Smart Sealing System (Electronic recording of seal position of SLRs/VPUs)

Ministry/ Organization name: Ministry of Railways
Problem Statement : Smart Sealing System (Electronic recording of seal position of SLRs/VPUs)(BB457)
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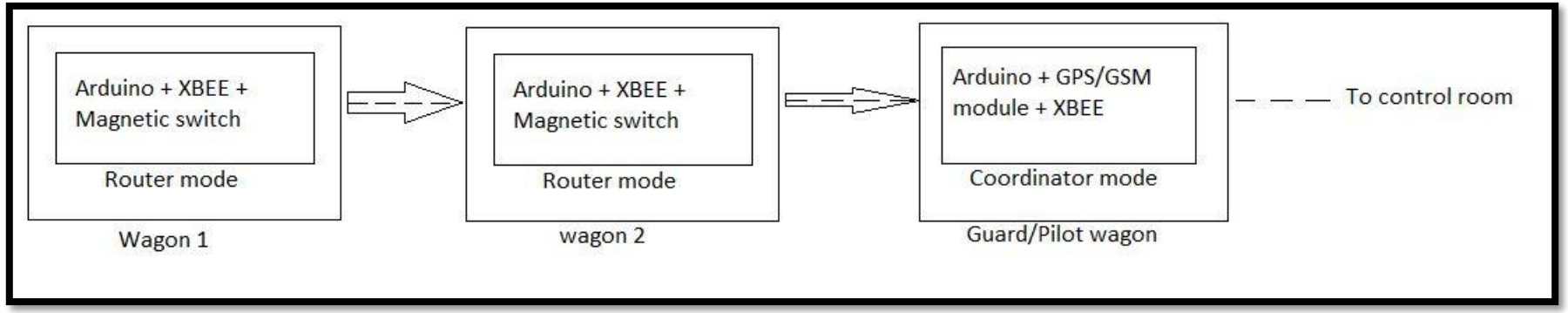
Idea / Approach details

The seal will be tracking the live location of the wagon with the help of a GPS module and with its current location it will make a search in its database to find the information about the control room having jurisdiction over the area. If the seal tampered at any instant before reaching the destination, it will alert the control room of the division having jurisdiction by sending the location where the tampering has been done along with its time of occurrence.
The overall module will be using only one GPS module to reduce the cost and to further increase the efficiency of the module the microcontroller will be in sleep mode until any intrusion is detected.

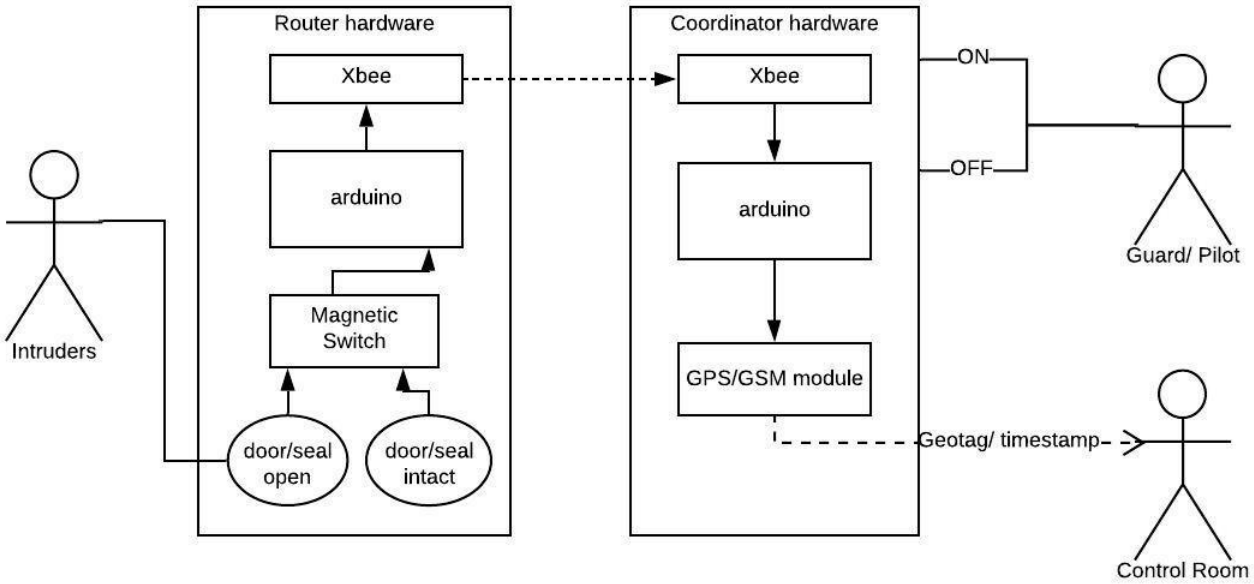


Technology stack:

- GPS GSM 7600E-H / SIM808 /SIM900 is used for tracking location and communication purposes between the control room and the seal.
- XBEE module is used for local communication in case of multiple wagon.
- ATMEGA328 DEVELOPMENT BOARD is used as a microcontroller to perform on board computational task, interfacing GPS, GSM and magnetic switch and decision making.
- Magnetic switch is used for determining current state of door/seal.
- Power bank for onboard power supply.

Use case

- The guard/ pilot of the train must ON the module via a switch available on the module after the goods have been loaded. Hence the guard/ pilot will act as the admin of the device.
- After the device is on it will track its location and the state of door. If at any instant the seal/door is found open it will alert the corresponding control room and guard in the train.
- After reaching the destination the guard/pilot will have to Off the device with a switch on module.



Key features

- Cost effective , as we have used only one GPS,GSM module to transmit data of multiple wagon via a local communication using xbee.
- It is reusable and durable.
- It is scalable even in case of multiple wagons and different wagon types with minor adjustments.
- The user interface is simple, thus the operator does not require any special training to operate the module.
- The GPS location and time is relayed in real time in case of any tampering.
- Low power consumption as the module uses sleep mode to save power.

Dependencies

- Our hardware mainly consists of an Arduino, Xbee module, GPS/GSM module, magnetic sensors and power bank as power source for various components.
- Arduino will be programmed using Arduino IDE v1.8.11.
- XCTU v6.4.3 software will be used to upload firmware in Xbee modules.
- Libraries for various components will be used for interfacing various sensors.

Show stoppers

There is no requirement of external data for the implementation of this system.