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Wireless ID Verification and Updation Using RF-ID Tag in Vehicle

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ABSTRACT: In this project is to design RFID tag for each and every vehicle in order to find the unregistered vehicle. By installing a RFID receiver in the highway tollbooth it receives the complete information of the vehicle and display it in the PC. Information will be stored in the server. With the help of the RFID tag the unregistered vehicle can be identified. It can be used in organization, where you need to intimate the alert to the authorized person from unregistered vehicle.

I. INTRODUCTION

The main aim of the project is to automatically identify the identity of the vehicle using the RFID unique identification with wireless transceiver technology. The RFID identity of the vehicle is received by the controller and the data is transmitted through the RF transceiver to the Toll tax collection. The information or details of the vehicle which is Entering through the Tollbooth will be displayed in the system. The information of the passage of the vehicle will be stored in the server. Using this methodology when can easily identify and detect the double usage of vehicle through a single IMEI number this process enables the cops to catch these kind of fault makers. the project is designed with the following equipments, MICROCONTROLLER, RFID,

ZIGBEE, RELAY, LCD DISPLAY.

II. MICROCONTROLLER

Microcontroller are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other Embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signals microcontrollers are common, integrating analog components needed to control non-digital electronic systems.

III. ATMEGA162

The ATmega162 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega162 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. The ATmega162 provides the following features: 16K bytes of In-System Programmable Flash with Read-While-Write capabilities, 512 bytes EEPROM, 1K bytes SRAM, an external memory interface, 35 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary-scan, On-chip Debugging support and programming, four flexible Timer/Counters with compare modes, internal and external interrupts, two serial programmable USARTs, a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the

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Oscillator, disabling all other chip functions until the next interrupt or Hardware Reset. In Power-save mode, the Asynchronous Timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low-power consumption. In Extended Standby mode, both the main Oscillator and the Asynchronous Timer continue to run. The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot Program running on the AVR core. The Boot Program can use any interface to download the Application Program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega162 is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications.

