Easy Performance Based Learning Of Arduino And Sensors through Tinkercad

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Abstract—**Considering different sensing systems, one can easily upgrade the skills and effectively use of programming knowledge to understand both theoretical and practical concepts by using Tinkercad tool. Proper circuit connection, programming, and run the instructed command of programming through simulation and to get the specific goals is a very pleasurable experience to the users. Due to simulation, one can easily identify the required logical development and then one can automatically start thinking to develop to resolve a specific set of problems or goals. As it is a web based online tool where one can easily monitor, also can make the required result oriented performance at any time, anywhere through the use of a mobile or personal computer. Here we have described some experiments on Tinkercad environment.**

Keywords—**Arduino, Sensors, Simulation, Tinkercad Circuit Tool and Innovative teaching Learning Process.**

I. INTRODUCTION

Nowadays, we all live in a computerized world. All kinds of electronic systems can be computing and can apply different logic behind all algorithms to perform specific task. This makes more attraction, interest and motivation to the users. Tinkercad is the best web platform to solve early problems before any hardware connection and to resolve the issues in simulation [1].

As Arduino is a good platform for all its users, as it is an open source. In Tinkercad, as per the user needs, one can use different sensors, pushbuttons, motors, all required devices through the library and easily build the real time connection and build the required performance [2].

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The main purpose that users can easily implement with their logic, so Arduino in Tinkercad tool is now a good platform to lead the education positive towards theory and practical approach of learning. The best content behind this tool is that it provides all components, with this facility one should work more effectively [3].

Sharing knowledge by looking at fast development technologies & science, with the same speed, the listener should consume all new eras by understanding the exact thing on the simulation environment. So basically to understand the different solutions, people need to have some difficulties and also experienced good results while solving different daily life problems.

This platform may give the users a huge amount of knowledge, where he/she can easily improves on high-level thinking. For logical thinking, synthesis and analysis can easily carried out by the learner or new users.
Particularly by using Tinkercad web based tool, one can easily interact with all project components, reactions of sounds light can be generated, data can be imported with different sensors like humidity, smoke, distance, etc., easily program can be interrupted through Arduino and all type of connections which is easily available on the tool environment [4].

Before proceeding to hardware the preliminary study and simulation help to get the desired output and the level of significance increase by obtaining different possibilities.

The coding can be easily embedded with Arduino and this simulation environment is used for a more flexible nature and safety work environment and its performance can be easily analyzed [5]. It gives all the basic ideas also it saves the time and no need to worry while performing in real hardware connection. Arduino board can easily read the sensor inputs and gives the output in terms of buzzer, LED and LCD display. Its applications are more [6]. Ultrasonic sensor also plays an important role in parking system [7]. Ultrasonic sensors also play an important role in blind people help [8]. The Importance of audio and its verification also should be highlighted [9].

II. PROPOSED BLOCK DIAGRAM

For any kind of electronic project application, small devices are required. Figure 1 represents the basic block diagram of
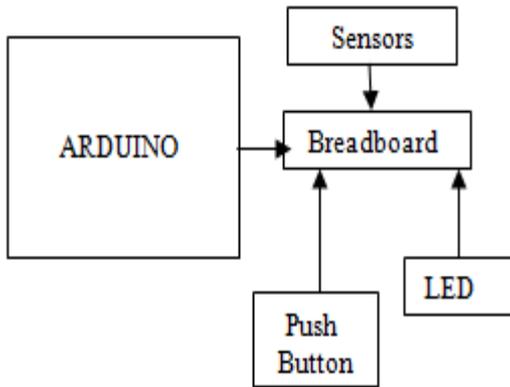
any simple project connection purposed system.

Fig. 1. Representation of block diagram

Based on this block diagram here we are representing three basic level project i.e. one is for LED bulb glowing, second Arduino with ultrasonic sensor and lastly sound generate through a virtual piano system

III. IMPLEMENTATION

Simulation response is obtained by applying proper value to the software. Something one can perform by breadboard, sensor, Arduino, all necessary wires, and the required components. By Tinkercad simulation tool, one can easily perform the task any time with no expense.

This type of research work encourages students and teachers to perform some of the practical application performance.

By using smartphones and tablets, one can easily implement different control things with the use of Arduino. Here we can easily do many things better, faster, and with more accuracy. Building on different sensor control and choice based data can be implemented. One can develop computational thinking also develop a process for the design of some algorithm. Sensors are simply controlled by Arduino and communicate with different work performance.

