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RFID AND GSM INTEGRATION: SECURITY APPLICATION

Junaid Riyaz, Mumin Hassan, Wasi Jeelani, AdityaAgarwal (Asst. Prof)
Department Of Electronics And Communication Engineering,
SRMUniversity, NCR Campus

ABSTRACT:-
RFID is proven technology that's been around since at least 1970s.Upto now it was limited for only some commercial applications. Use of GSM technology in integration with the RFID module can be used for many future applications. In this paper we have highlighted the security application of the RFID in the automobile industry. A lot of research is being done tosuggest methods which will ensure secure communications inRFID systems. The objective of this paper is to present anintroduction toRFID technology, its current and futureapplications, study various potential threats to security and privacy.

Keywords:-RFID, GSM, GSM module

I. INTRODUCTION:-

Radio frequency identification, or RFID, is a generic term for technologies that use radio waves to automatically identify people or objects. There are several methods of identification, but the most common is to store a serial number that identifies a person or object, and perhaps other information, on a microchip that is attached to an antenna (the chip and the antenna together are called an RFID transponder or an RFID tag). The antenna enables the chip to transmit the identification information to a reader. The reader converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can make use of it.

RADIO FREQUENCY IDENTIFICATION:

RFID technology was invented in 1948, but it was not mainstreamed for commercial applications until the 1980s. One of its first known applications was during World War II, when it was used by the British radar system to differentiate between German aircraft and their own aircraft with attached radio transponders.
Only recently, due to technology advances the price points dropped to where RFID is now feasible for companies to adopt. Wal-Mart was among the first commercial enterprises to select RFID technology to achieve improvements in the inventory supply process and theft control. Wal-Mart started the process of implementing RFID throughout its retail distribution chain by requiring its top 100 suppliers to use RFID tags by year-end 2004 on the pallets and cases they shipped to Wal-Mart.

HOW IT WORKS:

The underlying technology architecture of RFID is based on these components:
1. Tags
2 .Reader module

3.Database - data synchronization

1. TAGS

Tags are typically composed of a microchip for storage andcomputation, and coupling element, such as an antenna coilfor communication. Tags may also contain a contact pad. Tag memory may be read-only, write-once read-many or fully rewritable. Broadly the tags have been classified in three categories.

• **Active Tag:** An active RFID tag is equipped with a power source for the tag's circuitry and antenna.
The advantages of an active RFID tag includes readability from a distances of one hundred feet or more as well as capability to have other sensors that can use electricity for power. The major disadvantages of an active RFID tag are the limitations on the lifetime of the tag (5 years). They are more expensive and physically larger and they add to the maintenance cost if the batteries are replaced. Battery outages in an active tag can result in expensive misreads.

• **Passive Tag:** Passive RFID tag does not contain a power source; the power is supplied by the reader. The tag draws power from the inductive coupling with reader antenna. The major disadvantages of a passive tag are that the tag can be read only at very short distances, typically a few feet at most. However there are many advantages .The tag functions without a battery which increases the life time to more than 20 years. The tags are less expensive (10¢) and much smaller .These tags have almost unlimited applications in consumer goods and other areas.

• **Semi-Passive Tag:** Like passive tags, semi-passive tags reflect (rather than transmit) RF energy back to the tag reader to send identification information. However, these tags also contain a battery that powers their ICs. This allows for some interesting applications, such as when a sensor is included in the tag so it can transmit real-time attributes, such as temperature, humidity, and timestamp. By using the battery only to power a simple IC and sensor— and not including a transmitter—the semi-passive tags achieves a compromise between cost, size, andrange.

Figure 1.RFID tag

2. RFID READER:-

An **RFID reader** is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves; the tag responds by sending back its data. A number of factors can affect the distance at which a tag can be read (the read range). The frequency used for identification, the antenna gain, the orientation and polarization of the reader antenna and the transponder antenna, as well as the placement of the tag on the object to be identified will all have an impact on the RFID system's read range. The RFID reader provides the connectivity between individual tags and the tracking/management system. Depending on the application and operating conditions, there may be a multiplicity of readers to fully service a specific area. Overall, the reader provides three main functions

- Bidirectional communication with the tags.
- Initial processing of received information.
- Connection to the server that links the information into the enterprise.

3. DATABASE - DATA SYNCHRONIZATION

Often, the RFID reader contains a networking element such as wired Ethernet or wireless Ethernet that connects a single RFID-read event to a central server. The central server runs a database application, with functions that include matching, tracking, and storage. In many applications, an "alert" function is also present (for example the re-order trigger, for supply chain and inventory management systems).

II. RFID INTERFACED WITH THE GSM MODEM AS A SECURITY SYSTEM:-

As the crime rate is going up, security system for vehicles is extremely essential.

In this proposed system we are using a uniquely coded RFID key for users access only if someone tries to steal the car, the microcontroller gets an interrupt through a switch mechanism connected to the system and commands the GSM modem to send an SMS. The owner receives the SMS that his car is stolen. He can then send back an SMS to the GSM modem to 'stop the engine'. The GSM modem interfaced to the microcontroller, receives the message, the output of which activates a mechanism that disables the ignition of the vehicle resulting in stopping the vehicle. The system uses a motor to indicate the engine ON/OFF condition.

