SMART UNMANNED LEVEL CROSSING SYSTEM IN INDIAN RAILWAYS

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Abstract- Throughout the years, Indian Railways system had undergone lots of calamities and various accidents which directly suffered people's precious life. More than half of accidents are due to the level crossing problems in our country in which Unmanned level crossing is the main issue, where our country lacks in. India's railway system is one of the largest railway networks all over the Asia and with this mammoth system, every level crossing in our country cannot be handled manually. So, to rectify this problem we have designed model which is totally automatic, safe, regardless of human error and the most important thing in the paper is that it is designed to compensate and save road users time. So,here is a technological system in which railways tracks near crossing are laid by a piezoelectric plates which will give electrical signals to hooters and speedometer when mechanical pressure is applied by train on plates. LED screen timer is sync with speedometer which tells time of arrival of train and automatic gates are off as the train resides near rail- road junction. This will surely reduce time and considered as an effective way to increase safety for various lives of people.

Index terms- Indian Railways, Unmanned crossings, Automatic, rail-road junction

I. INTRODUCTION

Indian Railways which is a boon of economic growth of the country and the largest network in our whole continent is deprived of safety of people. Out of (31,846) crossing in our country in which around 42% i.e. (13,530) crossings are unmanned crossings [1]. This is due to a fact that with such huge system it is difficult to keep an eye on every level crossing manually and due to this many railway crossings remains unattended. Moreover, this usually happens in rural and extreme remote areas and people have to suffer with their precious life.

According to NCRB (Natural Crime Record and Bureau) says a total 2,547 railway crossing accidents occurred in 2014 which led to 2,575 deaths and 126 serious injuries across country, also annual report of The Hindustan Times stated that 83.5% railway crossing accidents have increased by when comparedto 2013 [2]. This problem is increasing day by day and needs a strong solution. No one thought-over it from many years. So here we are introducing our smart unmanned level crossing system which is economic user-friendly, automatic, efficient with very low service requirement and with the ability to itself produce power to do all function due to mechanical stress of train by using piezoelectric plate which makes the system independent to any type of external supply or aidto do various operations when train comes near to the crossing.

II. OBJECTIVE OF PROJECT

Indian Railways is the fourth largest network in the world with 8.397 billion passengers annually and an average of 18 million people carried to their destination each day. But sadly 15% of all accidents

occurred in the world last year, happened in India [3]. Unmanned Railway crossing which is 42% of all crossings in India is a main cause of this problem.[1]

So, now it's high time to solve to rectify this problem as soon as possible. So the main advantage of our paper is to establish a system which is trustable, efficient, time saving and moreover safe. We all know that we cannot combat the problems manually in this gigantic network of Indian Railways, so we need an alternative system which is free of human error, time saving and suits best in all related situations i.e. Automation. So, the fine thing about our project is that it is fully automatic. The major objective of our project is, it will definitely lessen the rail road accidents at a large scale, because rail road accidents possess maximum casualties in terms of death rate as compared to road accidents.

III. MATERIAL REQUIRED

- Piezoelectric plates
- Speedometer sensor
- LED screen timer
- Electronic Hooter
- Actuator
- Battery
- Proximity sensor

IV. CONSTRUCTION

As the train reside just 2km before the rail-road junction their we place a piezoelectric plates which will be laid on railway track upto some distance. Battery will be placed to collect the electricity supply from piezoelectric plates then battery is connected to all the main parts of the system.i.e. to the hooters, the

speedometer, proximity sensor, LED screen timer and to the automatic Gate.Speedometer is placed just 1 km before the rail-road junction to calculate speed of train and it will provide encoded information to LED timer. LED timer is sync with speedometer and desired decoded output is obtained at the timer end. Hooter will be placed near the rail-road junction with LED screen of (320mmX160mm) to display time (in seconds) require for train to cross the junction.
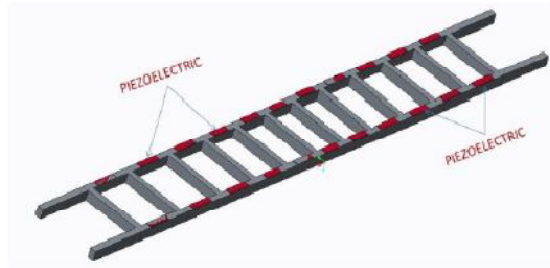

