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TRAIN LOCALIZATION SYSTEM FOR SAFETY RELEVANT SERVICES BY USING RFID

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Abstract— Global Navigation Satellite Systems (GNSS) isbroadly used in land transportation. For example vehicle steering, railway taskforce management, and train station passenger information. GNSS receiver is a practical instance for performing train localization function. Global Navigation Satellite Systems (GNSS) are relevant to deliver train locations in real time. But GNSS is not an accurate one for railways system so for we applying RFID based train localization system. This train localization function should comply with railway functional safety standards. We are implement RFID tag place in railway track and the receiver on train unit so when the train crosses the tag the position data updated to railway monitoring unit through wireless system. And in our system the location information updated to passengers also.

Index Terms—Evaluation, Global Navigation Satellite Systems (GNSS), quality ofservice, Radio Frequency Identification(RFID), train localization, LCD(liquid crystal diode),LED.

I. INTRODUCTION

In the modern railway signalling systems plays major role in the safety networks to prevent accidents due to human errors. The railway traffic management improve the utilization of scarce and expensive resources like the railways infrastructure. An onboard computer effectively compresses the speed of the train with the maximum permitted speed and automatically applies the trains breaking, if the limit is exceeded. So for, high speed lines and international freight transport lines have been the primary target of these systems. Which are implemented using infrastructures deployed along the rail tracks e.g. RFID tags. This RFID tags are very affordable one and this have low maintenance.By using this technique we can get the accurate information about train's localization with automation and time exactness.

II. BLOCK DIAGRAM AND IT'S DESCRIPTION.

TRAIN UNIT:-

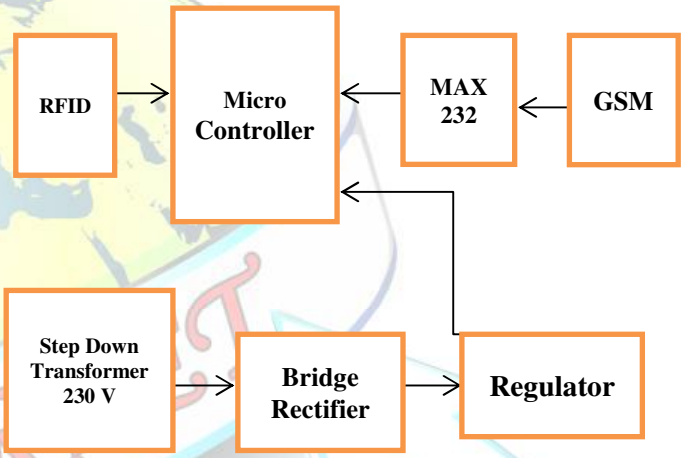

FIG.1.Train unit.

In this onboard Train Localization safety Relevant services System we used one power supply system to give power to the system which is connected with the controller. This controller is used for control the whole system. It contains PIC Microcontroller, crystal oscillator, Bridge rectifiers, switch, voltage regulator, LCD system, LED, clock and some resistors and capacitors. Then this controller gets the information from the RFID reader. This RFID tag fixed along with the track. In this controller have predefined information's and database. This controller is kept inside the train unit. Then this information's are given to the railway monitoring unit through wireless system for that purpose we are using ZigBee.

