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A Novel Design of Danger Zone Detector by Using Arduino

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ARTICLE INFO	ABSTRACT
Article history	Arduino programming that was detected any potential danger coming in target range. The system operated by sending signals based on the sensor reading. The purpose of the safety system was to increase the safety procedure and precaution for maintenance workers that currently doing their job at the emergency lane of the highway. In certain range of radar sensor detection, when the potential danger or accident was detected to approach, the sensor send the signal to the system and carried out the duty as medium of sending alarm caution in three ways, which were through sound, vibration and visual.
Keywords Arduino, Sensors, Safety, Danger zone, Detector, Electronics safety, Automatic alarm, Reducing risks.	

1. Introduction

The miniaturization of electronics, along with the advance in wireless communication and the development of multi-functional sensors, had led to the birth of a new technology named Wireless Sensor Network (WSNs) [1]. A general definition of sensor or also known as transducers could be defined as an electronic device that produced measurable response to a change in a physical or chemical condition [2]. Wireless Sensor nodes and network composed by a large number of small nodes with sensing, computation, thermal stability [3] and wireless communication capabilities. The sensors were applied in many conditions or equipment like a distance sensor system was used as wireless engineering machine [4], thermal system [5], automotive [6], burner system, antenna technology and others. These sensors were small in size but were equipped with sensors, embedded microprocessor, and radio transceivers. Sensor nodes were usually scattered and the sensor network, protocols and algorithms must provide self-organizing capabilities to find network position. Arduino was a small microcontroller board came with a universal serial bus (USB) that could be wired to external electronics and designed to allow interaction between computer systems with some environmental physical quantities using appropriate sensor. The coordination of sensor nodes produced high quality information about the sensing environment and Arduino boards were designed to allow interaction between computer systems with some environmental physical quantities using appropriate sensor. The sensor application was not limited to Arduino board system for programming only. But, the sensor could be apply in material composite fabrication, oil palm industry and micro printing technology. It was very useful in Industrial Revolution (IR)4.0 in developing automation system with safety as important factor either for small or big engineering industry liked monitoring tank storage. Arduino was more straightforward and easier to use for making computer as the programmer [17] to program the microcontroller because Arduino programming language which was based on wiring and the Arduino development environment which was based on processing [18] which included support of C and C++ programming language was used [19]. Arduino was functional as programmable controller to control all the electrical components in danger detector safety system [20]. During the maintenance at the highway emergency lanes, usually the safety procedure was conducted by displaying a safety sign board and blocking with safety cones. However, it only alerts the highway users and not to the maintenance worker themselves for any emergency or danger coming. From this situation, those workers were actually needed a danger or emergency detector safety system which could gave the early emergency signal either by sound, vibrator, or light.

2. Methodology

Sensor signal danger detector system was a classical optimization approach. It was used to detect any emergency during working or maintenance at highway straight emergency lane. The factor that caused of the safety issue happening was been studied and analyze on how this factor could affect and relate with the outcome of the problem. The necessary information to construct the auto safety system generally

accumulated by the simulation and experimental works. the factor was controllable and could be improved, then the further process and decision was made either to use Arduino program to solve the problem or not. But, if the factor was uncontrollable, the result was straight to the end as there was nothing could be done in solving the problem. The comparison between current and proposed safety precaution procedure of maintenance worker at the highway was shown in Fig.1. Therefore, the proposed idea liked showing in Fig. 2 was to achieve its objective by setting up any potential danger coming within 100 meters from the maintenance truck was labeled as threat to the system, thus active the safety precaution process.

