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SMART TRAFFIC LIGHT USING SOUND SENSOR

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ABSTRACT-
Currently, noise pollution is a major problem especially in urban area, and moreover traffic noise is the most significant source of noise in the cities. It is observed in a research that the main reason for traffic noise pollution at signal is due to the honking by vehicles which has its own adverse effects. The effects of noise pollution can be related to performance, hearing capacity, mental and physical health, aggression and many more and adds to traffic chaos. The research aims to make people aware about the problems caused due to honking as a punishment. Based on an experiment conducted by the Mumbai Police this unique way of making people aware was conducted. Analysis of the research demonstrated that the vision of reducing noise pollution at traffic signal can be achieved by using this method. The result indicated that honking has adverse impact on environment as well as human beings. On this basis, it is recommended that people should not honk more at traffic signal. Further research is needed to reduce this problem by improvising the current method according to the requirements.

KEYWORDS –sound sensor, honking noise, logic state, noise pollution, smart traffic light

1. INTRODUCTION

Traffic not only in India but across the globe is an untameable beast. The blares and thunderous honking by all the conveyances has become inevitable. Science has demonstrated that in crowded areas the honking noises sometimes go over the moon which eventually damage all the living beings. In urban areas the largest source of noise is traffic induced noise, which accounts for 80% of all communal noise sources and as such poses a serious problem. The research is influenced by the innovative idea by Mumbai Police tweet

which had an advertisement length video tweeting "Horn not okay, please!". The World Health Organization has shown that noise can contribute to diseases, with effects such as increase in stress hormones, hypertension, obesity and cardiac arrest. Continuous indeed round the clock honking noises can lead to deafness. In this research we have implemented this idea and made a simulation based model. In the simulated model the signal count resets if the sound is above a specified level of

decibel. It can also be called as a punishing signal. The project makes people aware about the noise pollution by implementing a variable timing in the signal. The alert message will be displayed on LCD screen in all the traffic lanes.

Figure 1: sign board for traffic movement

2. PROBLEM STATEMENT

During the past few years, by reason of gargantuan advancement of automobile industry, the count of conveyances in every part of the globe has become skyscraping whereas; the traffic noise is rigorous and pervasive type of noise pollution. People usually honk unnecessarily on the junction which has affected the hearing ability of on- duty policemen as well as other citizens which afterwards results in deafness also. Following this, researchers have found another drawback that the exposure to the high intensity noises can also cause various diseases like fluctuating blood pressure, heart rate, skin conductance, stress hormones of cardiovascular diseases, diseases of the digestive system, allergies etcetera.

3. CURRENT ISSUE

The paper titled “Traffic Light Controller Using Sound Sensors and Density Sensor” which has IR proximity sensors installed throughout the traffic signal. They are placed in zig-zag manner as they can distinguish between large and small vehicles. When a vehicle is counted the information is send to counter which is connected to the arduino. The lane having the highest counter value is given priority and so goes on till it reaches the lane which less counter value. Sound sensors are also placed across the 4 way of the traffic signal as it will help in informing about energy vehicles such as ambulance or a VIP vehicle. Then the lane with such vehicle will be given priority till they pass and the signal will reset to normal working condition after that. Also, in the way for traffic light control decision when counters have same value they become neutral and occurs an error. While, Lala Bhaskar∗ , Ananya Sahai et al have used an inductive loop to suit the microcontroller based algorithm which can ease the congestion to ensure less traffic density. The motivation came from this idea and hence the proposed system is able to provide the solution using sound sensor which searches the honking noises at the traffic signals. On the condition that the honking noise outstrips the allocated point, it will reset the signal count. This project has come with a solution to throw the book at people who honk superfluously. It will kick those individuals' heels with an intention that by facing this situation they will not honk worthlessly in future.