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MONITOR UNIT

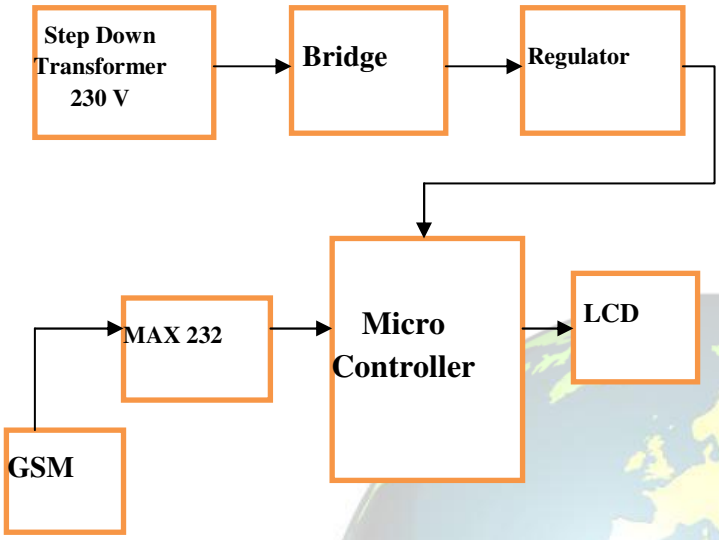

FIG.2.Monitoring unit

III. PERFORMANCE OF RFID &ITS APPLICATIONS

Radio Frequency Identification Device (RFID):-

RFID is Radio Frequency Identification Device. It is fast, affordable and automatic identification machinery that uses radio frequency (RF) to transfer data between a RFID reader and a RFID tag. Usually the RFID circuit is a single solid-state memory chip, but could also be designed where several electronic machineries together are used to form an integrated circuit design. In other words RFID is a means of capturing data abo without having a hominid to read it. small amount of inimitable data number or other unique attribute of

The data can be read from a no contact or even line of sight essential RFID technology uses RFJD tags, which is a small object, such as an adhesive sticker, that can be attached to or incorporated into a product. RFID tags contain antennas to enable them to receive and respond to radio-frequency inquiries from an RFID transceiver.

RFID tags:

An RFID tag is a small thing, such as an adhesive slicker, that can be attached to or incorporated into a product. RFID tags contain antennae to enable them to receive and respond to radio-frequency queries from the interrogator. The tag is generally made of a 1C. The IC will include memory and some form of processing capability. The memory may be read only or read/write, the type selected will depend on the application.

Transponders (tags) can be classified into two

- Active tags -With internal power supply
- Passive tags -Without internal power supply.

Active tags:

Active RFID tags, on the other hand, must have a power source, and may have longer ranges and larger memories than passive tags, as well as the ability to store additional information sent by the transceiver. At present, the smallest active tags are about the size of a coin. Many active tags have practical ranges of tens of meters, and a battery life of up to several years. The improvement is that tag is not dependent on the strength of, the carrier from the interrogator to provide the power it needs.

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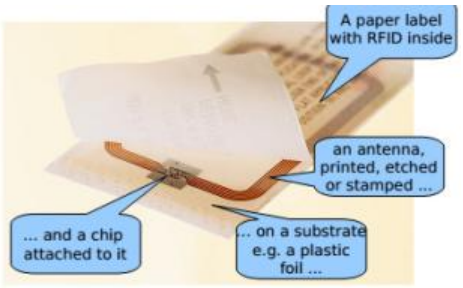

FIG.3. Interior part of RFID

Passive tags

Passive RFID tags do not have their own power supply. The minute electrical current induced in the antenna by the incoming radio-frequency scan provides enough power for the tag to send a response. Due to power and cost concerns, the response of a passive RFID tag is necessarily brief, typically just an ID number (GUID). Dearth of its own power supply makes the device quite small: commercially available products exist that can be embedded under the skin. This system also communicates through a reader which broadcasts a signal through an antenna. When a transponder enters the antenna field, it receives the signal and energy from the reader. The tag is "charged" with enough power to send back a unique ID.

Basic working of tags

The tag is made of an IC and an antenna. The IC willinclude memory and some form of processing capability. The memory may be read only orread/write type selected will depend on the application.

When the tag is brought in the range of the interrogator or the reader, it receives the signal which is sent by the reader (interrogator). In case of a passive tag, it receives all the power it needs from the signal itself. As well as using this radio wave to carry the data, the tag is able to convert it into power. This means that the tag is only powered when it is in the beam of the interrogator. The tag then uses a technique called backscatter to reply to the interrogator. This does not involve a transmitter on the tag, but is a means of "reflecting" the carrier wave and putting a signal into that reflection Battery assisted tags are just like passive tags (they use backscatter) but they have a battery to provide the power to the chip.

The tag talks to the interrogator using what is called the air-interface. This is a specification for how they talk to each other and includes the frequency of the carrier, the bit data rate, the method of encoding and any other factors that may be needed.

Also a part of this air interface is what is commonly called the anti-collision protocol (if the tag supports it). This is a means of allowing many tags in the field to talk "at the same time". There are several ways of doing this, and each manufacturer has developed their own way of implementing it.

Memory Capacity

The general rule with any memory based system has always been that no amount of memory is ever sufficient. Invariably, the response to enlarging the memory capacity of a system is to increase the scope of the application. So that it requires even more memory.

