



**Sensor Based automated alarming bell,  
flashers and LED display system for  
unmanned Level Crossing gate  
through wireless communication**



**Invented by**  
**Asim Kumar Talukder**  
Govt. Inspector of Bangladesh Railway  
Department of Railway Inspection  
Ministry of Railways

## Auto Sensored Warning & Flashing System ON PILOT basis in Gate no.T-12 at km 11/7 to 11/8 between FJT-PHT section of Chittagong Division



**Introduction:** The Sensor Based Automated Alarming and Flashing system involve automatic detection of passing train and relaying the signal to a central receiving unit that activates the alarming and flashing system without any human intervention. The system uses **wireless RF** for performing communication task between the transmitter( Up line & Down line Train detection Unit) and receiver(Central Unit) units. This plays a vital role as in unmanned railway crossings throughout the country, where accessibility and maintenance of wired communication is very limited. The alarming and flashing system help to alert the pedestrians and ongoing vehicles which significantly reduces the possibility of accidents that occur at the unmanned railway crossings.

The System is comprised of three main units that work in unison for forming an uninterrupted and unmanned alert system comprised of alarms, flashing lights and LED Display unit.

The three main units are as follows:

1. **Train Detection and Signal transmission Unit (Up line/ Down line)**
2. **Central Receiving Unit**
3. **Alarming, Flashing and LED Display Unit**

**All the units are equipped with self-sustaining power supply, complete with solar panel Auto charging controller and battery.**

**Train Detection and Signal transmission Unit:** The transmission unit is a combination of several train detection components and a RF transmitter that transmits signal wirelessly. The specific parts of the unit are software based Up/Down Remote Train Detection and signal transmission Unit complete with following: component as industrial grade Tract Sensing unit, Sound Detecting Unit, Train Detection Unit, Wireless Transmission Unit (up to 1.5Km) all safely stored inside a metallic box.

**Central Receiving Unit** The receiving unit is the central processing unit of the whole system. This unit is tasked with receiving the train detected signal from the transmission units through RF receivers and enables the alarming and flashing units. The main components of the receiving unit are motherboard for processing the received signals, time controller, variable delay timer, processing circuits for all the alarming and flashing units etc. all safely inside a metallic box.

**Alarming Flashing and LED Display Unit :** The alarming and flashing unit is used for alerting the pedestrians and ongoing vehicles when incoming train is detected. The unit is composed of electric buzzer, flashing light and scrolling LED display. The alarming and flashing system is activated by the central receiving unit.

**Common Components:** All the units are equipped with self-sustaining power supply. This is achieved through Solar Powered Battery which mitigates the need of providing any form of external power to the system. This is especially required as the system may be implemented in areas where availability of constant power supply is scarce.

## **Working Procedure:**

**Step 1:** When a train approaches, it is first detected by our transmission unit which is placed somewhere between 1200 to 1500 meter away from the level crossing gate. First the Track Sensing Unit is activated when the train approaches the area even before the train reaches in front of the transmission unit.

**Step 2:** Track Sensing Unit activates the Train Detection Unit which comprises of Length Measuring Sensor and Motion Detecting Sensor. The Sound Measuring Sensor identifies if the object approaching is a Train and the Motion Detecting Sensor identifies if the object is of at least 10 m or more.

**Step 3:** After all these sensors are activated and gets positive reading, this information is sent to the Transmission circuit (TX). The circuit has a timer delay of 1.5 second and after this time the circuit activates the **RF Transmitter** which transmits a signal to the central Receiving Unit wirelessly.

**Step 4:** After a train detection signal is received by the **RF Receiver** from the Transmission Unit, a confirmation signal is sent back to the Transmission Unit for confirming that the signal is a valid signal and not a false signal. After the confirmation is received the processing circuit activates the variable timer delay which can be set according to the users demand. Then at the same time the Receiving Unit activates the Alarming and Flashing Unit at both sides of the level crossing gate to warn the ongoing traffic.

**Step 5:** The Alarming and Flashing Unit is composed of flashing light, LED panel for scrolling message and warning sounds. The alarming and flashing units run as long as the train crosses the level crossing gate and reaches a distance of 1200 to 1500 meter where there is another Train Detection Unit. If the train is moving slowly and takes a lot of time, the alarming and flashing unit will be cutoff according to the delay time set in the variable timer delay keeping in mind the disturbance caused to the local people.