4. FUTURE PROCESS FLOW DUE TO THIS SOLUTION

The whole idea of **“**SMART TRAFFIC LIGHT USING SOUND SENSOR” is to reduce the noise pollution by making people aware about it. In future, additional feature of traffic density measurement can be added at a particular lane as the maximum amount of noise is generated from the lane having the most amount of traffic. So a shift from the conventional system to a dynamic one is required by which people can be made aware of environmental issues as well.

5. PROPOSED METHOD

The sound sensors have been brought to bear in the proposed method which eventually employed to ascertain sound. Whenever detectors uncovered the honking noises over and above the allocated value, the signal count got re-established. Antithetically, a green light for customary drift of traffic lights was carried on by the system when detectors found a value beneath a particular value and the same result sustained during the situation of no noise. The "SMART TRAFFIC LIGHT USING SOUND SENSOR" has been accomplished by turning the Proteus Design Suite into service which is a software tool developed in Yorkshire, England by Labcentre Electronics Limited. Arduino has been used for the simulation which is an open-source electronics platform based on easy to use hardware and software. Logical State helped the sound sensors for input. Thereupon, the manifestation of different traffic lights was attained by the senses of the provided Liquid Crystal Displays (LCDs) and the binary signals. A message saying "Honk More Wait More" is received after leaguing of LED and Arduino. This process is depicted in figure 2.

6. PROCESS

On account of the fact that Proteus Software was incapacitated to engender sound; ergo, Logic State has been executed by concatenating the test pin of sound sensors with the latter. With an eye towards the observation of conveyance count; the serpentine sound sensors were situated in alternative ways on the boulevards.

Upon setting the input to high mark in logic state scilicet logic 1, the detectors studied it and the particulars akin to logic 1 were spawned, which helped in prognosis for contrivance of high honking noises. Consequently, the output of the system at certain part became logic 1.

After acquiring the yield of sound sensors, a program code which calls attention to the notion of "HONK MORE WAIT MORE" was inscribed to bring people to the book if they Honk gratuitously. The comeuppance results in resetting of yellow signal in the lane where honking noise exceeds the stipulated value which on the nail means that people in the precised lane have to wait more. More the honking noises were detected by sound sensors, the count of yellow signal got re-established persistently. In contrast, an accustomed circulation of traffic lights were preserved in all other lanes and LCDs kept on displaying a message of "Honk More Wait More".

Secondarily, the sound sensors experienced low input on the condition that logic state was fed abutting the ground level expressly logic 0. The methodical statistics analogous to logic 0 has been effectuated to prognosticate the manipulation of low honking noises. Undergoing the output of sound sensors, a program code was divulged to ascertain less honking noises in all other lanes. In consequence, the signal count of yellow light functioned routinely without any re-establishment.

As a result of all the process carried out, the wonted working of traffic lights kept going on.

7. UTILISATION OF ARDUINO SOFTWARE

To persist in both online and offline mode, Arduino UNO was mapped out weilding Arduino software common to all boards. The writing and codifying service of program code into Arduino UNO unit was predominantly performed by the open source software that is Arduino Integrated Development Environment which is official Arduino software and makes code compilation trouble-free.