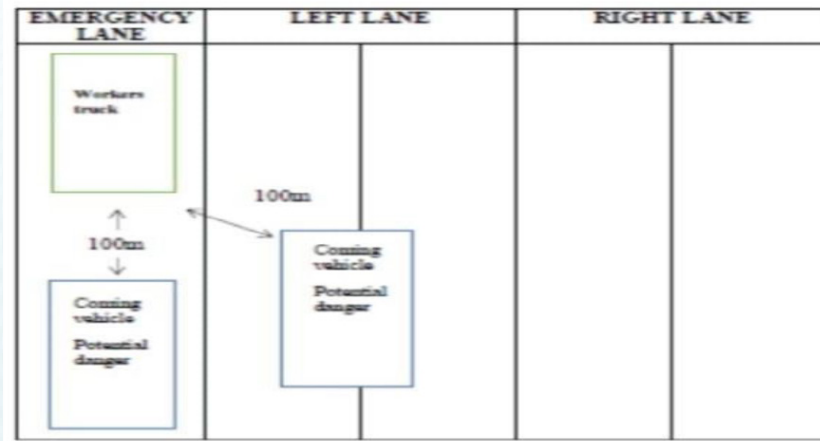


Fig.1: Current safety precaution procedure at Highway

By applying the propose safety system, it intended to help highway maintenance worker to feel safer while working, reduce unnecessary congestion or accident, and improve the safety confidence of the company towards their employees. Another advantage regarding system were saved time and energy.

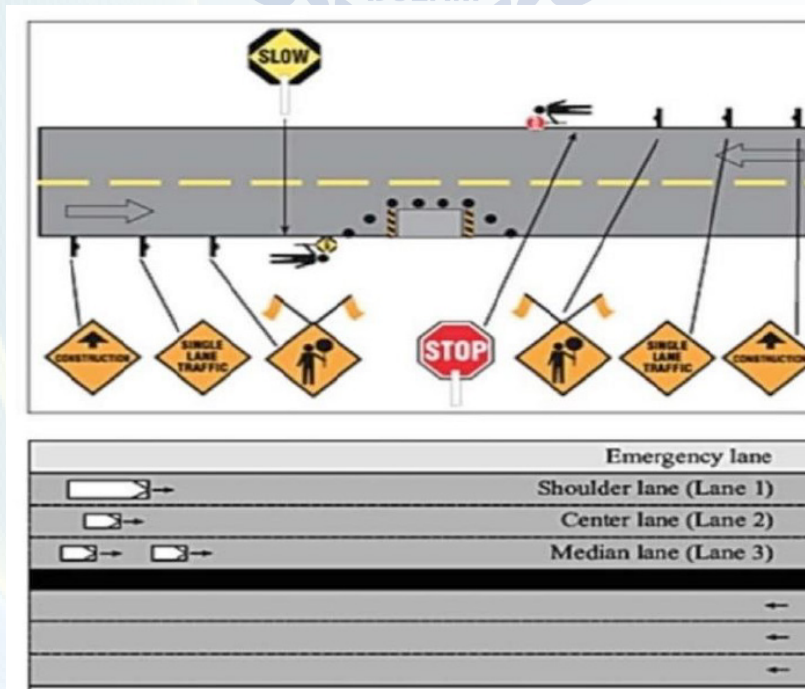


Fig.2: The proposed new safety precaution.

3. Result and Discussion

The Arduino software was tested on its reliability to perform the desired operation to detect and carry out responsible in giving instruction and signal to warn the maintenance worker through 3 medium of outputs which were through sound, vibration and visual. Before testing the real implementation of this system in industry application, the simulation prototype of wireless danger signal detector safety system was created in form of miniature. Later, the actual prototype that was used in industry application also was discussed in this study. The objective of creating and presenting miniature prototype simulation in this research was to show an example on how the wireless danger signal detector safety system worked as a whole automation by using Arduino programming as it system language. The miniature prototype simulation as shown in Fig. 4 used ultrasonic sensor that responsible to detect and send signal to the Arduino automation system. When Arduino received the warning reading signal, it was carried out its duty to activate the output warning medium through 3 ways. The first medium was sound warning which carried out by the buzzer. Second, the vibration medium through vibrator and lastly, the visual warning medium through the light-emitting diode (LED).

4. Conclusion

The research study had achieved the main objective which was to increase the level of safety for both parties to avoid accidents. The maintenance worker can have more early and reliable warning system if there was a dangerous intrusion from other highway user. The signal had successfully warned the highway maintenance worker through three medium of outputs which were sound, vibration and visual.

5. References

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