Due to the use of simulation, students can know the basic concept of programming very clearly. Also, it can enhance the learning capability. After assembling and operation of simulation, student can understand the functional work of the circuit. On the practice of use of this tool, user can be familiar with concept of programming of day to day life work problems.

One can think build and make any circuit connection. It can be produced using free online programming Tinkercad tools. As it contains (active and passive) electronic components, with different sensors, multimeter, relay, Arduino board, one can easily perform the build of codes and realization of virtual model function in the solution to real time problems. The best open source Arduino is used for computing platforms. It is good to use for development environment.

It can work with different operating system like Linux, Mac, Windows. Readymade libraries can be downloaded from the Internet.

Figure 2 represents here the working of LED Bulbs in Tinkercad environment and coding is shown in figure 3.
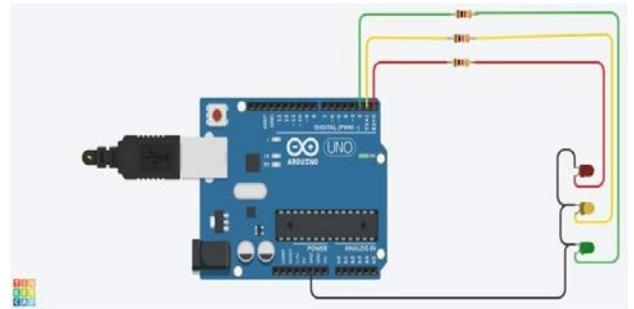

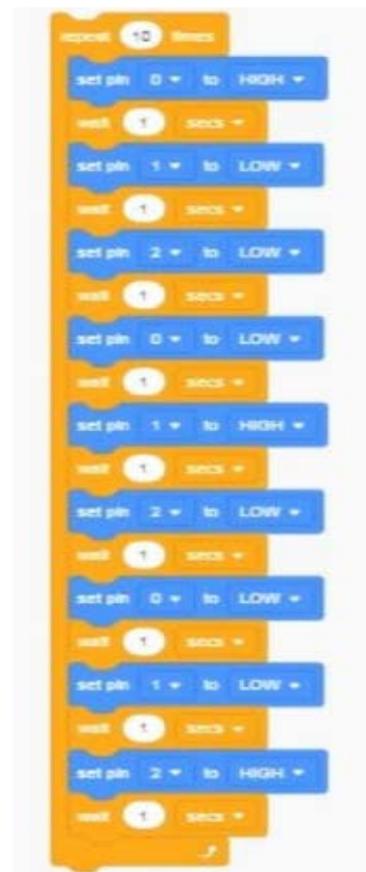Fig. 2. Working of LED Bulbs

Fig. 3. Representation of Coding for LED bulb glowing

Instant feedback on how the program is running and if any require on debug on the process code, quick information user can get from this tool environment, which will increase the learning capability. The drag and drop facility of every block to the workspace makes good to construct the circuit performance.

To proceed, one should go for the first step to take 3 LED bulbs of different colors and then connect the anodes of each LED bulbs to the power supply which is present on the Arduino board on the digital pin side. Then make the connection as-

    1st LED bulb anode=Pin RX(0)
    2nd LED bulb anode=Pin TX(1)
    3rd LED bulb anode=Pin 2

after that Use the resistors while connecting to the power supply. Again make ground to all the cathodes of the LED bulbs which are present on analogue pin side of the Arduino board. Lastly beginning the stimulation of the circuit and observe the output. The overall LED glowing circuit is shown in figure 4.
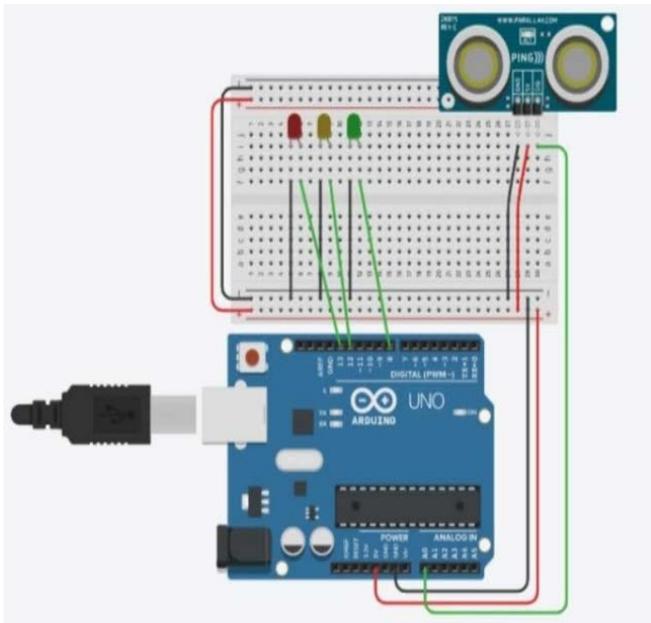