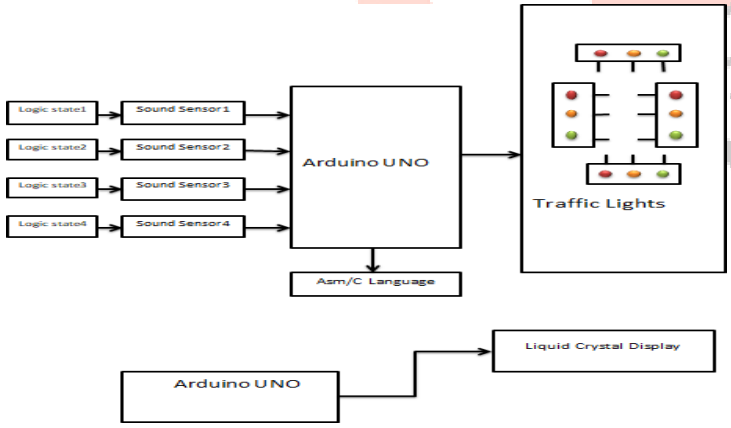
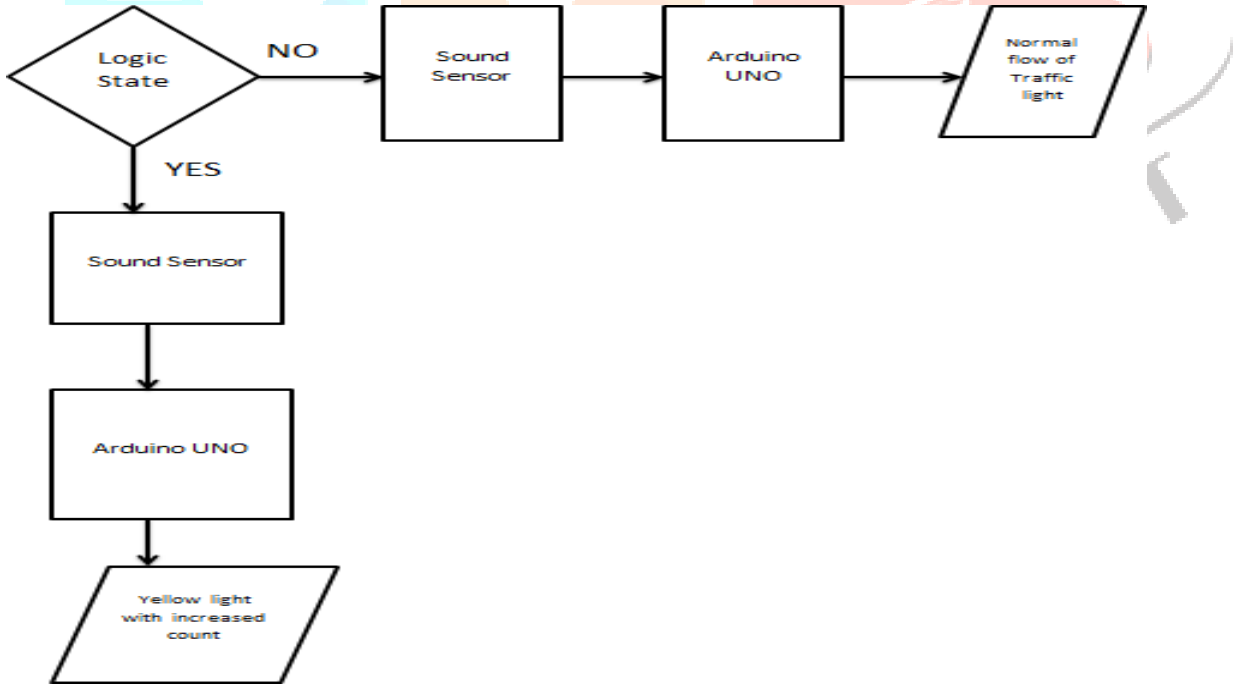


Figure 2: block diagram of the proposed method

8. BLOCK EXPLANATION

A binary signal is a categorization of digital signals and has impersonated as raw data for the sound sensors. The former has two valid values and the latter is used to search noises in circumambient and also identified as sound detectors. As it has already been mentioned in the "Process" that proteus software was impuissant of determining sound which leads to make a junction between test pin and logic state. Precisely, sound sensors had 4 pins and all of them had different connections. As Arduino Uno requires the electric potential difference of 5 to 7 V, VCC was linked with an electric potential difference exceeding 5 V, GND pin had a relation with ground, the OUT pin was associated with Arduino Uno and TEST pin was combined with logic state. There was also a major connection that all OUT pins of the sound sensors were linked to the digital pins of the Arduino UNO. On receiving commands from sound sensors, microcontroller operations have been performed by Arduino UNO. All attained instructions were utilised as input to the program and the code was presented in Arduino Integrated Developmente Environment Software. This software authorised to compose a program code eventually upload the same on the Arduino board and embedded C was also implemented there. The console displayed the texted yield by Arduino Integrated Development Software which had included all inclusive figures with regards to error messages and the other particulars concerning sound sensors were given to Arduino Uno. Thereafter it processed the acquired information and fabricated an output on LED. 32 * 2 LED was an alphanumeric LCD module which lead into displaying the alphabet and numbers. The interlinking of LCD and Arduino UNO was perpetrated to exhibit the message of "Honk More Wait More" on the screen.

