

Flagman and Risk Involved in Road Construction Site

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Abstract

Road construction is a necessary process of development for the comfort and safety of users. Most road construction is a tedious job whereby the duration and safety is always considered very important for the construction management. One of the most crucial factors in a road construction site is the safety of the road users and the construction workers. Proper safety sign and indication system should be utilized to ensure safety to be optimized. The most common practice of safety indication is performed by traffic controller or also known as the flagman. This practice is very crucial in a road construction site in ensuring the smoothness of the road traffic operation and to alert the road users on road construction activity. This paper highlights the risk factor of flagman in certain road construction or road maintenance site. The risk of fatal accidents is high for the flagman since he is placed in the highest risk zones. Authorities and contractors seek for various methods and measures in eliminating the usage of flagman, yet it is impossible since the usage of flagman is considered the best practice around the globe. The research highlights that the usage of a flagman can be replaced by implementing new technologies to automate the task of controlling the traffic flow without human intervention. The intelligent traffic light system which is proposed in this paper can be wisely utilized to overcome problems arising on the safety measures in a road construction site and also in the afford to be in line with the requirements of Department of Occupational Safety and Health (DOSH) and Ministry of Works to reduce fatal accidents.

Keywords: *Flagman, traffic controller, road construction site, safety at road construction, intelligent traffic light.*

1.0 THE CONSTRUCTION SITE HAZARDOUS

Safety regulation is revised by authorities periodically in the effort towards a safer working environment on a road construction site, whereby the prime concern is the safety of road users and construction workers. Traffic accidents [1], [2] in road construction site are continuing problem. According to acts as stated in the road construction safety regulation, sufficient safety measures have been always considered in all means especially when involving human life's [3].

Statistics on road construction accidents which was published by DOSH [4], highlights indispensable measures which have been overlooked by the appointed road contractors. Ignorance of the road safety regulation has results in various fatal accidents for both domestic users and construction workers [3]. In the effort to maintain safety and smoothness in traffic flow on the road construction site, the usage of a traffic controller or so called "flagman" is essential [5], [6]. Such practice was introduced edges ago, since then it is widely in practice throughout the world. The best practice in neutralizing the traffic flow indirectly positions the flagman's life into the fatal zone. So it means, un-realizing contractors have put the flagman's life in high risk where incidents shows most fatal cases are among them. The practice of a flagman is shown in Figure 1.

The ultimate aim of this research is to implement technological approach which will overwrite the conventional flagman practice. Revolution and modernization have introduced new technologies in assisting and ease human life in various ways. In order to reduce fatalities and injuries from crashes and to enhance smoothness in traffic operation as well as to ensure safety within work zones especially during road construction, an intelligent traffic light is essential.



Figure 1. The flagman is placed in the road construction work zone

2.0 SAFETY REGULATIONS IN A ROAD CONSTRUCTION SITE

The flagman is used in construction area to direct road users when the road construction activities are in progress. Usually the flagman is highly visible in their bright orange vests, as they stood up with their "Stop" and "Go" signs. As an alternative, some contractors practice the usage of flaggers with a custom flags to alerts and direct the drivers when bypass the road to single lane.

There are many hidden factors which results in various road accidents in a road construction site regardless of safety implementation imposed by the contractors. The role player in directing the traffic flow in a road construction site falls on the hand of the flaggers which plans and alerts the vehicles wisely into the construction site. As the human factor is taken into consideration, some irresponsible flaggers overlook the importance and their contribution to avoid fatal involving road users. Figure 2 shows inattentive flagman when carrying out their job in a certain construction site [7].

A perfect picture of a road construction site involves various activities whereby safety is always given high priority. The safety factor in a road construction site includes the workers and also the road users. Some cases have been reported that accident happens around the road construction site is mainly caused by reckless drivers. Studies clearly indicate that the reasoning behind these accidents shows that most drivers tend to ignore flaggers directions as published by DOSH [4]. Disobeying the flagman and speeding in a road construction site is serious and punishable which is finable or imprisonment if it results in a bodily injury accident.



Figure 2. The flagman not conscious on his task

The flagman also indicates to the road users enters a bypass lane to be caution on the pavement which may not be as smooth as the expressway. In fact, it is likely to be rough and uneven, possibly full of potholes and also muddy and slippery. Some irresponsible drivers enter the bypass lane at high speed than posted speed limits is one of the cause of loss control and results in road accident [8]. This irresponsible attitude will drift the construction workers and other road user into fatal zone. Drivers must comply with traffic regulations, as well as security and safety standards for their own safety, other road users safety and road construction workers safety as well [4].

The other factor which leads towards fatal accident in a road construction site is due to less competent of contractors. Contractors failed to comply the road safety regulations as set by the Ministry of Works for a road construction site. These regulations are created by responsible authorities and agencies such as the DOSH which contains legal requirements to ensure safety of the workers and public at road construction work zone. According to the Ministry of Works, during a road construction there should be a

minimum of 10 safety alert sign boards that must be placed on specific locations at the construction area. In most cases the contractors overlook the safety regulations and take it for granted. Indirectly, this irresponsible attitude causes problem to numerous parties.

Apart from that, a flagman who is appointed by the contractors might not be well trained by their employment. These untrained flagmen could be harmful for the road users and themselves. At times the flagman's concentration on controlling the traffic flow also can result in various miseries not only to his life but also to the public. For an example, when the flagman works under the unpleasant environment such as rainy, hot sun, etc can make them tired easily and lose their concentration on work. Nevertheless, miscommunications between the flaggers at each end of construction side also causes the flow of the traffic is not smooth and leads to the accident [4].