The amount of memory available on Read Only Tags is 20 bits of information. Active Read/Write Tags vary from 64 Bytes to 32KB, meaning that several pages of type-written text can be stored in a Read/Write Tag. This is usually sufficient to carry build manifests and test data, as well as allowing room for system growth. The memory of Passive Read/Write Tags ranges from 48 Bytes to736 Bytes and provides many distinct benefits over Active Systems.

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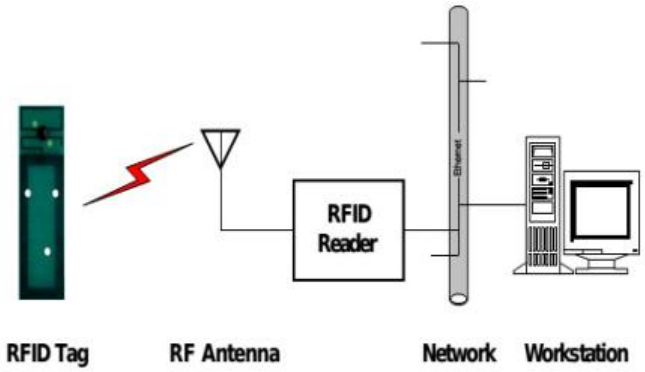
RFID System coponents:



IV. PIC MICROCONTROLER

Microcontroller with its basic elements and internal connections

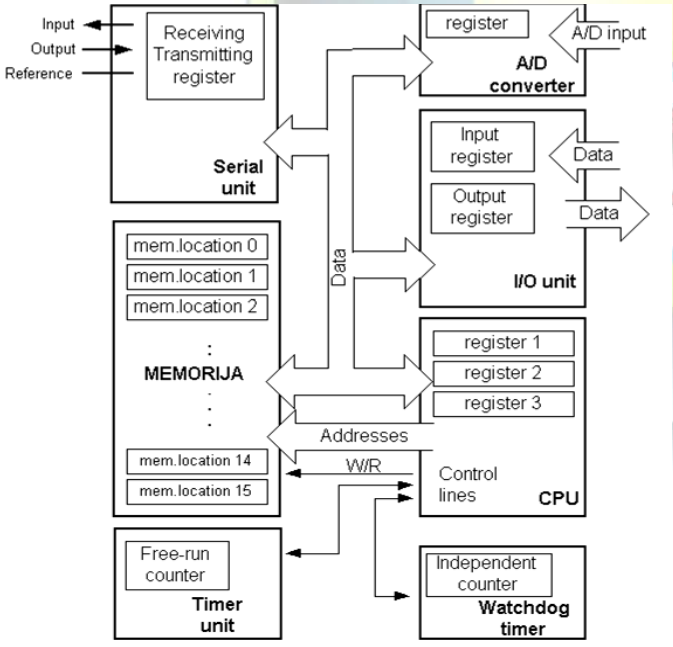


FIG.4.Block representation of the microcontroller

Circumstances that we find ourselves in today in the field of microcontrollers had their beginnings in the development of technology of integrated circuits. This development has made it possible to store hundreds of thousands of transistors into one chip. That was a prerequisite for production of microprocessors, and the first computers were made by adding external peripherals such as memory, input-output lines, timers and other. Further increasing of the volume of the package resulted in creation of integrated circuits. The main part of this microcontroller is memory unit. The main function of this microcontroller is to store the data.

FIG.5.RFID along with track

There are several types of RFID systems and they can be classified by the radio frequencies used. Low frequencies, from 100 kHz to tens of MHz, have ranges of less than a metre and use inductive techniques. Communication distance of several tens of metres is the realm of systems operating at frequencies from about 400MHz to 6GHz. The RFID systems for rail in North America use frequencies near 915MHz."The equipment operates in all weather, is robust, has long range and does not require a line of sight."

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V. CONCLUSION

In our project, we are using RFID sensors that is used to identifying the location of particulartrain travelling on the track. And also that signal is transferred to controller and control section for the train. Thisinformationis shows to the passengers via mobile phone and console unit also, which are left for the future research.There are some systems that use infrared instead of radio. An infrared tag requires line of sight and a battery. Consequently, cost, reliability, life and weather concerns favour RFID over infrared systems for transportation applications.

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