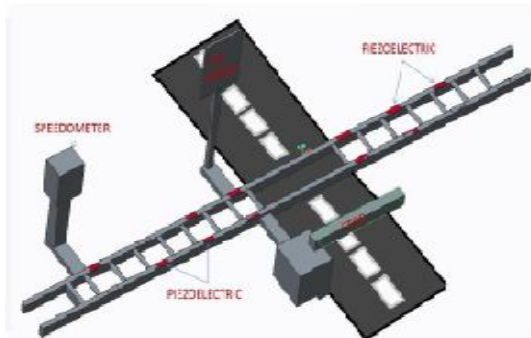**Fig.1: Railway track with piezoelectric plates.**

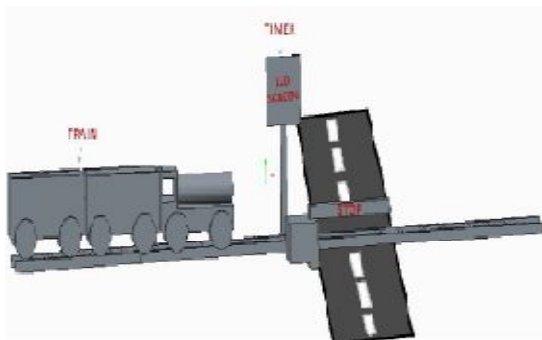**Fig.2: Actual view of unmanned crossing system.**

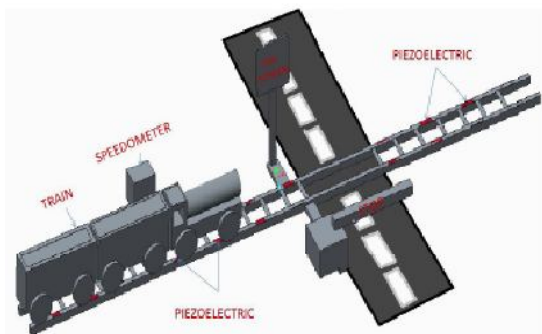**Fig.3: Front view of Railway crossing.**

Fig.4: Complete view of unmanned crossing system.

V. WORKING

Working of our model is very simple. The piezoelectric plates will provide electricity when any pressure will come on plates because piezoelectric is a material that response to applied mechanical stress, and then all the charge is stored to a battery. Through battery; hooters, speedometer and LED screen is attached. As the train reaches 2 km before rail-road junction the hooters at junction will start warning people at crossingand as the train approaches just 1 km before junction, automatic gate will start closing with the help of actuator. Speedometer will detect speed of train and gives encoded information to LED Screen timer to decode the information. LED screen will have a coding inside to calculate time (in seconds) to reach the train at junction by just dividing distance by speed of train. Distance will always be fixed i.e. 1 km and speed will vary every time and then countdown will begin telling people the exact time of train to reach crossing. As the train goes through junction completely proximity sensor will work and give instruction to actuator to open the gate. It hardly a matter of less than 5 minutes to complete whole process and saves time of all people nearby crossing.
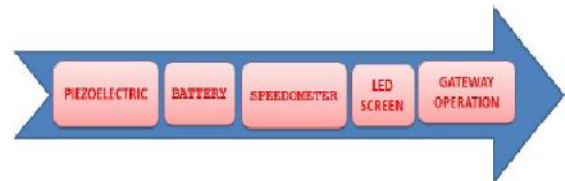

Fig.5: Block diagram of working

VI. COST ESTIMATION [4]

MATERIAL REQUIRED	COST/PIECE ($)
HOOTER	26 $
PIEZOELECTRIC PLATE	5 $
BATTERY	35 $
ACTUATOR	45 $
SPEEDOMETER	10 $
LED SCREEN	10 $
PROXIMITY SENSOR	8 $

CONCLUSION

Our paper deals with a clear solution of unmanned crossing problems of our country. Automation is an only solution to handle such a huge network. Most important, safety of people is the top priority. Apart from safety we have also managed to save time of people, now the process which takes more than 15

minutes or half an hour can be completed in a mere time of 5 minutes. Due to LED screen-timer it will psychologically make people feel positive about waiting in a row at the crossing.

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