## Conclusions:

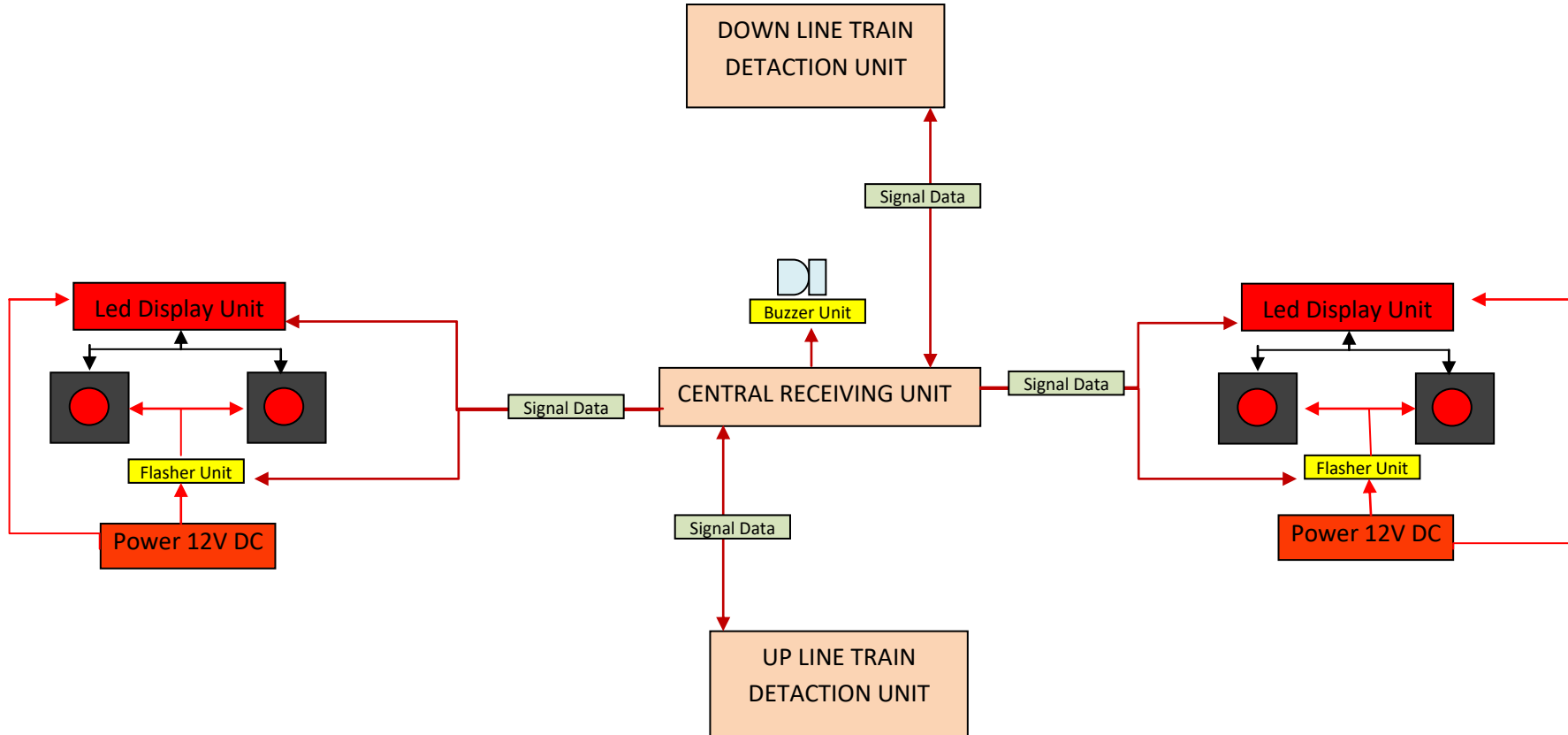
Presently about 1615 no gates are unmaned and unauthorized in Bangladesh Railway. High speed train have no safety during there movement over these L/C gates. So, small/severe accidents are very common practices all over the year. With having the matter in mind, this sensor based automatic warning bell and flashing system may be introduced in remote unmanned/unauthorized L/C gate to call attention of the drivers of vehicles passing over the L/C gates.

This type of sensor based automatic warning bell and flasher system can also be installed at the manned level crossing gates where telecommunication (poin to point) is not available to convey the information of arrival of trains.