9. FLOW CHART



10. PROGRAM FLOW

The communique concerning the colossal raw data of the sound sensors was brought using integer data type in view of the fact that raw data was in the form of digits whereas it was operated on logic 0 and logic 1. Therefore it was also identified as a Boolean Function. Different proclamations had separate targets like chalk and cheese. To elaborate, "Set Cursor" was one of the declarations which had the aim to handle display control whereas one another declaration namely "Digital Read" was implemented to scrutinize the input from the sound sensors and the last one such as "Digital Write" was brought to play with an intention to dissect the yield by means of LEDs. Notwithstanding, customary mode was also in action along with the "if else condition loop" the "if condition loop" kept a tight rein on one and all loop. In addition, a pin declaration was designated by pin mode in the program code. A variety of functions in the program code legitimatized to give structure to the programs in different segments of code so that the individual tasks can be effectuated.

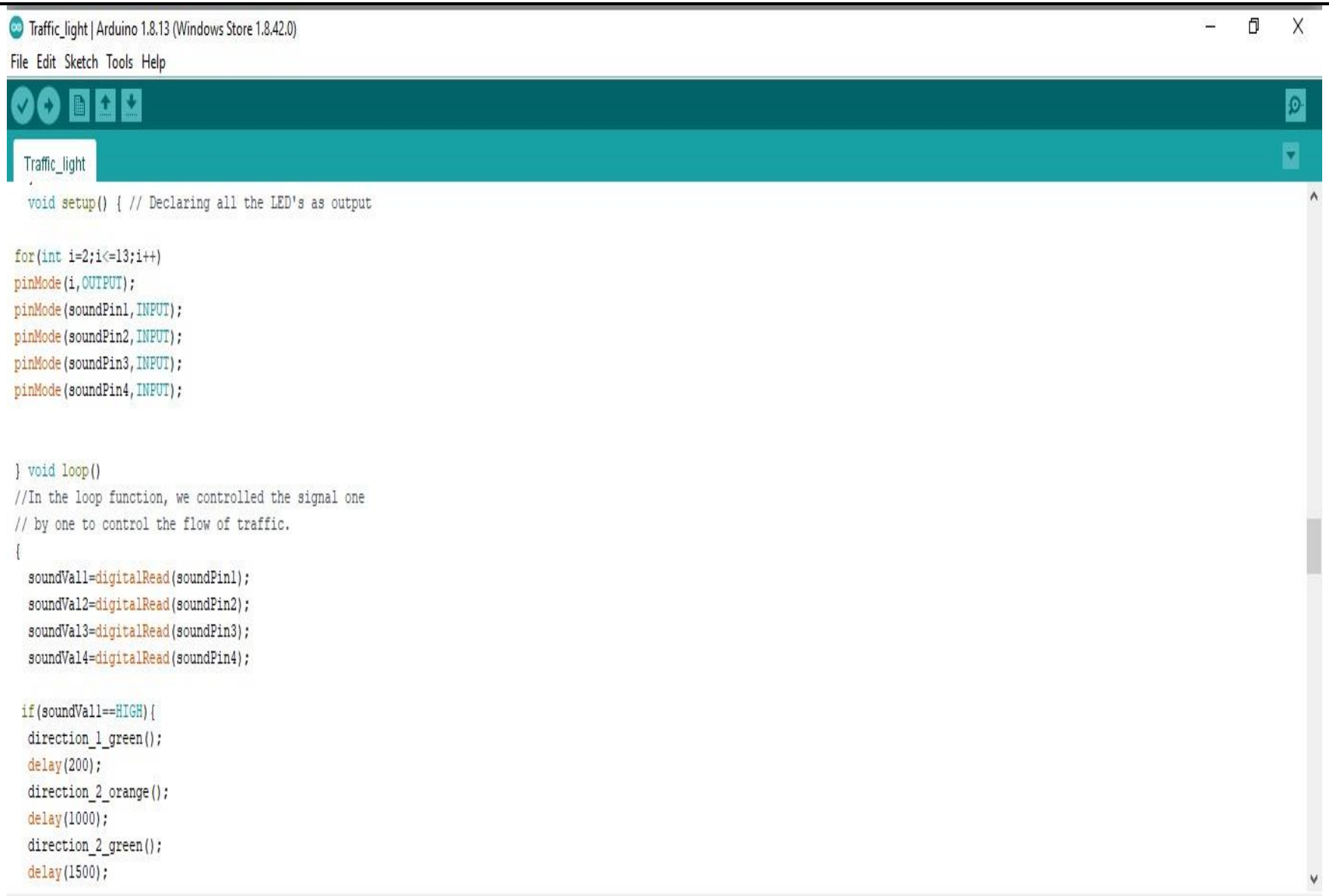


Figure 3: arduino program window

11. PSEUDO CODE

Step 1- Check the input of the logic state.
Step 2- If the input of the logic state is high, repeat steps 4 to 5.

Step 3- If the input of the logic state is low, repeat steps 6to 9.

Step 4- Input sensed by the sound sensor and output of the sound sensor given to the arduino.

Step 5- The Count of the yellow led is reset again.

Step 6- Low input is detected by the sound sensor.
Step 7- The output of the sound sensor received by the Arduino UNO.