Fig. 4. Glowing of LED circuit by using Ultrasonic Sensor

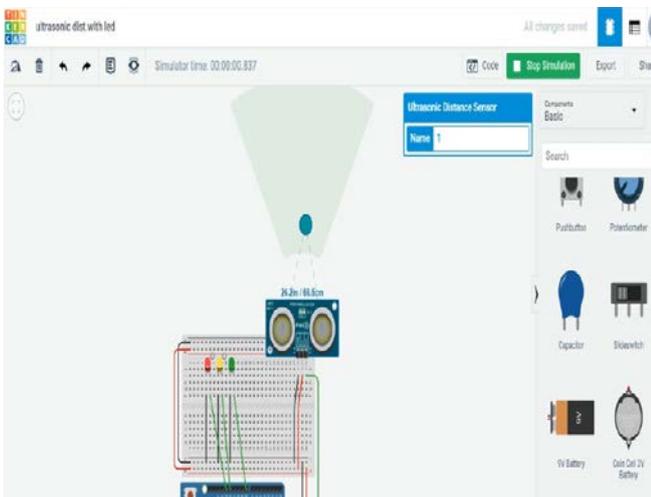Figure 5 for implementation of ultrasonic sensor with Arduino in Tinkercad tool environment.

Fig. 5. Glowing of Red LED Bulb

The ultrasonic distance sensor is to be fixed on the breadboard on row -j and column-28, 29, 30 (all 3 terminals respectively). Using wires for connection ground the terminal which is at column 28 on the Arduino board, the middle terminal of the sensor is connected to 5V on the Arduino board, and the remaining one terminal of the sensor is to be connected to A0 pin present on the Arduino board. All these connections are on the analogue pin side of the Arduino board. Use 3 LED bulbs of 3 different colours and connect them onto the breadboard on row-i and the cathodes on column-5, 8, 11 respectively. Now connect the cathodes

of these LED bulbs to the -ve terminal of the breadboard. Connect their anodes to pin number-13, 12, 8 respectively.

These pins are present on the digital pin side of the Arduino board. Let us start the stimulation of the circuit. By pressing the ping button present on the ultrasonic distance sensor, you will be able to see at what distance is the cursor. By moving it at different distances, you will be able to see different LED bulbs glowing.
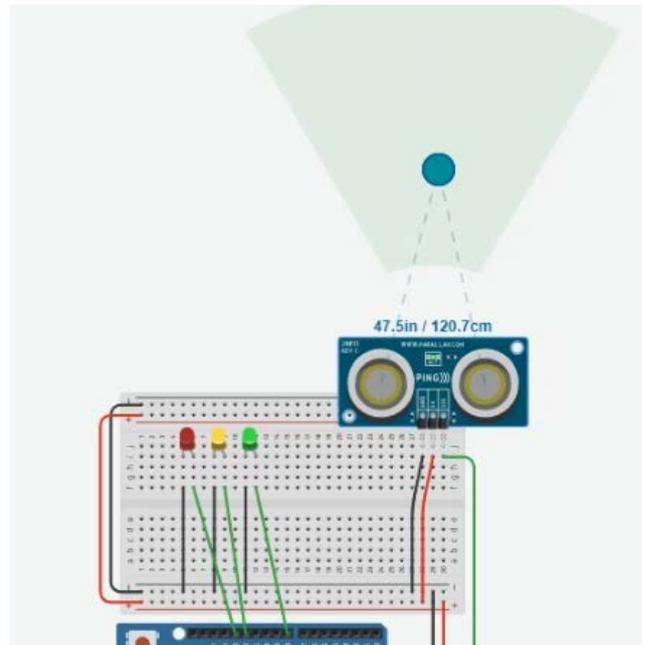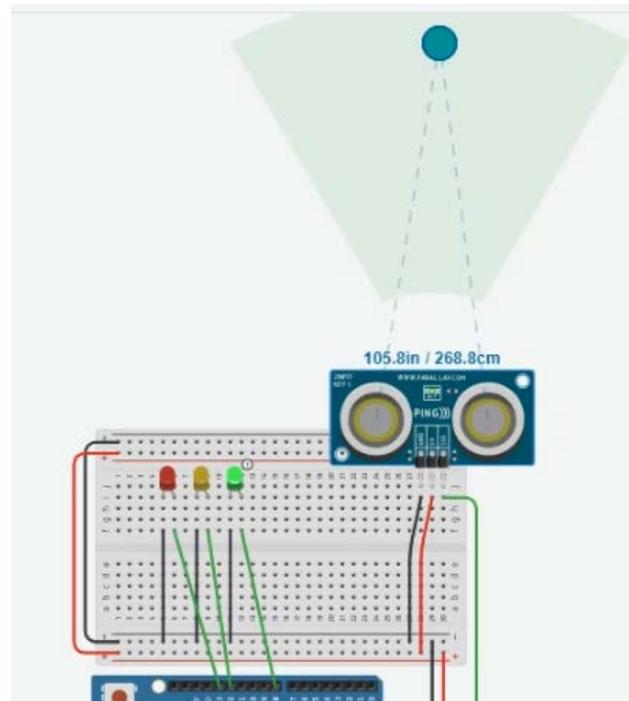

