is the center of control on this Tinkercad tool [6]. Gas leak detection can be alerted through Arduino and sensor circuit connection with LCD [7] and [10]. Arduino is also used for many applications like floor cleaning [8] and in waste alarm system [9]. Simulation based performance will give early information about the easy performance for any application [11].

III. APPLICATIONS

Different types of applications are possible to design on Tinkercad tool, but here we are focusing on three small applications:

A. Gas sensing alarm system

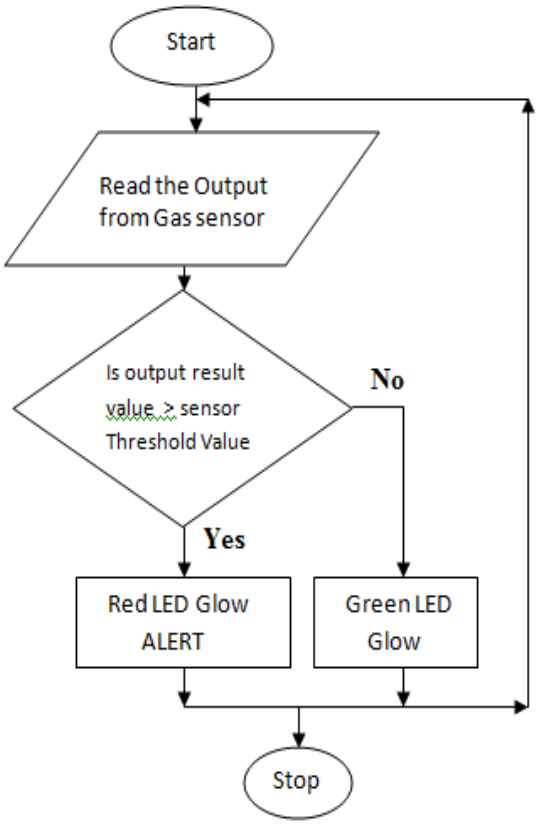

Fig 2. Flow chart for gas alarm system.

Once the detector detects the gas, immediately with the help of Arduino the program simulation results are obtained on the LCD display. Buzzer sound will be generated when gas concentration will increase as per the set value in the program. As per the required instructions, signal information will trigger the buzzer. Fig. (2) represents the flow diagram of gas sensing alarm system. Fig. (3) and (4) represents gas sensing circuit in Tinkercad environment.

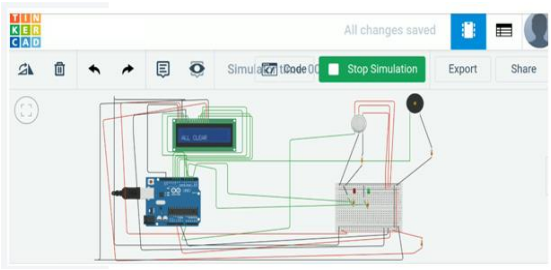

Fig 3. Simulation circuit for gas sensing alarm system

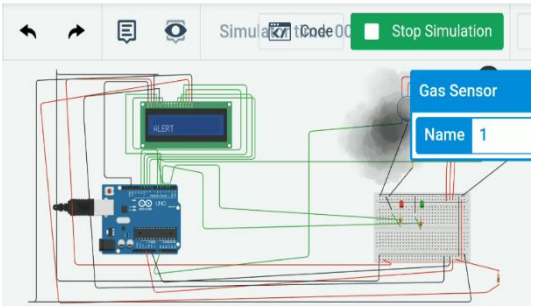

Fig 4. Gas alarm system for Tinkercad environment

B. LED Brightness control

Also, in this context we are also performing two other applications in Tinkercad environment,

i. LED brightness control through potentiometer

ii. seven segment display.

Easily one can construct and perform on this environment. The potentiometer has three pins, the center pin of the potentiometer is always voltage In and pins in the left and right are used as voltage output. The complete circuit connection is shown in Fig. 5. Different applications can be performed by using Arduino in industrial applications [8]. Fig. (5) represents the application of brightness control through potentiometer.