Step 8- the count of the yellow light on the particular Lane is not going to reset again.

Step 9- Normal flow of traffic is maintained.

12. ALGORITHM

The four sound sensors (SS) namely SS1, SS2, SS3 and SS4 were linked separately with four logic states in an anfractuous fashion with an aim to cast around the sound. The sound sensors are able to uncover honking noises which exceeds the allocated point and located at each end of the thoroughfares. Before changing into the green signal, the sound sensors detect the value of honking noise. If the value exceeds the specified mark, the signal count would re-establish. Consider lane 1, 2, 3, and 4. If honking noise is at peak in lane 1 as compared to other lanes, then the count of yellow light in lane 1 gets reset, eventually green light shifts to next priority lane. The sound sensors will search the sound and send commands to Arduino Microcontroller with an intention to give priority to that lane. A usual mode is sustained when honking noises are less so that the traffic control mode can be enabled [1].

13. OUTPUT AND DISCUSSION

Sound sensors compute the Honking noise arising on the lanes which was eventually fed to the Arduino by means of wired network whereas, the dumped program was given the figures which were collected from the processor. The extortionate honking noises among all the lanes were examined and the loop started to run by looking over the conditions which were provided using "if else" statement correspondentily the count was reset. An imitate output was first attained by the aim of checking the efficiency.