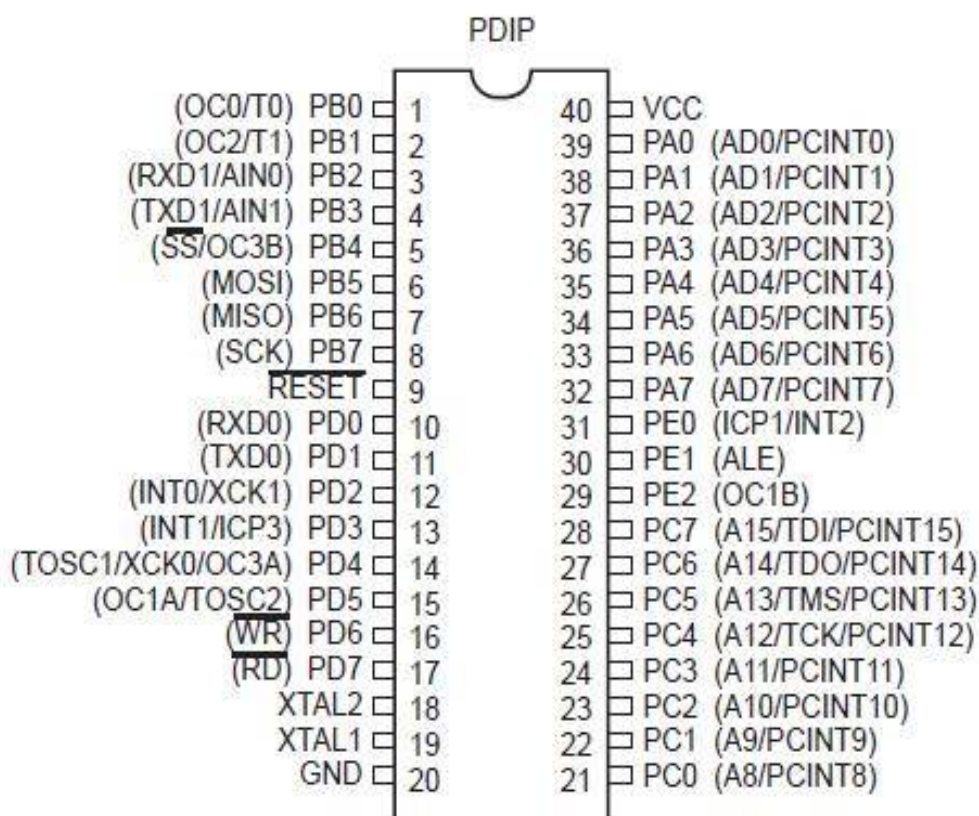


Fig. 1Pinout for ATMEGA162

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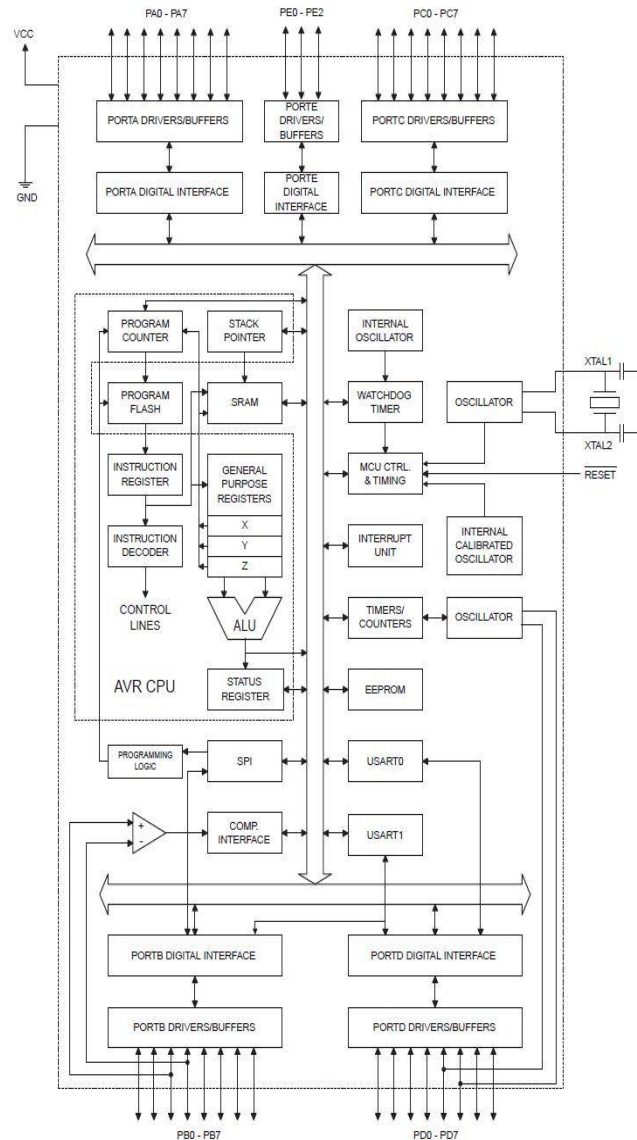


Fig. 2 Block Diagram of ATMEGA 162

The ATmega162 AVR is supported with a full suite of program and system development tools including: C compilers, macro assemblers, program debugger/simulators, In-Circuit Emulators, and evaluation kits.

IV. RFID

The RFID reader reads EM4100 family transponder tags that are brought in proximity to the reader and output the unique tag identification number through RS232 serial port @9600 bps. The reader output 12 byte including one start, stop byte and 10 unique data byte. The start byte and stop byte are used to easily identify that a correct string has been received from the reader (they

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correspond to a line feed and carriage return characters, respectively). The middle ten bytes are the actual tag's unique ID.