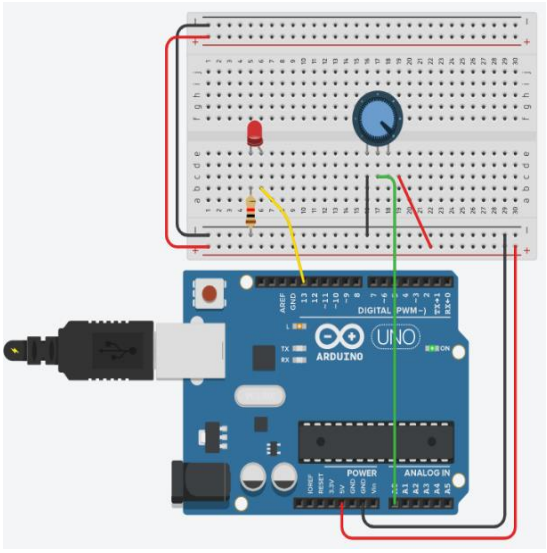

Fig 5. LED brightness control circuit using potentiometer

C. *Seven Segment Display*

Also in this context we are also performing two other applications in Tinkercad environment,

i. LED brightness control through potentiometer in Fig. (5)

ii. Seven segment display in Fig. (6) and Fig. (7).

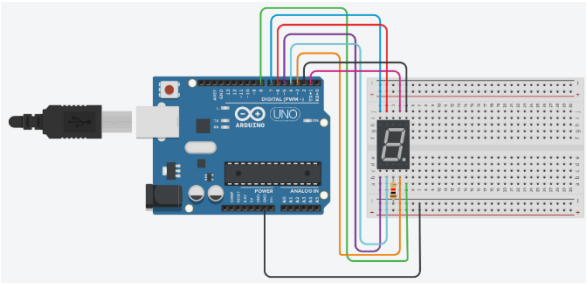

Fig 6. Seven segment circuit in Arduino model

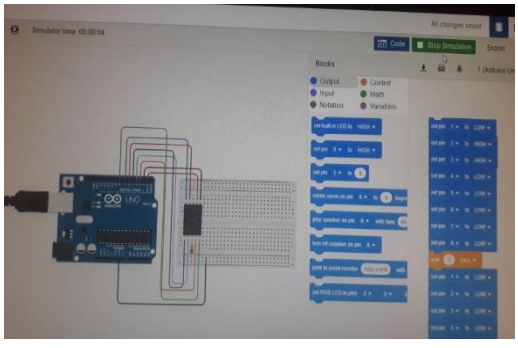

Fig 7. Performance of seven segment in Tinkercad environment.

IV. DIGITAL TOOL

Basic purpose behind all such different applications, is that anyone can immediately perform the practical and it is a smart process and also it eliminates usage of time for the instructor or the user. After successful implementation, student or work employees need less time to complete the hardware design. Safety can be improved by using all such digital tool and also reduce the waste time. Different plan of execution on all different circuit may increase the productivity.

How to use some of the math, variables and notations, control parts, input as well as output is very important at the initial stage on the Tinkercad environment. Also, different researchers have done different applications. Solution combined with all passive and active component in a single system Tinkercad platform is best to use in different applications.

For the online mode of practical applications, the educational institute can serve in very smart and smooth way. It is very free flowing software and lot of study tutorial can make the design workflow to be very easy, interesting and in understandable form to the users. It also increases the interest also save the cost, time and efforts. It is a best learning platform where the user can develop their skills effectively by using it easily and smoothly. Tinkercad tool makes positive impact on students, learning on different thinking approach and ignite them for different competitions. So this provides good impact on learning and exploration on things of laboratory activities, so it is more beneficial to the whole education system

V. CONCLUSION

This type of digital learning tool makes the students more attentive towards practical and also motivates the instructor, who can engage students with several design activities. Meaning full learning can accelerate different experimental work. It is also inexpensive, very user friendly and easily handled. For practice point of view in science and mathematics, this digital tool can be very helpful on both applications based as well as technology based. By utilizing Tinkercad, user can make some application-oriented projects. Different applications will be with different results and can cultivate student knowledge on programming and computing process. So educational institutes are promoting students to work with different digital platform which enhances their carrier and also is beneficial to their technical knowledge.

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