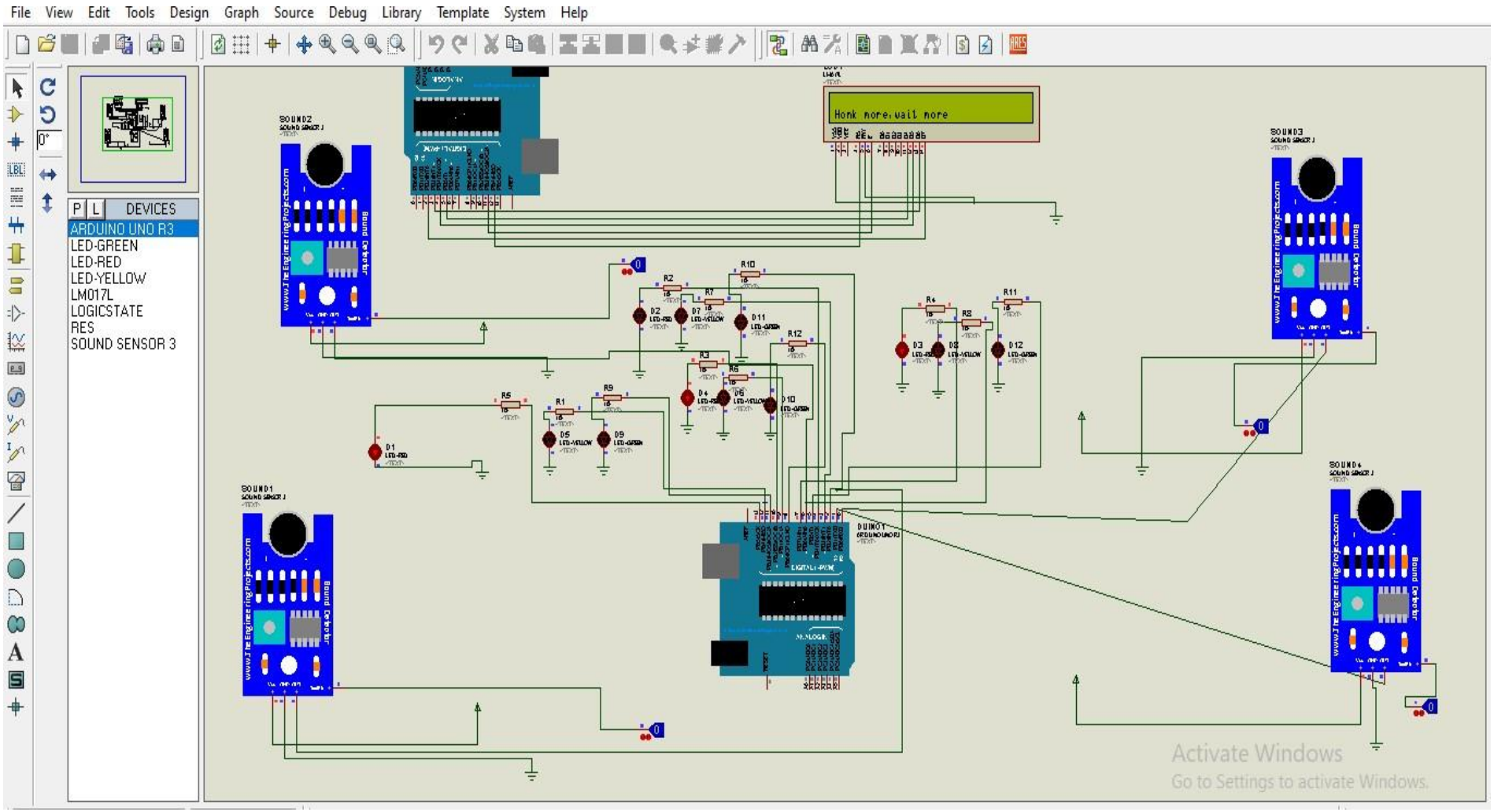


Figure 4: proteus circuit design i

1.
2.