Fig. 6. Glowing of yellow LED Bulb

Fig. 7. Glowing of Green LED Bulb

Figure 5 represents of red figure 6 for yellow and figure 7 for green LED bulb glowing according to distance from ultrasonic sensor.
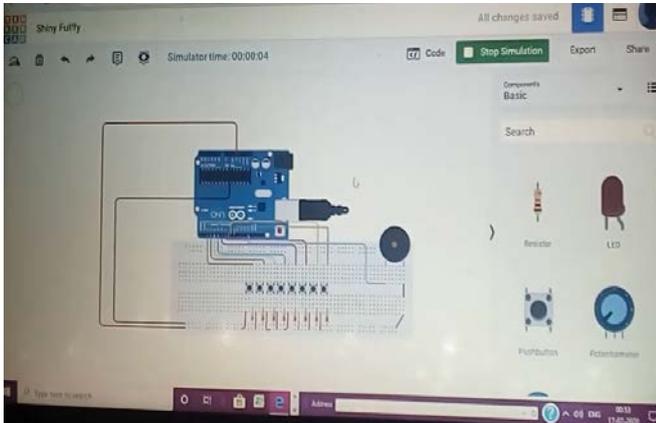
IV. SOUND ANALYSIS.

Fig. 8. Analysis of sound control of piano through simulation

Figure 8 represents piano sound analysis where we have to learn how to generate different tones using Arduino. Arduino is capable of producing PWM signals. First, connect 8 pushbuttons to digital input pins through 3 to 10 of Arduino and another terminal of pushbutton is grounded.

5v Piezo Buzzer is connected. It's +ve terminal is connected to pin 10 of Arduino and -ve terminal is grounded. It is necessary to connect the buzzer to one of PWM capable pins. After that, we have to connect 8 resistors (i.e. external pull-push resistors) to protect the buzzer from being overloaded with the current.

Applications help instructors to easily explain without the real use of components. It gives inspiration to teachers, to the instructors, and to the users to do some circuit features to participate in some contest & challenges by using Tinkercad.

Tinkercad can make interactive innovative connections between different techniques and new technologies in relation to different informative information. This helps the users and students to develop knowledge and skills, as an outcome it will fulfill innovative teaching and learning technique which will be satisfy the student members.

V. CONCLUSION

This tool will improve motivation to students and researchers by working in teams with collaborative projects. It allows students or engineers to improve their skills. So, they can solve and develop different solutions to the real world problem. As it is a part of Autodesk, users can simulate and optimize on the cloud-based project work. The instructor and students can work together through cloud tools during their studies.

The collaborative study can be possible as the instructor

delivers ideas through a software environment. Student can perform this software tool as an experiment basis and multidisciplinary students can perform different task of engineering problems. This type of research emphasis instructors, educators, and students to take part in this type of simulation tool. So students can collaboratively participate to solve different aspects of challenges.

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