Thus, owner of the vehicle from anywhere can switch off ignition of his car. This system can be further enhanced by integrating a GPS system, which will give exact position of the vehicle in terms of its latitude and longitude. Further this data can be sent to the owner via SMS who can enter this value on Google maps to get the exact location of the vehicle.

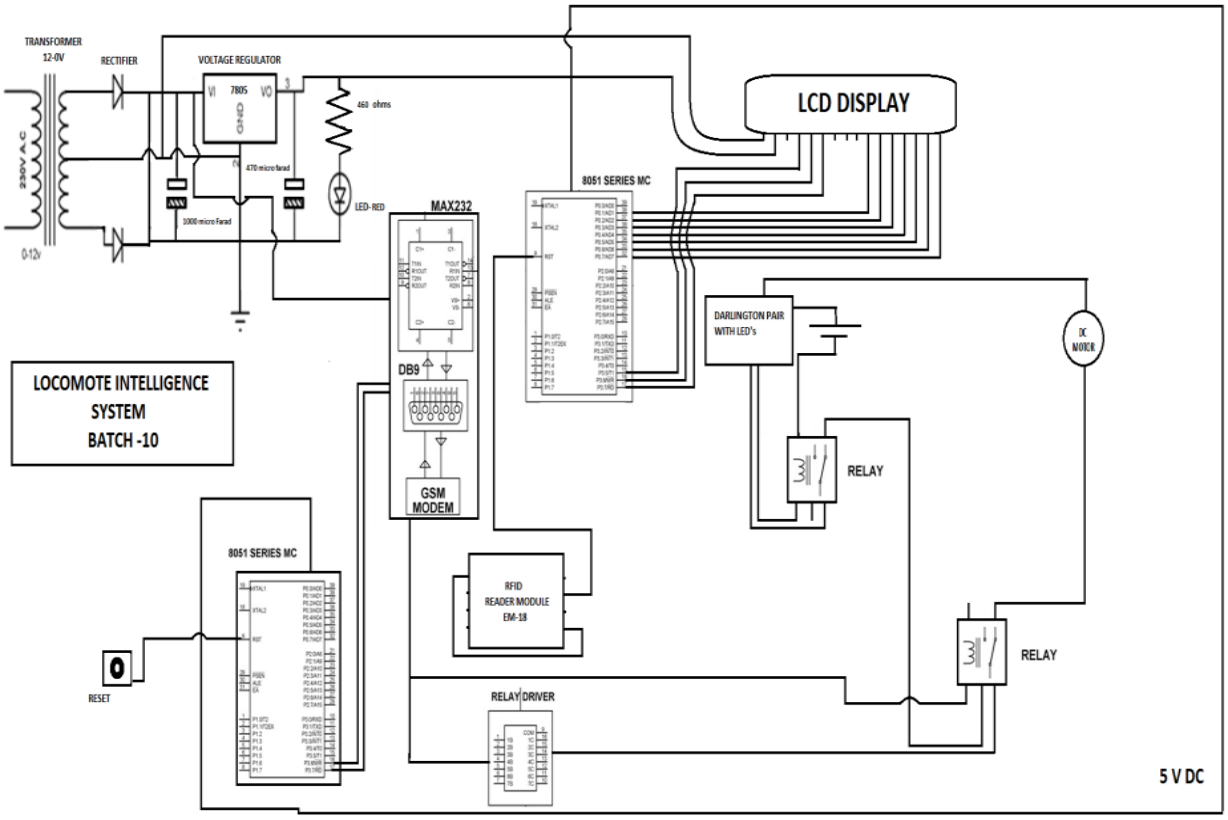

Figure 2.CAR SECURITY SYSTEM USING RFID

CIRCUIT DETAILS:-

The circuit consists of a power transformer, the transformer steps down the 240 V a/c into 12 V a/c. The transformer works on the principle of magnetic induction, where two coils: primary and secondary are wound around an iron core. The two coils are physically insulated from each other in such a way that passing an a/c current through the primary coil creates a changing voltage in the primary coil and a changing magnetic field in the core. This in turn induces a varying a/c. voltage in the secondary coil.

The a/c voltage is then fed to the bridge rectifier. The rectifier circuit is used in most electronic power supplies is the single-phase bridge rectifier with capacitor filtering, usually followed by a linear voltage regulator. A rectifier circuit is necessary to convert a signal having zero average value into a non-zero average value. A rectifier transforms alternating current into direct current by limiting or regulating the direction of flow of current. The output resulting from a rectifier is a pulsating D.C. voltage. This voltage is not appropriate for the components that are going to work through it.

The ripple of the D.C. voltage is smoothened using a filter capacitor of 1000 microfarad 25V. . A filter capacitor is connected at the rectifier output and the d.c voltage is obtained across the capacitor. The voltage regulator regulates the supply if the supply if the line voltage increases or decreases. The series 7805 regulators provide fixed regulated voltage of 5 volts. An unregulated input voltage is applied at the IC Input pin i.e. pin 1 which is filtered by capacitor. The out terminal of the IC i.e. pin 3 provides a regular output. The third terminal is connected to ground.

For further filtering the 470 microfarad capacitor is used .The output from the filter is indicated by the LED in the circuit .This 5 volt voltage is used in all the TTL circuits.

The RFID reader module is used in the circuit for identification of the authorized RFID card .The module is connected to the RESET pin of the microcontroller .The microcontroller is interfaced with the LCD display to display the messages and the commands.

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