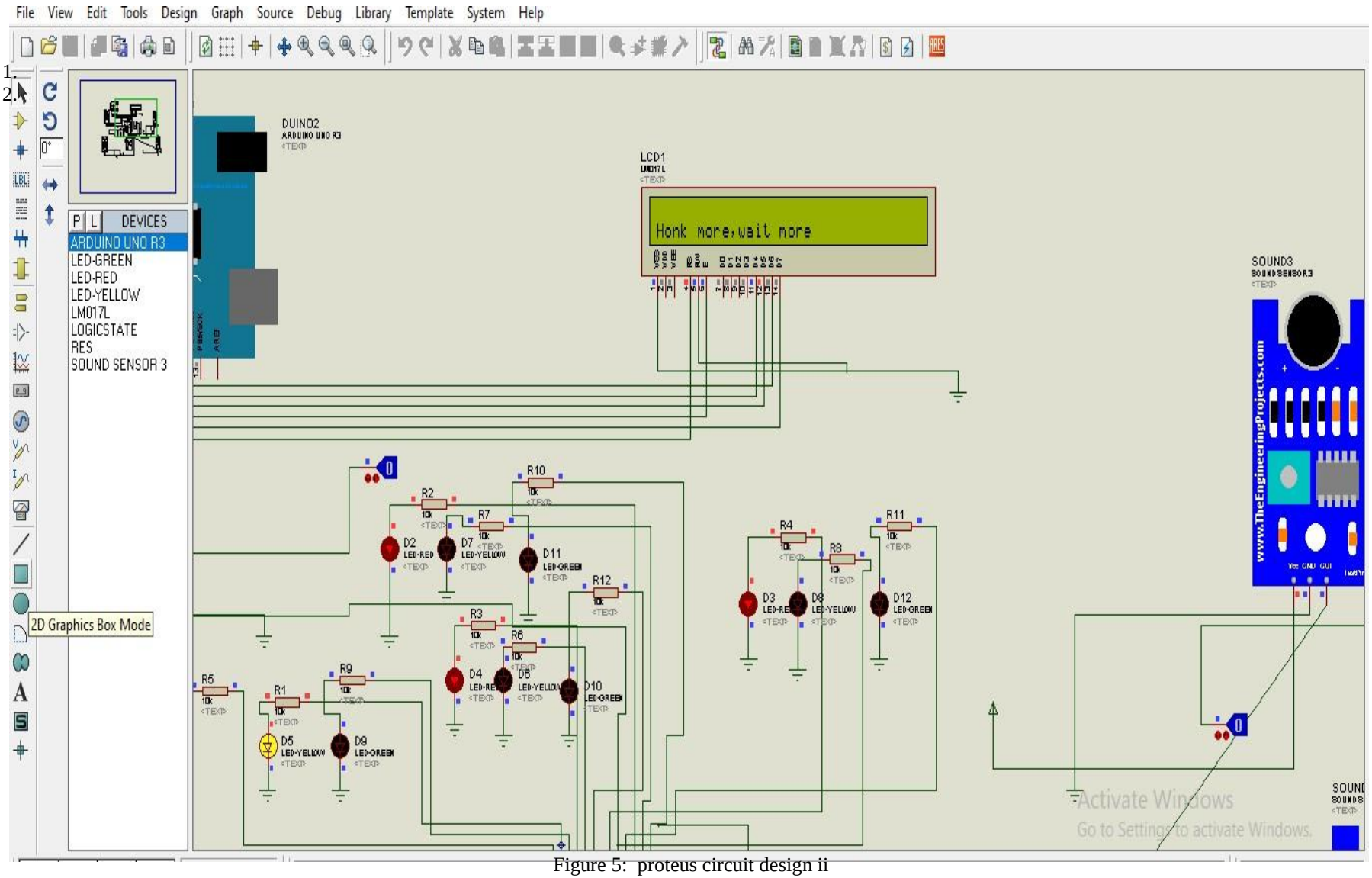


Figure 5: proteus circuit design ii

14. CONCLUSION

Less honking is imperative to maintain ecological balance as it will reduce noise pollution and protecting the public's health. Since the dawn of automobile industry increase in honking at the traffic signal has been increasing exponentially and is deprivating hearing capacity, mental and physical health.

Analysis of the honking by vehicle is determined by sensors which is manual and can be turned automatic in near future. The data storage and input to the Arduino is faster by wired communication which is error free and reliable as a source .Depending upon the honking the signal time for the 4- way will be determined. The program for each condition has been uploaded in Arduino for the smooth functioning of the signal. This system when connected to wireless system can have wider spread and detailed data processing can be done with probability of some data loss to occur. Additional features like traffic density, emergency alert can also be integrated in the near future. All these features can improve the proposed system and will provide the controlling distance wider and efficient. To sum up everything that has been stated so far we can say that this project is the need of the hour to cope up from increasing mental distress and noise pollution caused at the signal due to honking.

15. ACKNOWLEDGEMENT

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