Fig. 3 RFID Reader

Vertical and horizontal parity checking has been done in card reading algorithm to ensure data integrity. One status LED is provided to indicate card detection. RFID (radio frequency identification) systems use data strings stored inside RFID tags or transponders) to uniquely identify people or objects when they are scanned by an RFID reader. These types of systems are found in many applications such as passport protection, animal identification, inventory control systems, and secure access control systems, robotics, navigation, inventory tracking, payment systems, and car immobilization. Because passive tags require a strong RF field to operate, their effective range is limited to an area in close proximity to the RFID reader. Product Features in RFID Low-cost method for reading passive RFID EM4100 family transponder tags, Reading Distance 10-15CM of the reader (Depend card shape),125kHz read frequency,9600 baud RS232 serial interface, Standard 2.54mm Pitch Berg strip connector, Bread Board compatible, Low power Requirement 7-9V @ 100mA, Small Size, in Antenna, No components at PCB bottom side (easy to stick to any surface like wood, glass etc), Status LED for card detection, On-Board Power LED. This is a basic VLF RFID tag used for presence sensing, Access Control etc. Works in the 125kHz RF range. These tags come with a unique 32-bit ID and are not re-programmable. Card is blank, smooth, and mildly flexible. RFID Clamshell Card (125kHz) Features: EM4001 ISO based RFID IC, 125kHz Carrier, 2kbps ASK, Manchester encoding, 32-bit unique ID, 64-bit data stream

V. ZIGBEE

Wireless transmitter receiver developed by Texas instruments which is used in 2400-2483.5 MHz ISM/SRD band systems. In this project, the input present at PORTD of transmitter atmega8 is transmitted wirelessly to the PORTD of receiver atmega8. This project shows how to configure registers of CC2500, how to give commands to CC2500 and how to activate transmission or receiver mode of CC2500 via SPI interfacing with avr microcontroller. The CC2500 RF module is a low-cost 2.4 GHz transceiver used in very low power wireless applications. The RF transceiver is integrated with a highly configurable baseband modem. It supports OOK, 2-FSK, GFSK, and MSK modulations. It works in voltage range of 1.8 - 3.6V. Two AA batteries are enough to power it. It has 30m range with onboard antenna. It is always used with microcontroller which supports SPI communication.

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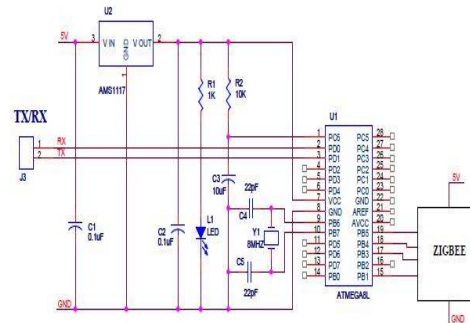


Fig. 4 Circuit Diagram of the Proposed System

Programming CC2500:SPI interface: CC2500 is configured via a simple 4-wire SPI compatible interface (SI, SO, SCLK and CS) where CC2500 is the slave and microcontroller (here atmega8) is used as master. Register access and commands are given serially to CC2500 by atmega8 with spi interface. In SPI, master generate clock and chip select signal. SPI communication involves two shift registers. One in master and other in slave. Data is shifted from master to slave and slave to master in circular manner in synchronous with clock generated by master and at the end of shift operation, data in master register and slave register is exchanged. In CC2500, all transfers on the SPI interface are done most significant bit first. All transactions on the SPI interface start with a header byte containing a R/W bit, a burst access bit (B), and a 6-bit address (A5 – A0). The CS pin must be kept low during transfers on the SPI bus. If CS goes high during the transfer of a header byte or during read/write from/to a register, the transfer will be cancelled. Initialize/configure CC2500. There are total 47 configuration registers in CC2500 which has to be programmed with SPI interface after each time the chip is reset. CC2500 can enter into transmitter or receiver mode or decide data transmission rate and type of modulation by programming these registers. The optimum configuration data based on selected system parameters can be most easily found in CC2500 datasheet by using Smart RF Studio software. The configuration registers starts from address 0x00 and end at 0x2F. To write data into configuration register Atmega8 sends two bytes to CC2500 through SPI interface. The two bytes are as follow:

1st byte (address byte)

r/w=0	Burst= 0	A5	A4	A3	A2	A1	A0
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2nd byte (data byte)

D7	D6	D5	D4	D3	D2	D1	D0
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These two bytes are sent one after the other. The last five bits (A5-A0) of byte one gives CC2500 the address of register and next byte give data to be written into the registers. As SPI interface is exchange of data between master and slave, when atmega8(master) sends these two bytes it get two bytes in exchange which gives status of the CC2500. This way CC2500 program its configuration registers. Now CC2500 is ready to transmit or receive data wirelessly. Transmit or receive data: Similar to the configuration register there are Tx and Rx FIFO registers. To transmit data wirelessly, data has to be written into Tx FIFO in similar way as we write data in config register. Address byte and data byte is send to CC and CC will write data in its Tx FIFO. Then

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'STX' command is given to send the data in Tx FIFO wirelessly. The address for Tx FIFO is 0x3F. So A5-A0=111111. But we are using burst mode because we are sending 3 bytes of data, so 6th bit of address byte will be 1. Hence address byte will be now 01111111= 0x7F. Similarly, whenever CC2500 receives some data, it gets stored in Rx FIFO and CC generates interrupt on GD0 pin. Atmega8 continuously check GD0 pin by polling method. Whenever interrupt is generated on GD0 pin atmega8 reads data from Rx FIFO. To read data from CC2500 register again two bytes are sent by atmega8. One is address byte and second one is data byte. But now atmega8 will send data byte as 0x00 and in exchange CC2500 will send the value in register to atmega8. For read operation, MSB of address byte will be '1' and we are using burst mode to receive continuous three bytes of data and the address of TX and RX FIFO are same. Thus address byte is 0xFF. To give commands to cc2500 like STX, SRX, SFTX, SFRX, SIDLE, only one byte is sent from atmega8 to CC2500 via SPI. STX will send data in TX FIFO. SRX will receive data in RX FIFO. SFTX will flush TX FIFO. SRTX will flush RX FIFO. SIDLE will turn CC2500 into idle mode. Atmega8 give these commands to CC2500 by sending one byte address of these commands. For reading and writing registers two bytes are send but for giving commands only one byte is send. Features in Zigbee. Low current consumption. (rx:13. 3ma,tx:21. 2ma @0dbm output power), Powerful digital features allow building a high-performance RF system, Programmable carrier sense indicator and digital RS SI output enables, word insertion/detection, add check, flexible packet length and automatic CRC, Full packet handling including preamble generation, Ideal for multi-channels operation (50-800khz channels), Robust solution with excellent selectivity and blocking performance, Programmable data rate from 1. 2-500kbps, Burst mode data transmission with high over-the-air data rate, reduces current consumption.

VI. RS232

In communications, RS-232 is a standard for serial binary data interconnection between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports. In this circuit the MAX 232 IC used as level logic converter. The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply EIA 232 voltage levels from a single 5v supply. Each receiver converts EIA-232 to 5v TTL/CMOS levels. Each driver converts TTL/CMOS input levels into EIA-232 levels.

Function Tables

EACH DRIVER	
INPUT TIN	OUTPUT TOUT
L	H
H	L

H = high level, L = low level

EACH RECEIVER	
INPUT RIN	OUTPUT ROUT
L	H
H	L

H = high level, L = low level

Table 1 Function table of RS 232

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logic diagram (positive logic)

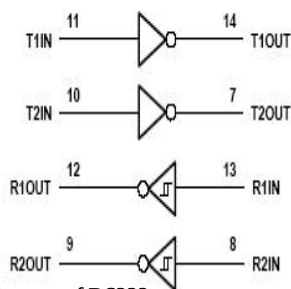


Fig. 5 Logic Diagram of RS232

VII. CONCLUSION

The RFID reader reads the data stored in the RFID Tag and it is communicated to the microcontroller through the zigbee module.

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