3.0 THE INTELLIGENT CONSTRUCTION SAFETY TRAFFIC LIGHT SYSTEM

The intelligent construction safety traffic light system is designed to be an intelligent system for smooth traffic operation in a typical road construction site with high frequency of vehicles. This system is fully automated and operates without human intervention at all time regardless of weather conditions. The system has many features which empowers the users on dangerous of road construction sites. The self detection and control system enables the road users to be informed on the traffic flow ahead. Traffic control in a road construction site is very difficult to be monitored and controlled in both directions especially during rainy seasons. The intelligent construction safety traffic light system can be best placed at high traffic frequency locations for effective, safe and smoothness in the traffic flow in a dangerous road construction site.

The most important factor in a road construction site is the hazard warning sign for the road users. If a system is capable to indicate the road users without human intervention and regardless of weather, it will help the contractors and their workers doing their work without worries. The intelligent construction safety traffic light system consists of a number of components working together to perform simple repetitive task [9]. The basic system requires motion detection sensors to detect the presence of vehicles on road construction site, a control unit to process the information and to establish communication between the master and slave unit [9]. The basic structure of the intelligent construction safety traffic light system is shown in Figure 3.

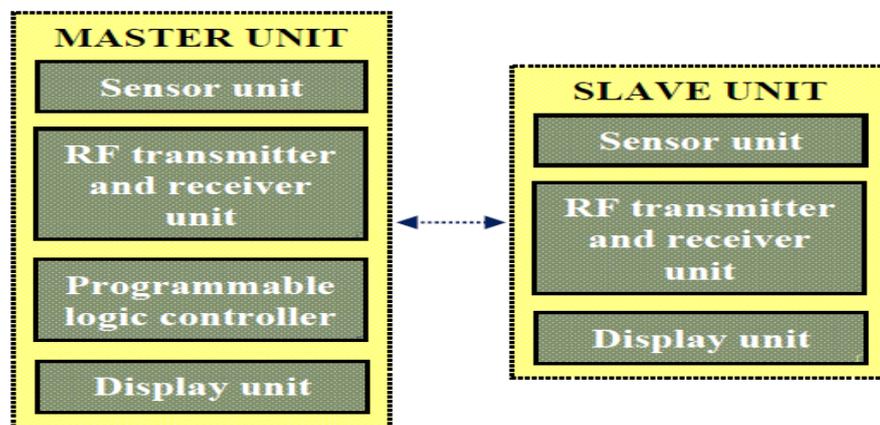


Figure 3. Basic components of the intelligent construction traffic light system

4.0 USEFULNESS OF THE INTELLIGENT CONSTRUCTION SAFETY TRAFFIC LIGHT SYSTEM

The proposed traffic light system is designed based on the factors which are occurring around the road construction site and limitations of a flagman. The system could be one of the best practices in road construction traffic control systems. This designed system is to replace the flagman who needed during the lane closures on a certain construction zone. Since the designed system is a portable traffic light and best to be utilized in temporary traffic control for long term or short term lane closures on construction sites, it is suitable to control two-way traffic in a single lane [10].

The system can be used in publicly and privately-funded road construction projects which require overnight or 24-hour traffic control regardless of weather conditions. The system is also less compare to the invested cost in the long run. The factor which is contributing towards the down fall of a flagman compare to the intelligent construction safety traffic light system is shown in Table 1 [10].

The intelligent construction safety traffic light system can be best utilized by road construction site contractors and for any temporary traffic flow control. The system can replace the use of humans in any kind of traffic control operation [10].

Table 1. Comparison between flagman and the intelligent construction safety traffic light system

Factors	Flagmen	Intelligent construction traffic light system
Working hours	Limited	Un-limited
Weather Condition	Not reliable	Reliable
Effectiveness	Vary	Consistence
Fatal Risk	High	Low
Costing	RM 50/shift	RM 4000/pair

5.0 CONCLUSION

The utilization of a flagman plays a major role in ensuring both safety and control of the traffic flow in a road construction site. The flagman is always placed in high risk to perform his task as a traffic controller. The awareness on safety signs and safety regulations should be complied by both the contractors and the road users as the first step to avoid unwanted accidents to happen. Appropriate measures should be taken by the responsible authorities in afford to minimized the risk involved to the flagman in a typical road construction site.

New implementation of technology can be a better move or taken as the first step in ensuring the safety of the flagman and the road users. Visualization on the technology growth has shown mass changes to the man kind in many ways in their daily life's. Such an approach has been taken in developing the intelligent road construction traffic light system which is believed to provide a better and safer indication to both the contractor and public. The system emphases on the elimination of a flagman from the conventional practice in many road construction sites.

The revolution of an intelligent road construction traffic light system creates a compact solution towards all miseries as highlighted in this research. The implementation of such technology could result in saving thousands of Ringgits in damages and the most important factor is to prevent life losses. As a road user and also a public conscious researcher in minimizing such miseries, responsible authorities should implement stern punishment to those contractors who fail to obey the road construction safety regulations.

6.0 ACKNOWLEDGEMENT

This paper describes research that is ongoing at the Faculty of Electronics and Computer Engineering to develop an intelligent construction safety traffic light system in support of the humanitarian community. This work is part of the project intelligent traffic light system and was funded by Universiti Teknikal Malaysia Melaka. The project targets to develop and offer efficient service in respect to road construction activities. Authors would like to thank all organizations and friends concerned for their sincere encouragement, support and assistance in the development of intelligent construction safety traffic light system. The authors would like to take this opportunity to also thank them for their contributions in defining and helped to improve the system and services towards a better system. The authors also would like to specially thank:

Ministry of Works Melaka (JKR)
Melaka Road Safety Department (JKJR)
Technical Wizard Sdn. Bhd.

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