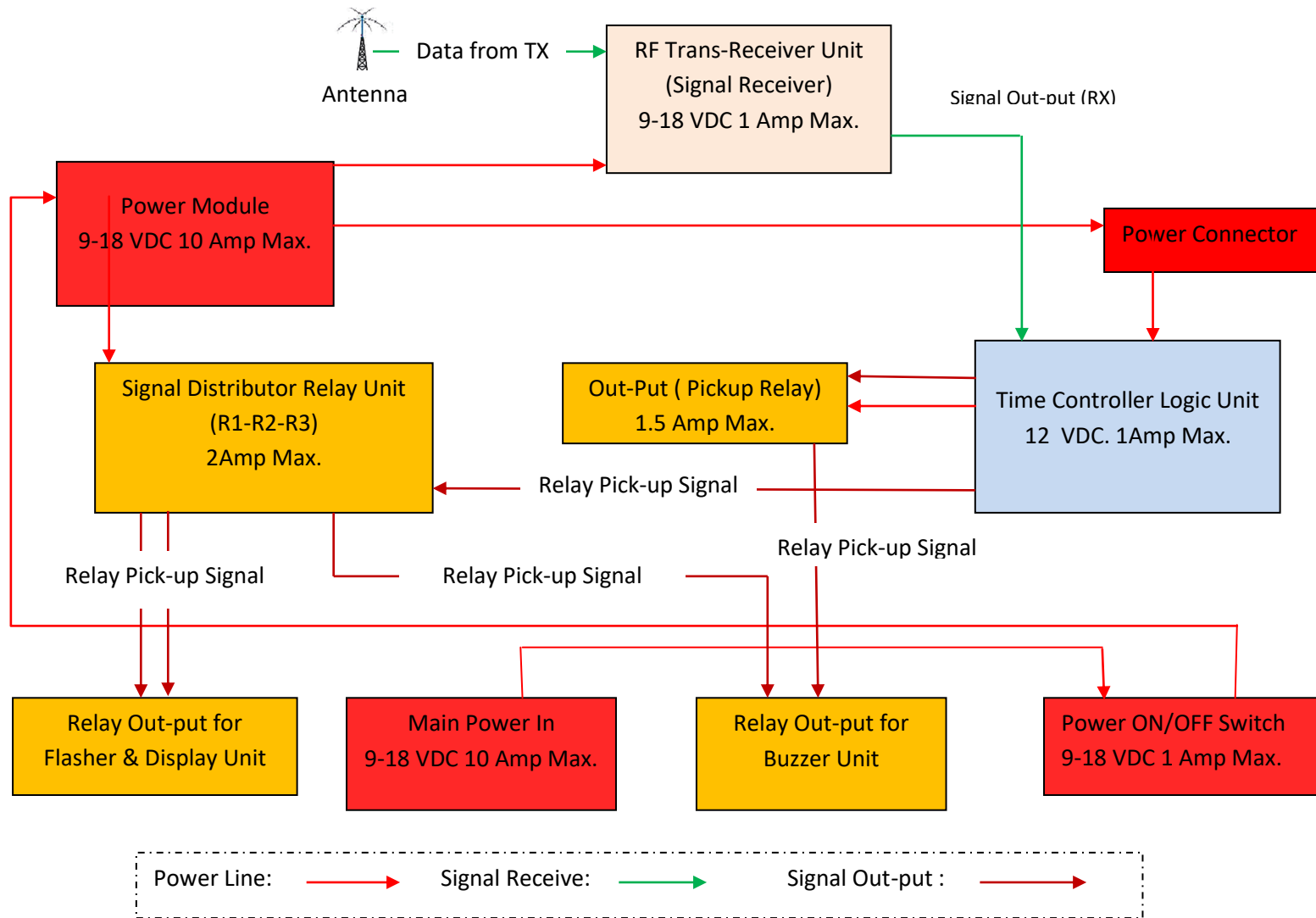
As a result, the accidents at these evel crossing gates will be reduced and train movements will be safe.

Asim Kumar Talukder, GIBR

**BLOCK DIAGRAM OF AUTO SENSORED WARNING & FLASHING SYSTEM ON PILOT BASIS GATE NO# T-12 AT KM 11/7 TO 11/8 BETWEEN FJT-PHT SECTION OF CHITTAGONG DIVISION**



## CIRCUIT DIAGRAM OF CENTRAL RECEIVING UNIT



## CIRCUIT DIAGRAM OF UPLINE & DOWN LINE TRAIN DETECTOR UNIT

