

DESIGN OF URBAN AND RURAL INTELLIGENT TRANSPORTATION SYSTEM

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ABSTRACT: --Rural transportation systems have unique aspects and desires than their urban counterparts. To address protection and effectivity concerns in rural environments, superior rural transportation systems (ARTS) test and deploy suitable intelligent transportation systems (ITS) technologies, many of which require conversation support. However, wi-fi systems that currently serve urban areas often are no longer avail-able or appropriate in rural environments. Thus, a want exists to identify communication options that are probable to address successfully the needs and aspects of ARTS applications. Current and emerging wi-fi systems and technologies have been systematically assessed with appreciate to rural ITS applications. Wireless communication functions associated with rural ITS functions are first identified. Then require-mends for relevant communication technologies in the rural environment are defined. Existing and rising wireless conversation systems and technologies are reviewed and evaluated via a systematic technique of assessing two rural two ITS wireless solutions. Finally, two tips for future research and operational assessments are offered. The evaluation results are expected to benefit rural ITS planners by identifying appropriate wireless solutions for unique rural contexts.

LINTRODUCTION

Intelligent Transport System (ITS) is an Upgrading system, which is a combination of telecommunications and advanced information. ITS is a coordinated application with technologies like computers, communications, electronics and sensors. These applications provide travelers with specific information while improving safety and efficiency of transport system. Reasons to promote Intelligent Transport System includes:

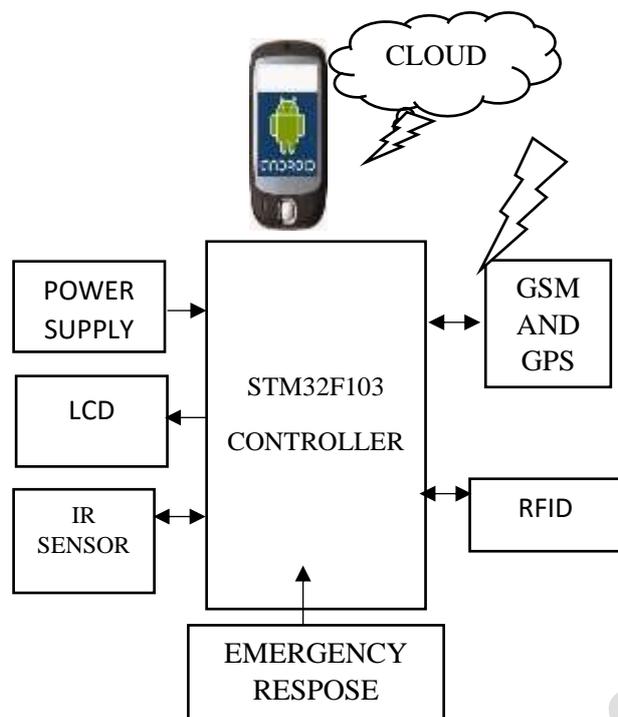
- Several issues caused by road.
- Improve economy
- Decrease drivers run

- Coordinate with different modes of transport.

Rural America consists of communities or areas with fewer than 50,000 residents. Analysis of rural sensible transportation systems (ITS) surroundings Briefly, rural transportation systems have different features than urban systems. Rural systems usually are characterized through complex geography, isolation, lack of huge infra-structure and services, and alarmingly excessive quotes of serious crashes. Although rural motor vehicle crashes symbolize solely 28 percent of the countrywide total, rural fatalities account for 56 percentage of the total number of fatalities nationwide. Thus, a need exists for deploy-in superior ITS technologies that enhance journey safety, reduce the penalties of site visitors' incidents in rural areas, and enhance operational efficiency. Within two this context, two superior two rural transportation two systems (ARTS) intend to use growing ITS applied sciences to enhance the safety and efficiency of rural surface transportation. Many rural ITS functions doubtlessly require some kind of wi-fi communications support. However, two handy wireless two communications two systems, which presently serve city areas, can also no longer be totally appropriate for application to rural areas because of limitations in coverage, transmission rate, and two so two forth. Two to sketch for the two desirables vary two of ARTS services, it is vital to evaluate and consider the potential of wi-fi verbal exchange systems and two technologies two inside two the rural environment. The aim of this research is to investigate the existing and emerging wireless communication systems in mild of wireless communications needs for ARTS applications. Evolves round the concept of three interconnected layers—namely, the institutional layer, the transportation layer, and the communications layer. This makes the architecture flexible and successful of incorporating time-honored advancements in communications technologies. Within the framework of The National ITS Architecture, require-mends and functions of the rural ITS may

want to be viewed as specifications of the ITS transportation layer inside the rural environment.

II. BLOCK DIAGRAM



SOFTWARE REQUIRMENTS:

- Keil uvision 5 IDE
- Android Studio

HARDWARE REQUIRMENTS:

- STM32F103 Microcontroller
- GPS Receiver
- RFID Reader
- 16 x 2 LCD display
- GSM Modem
- IR Sensor
- Power Supply
- Emergency Response System

III. STM32F103 MICROCONTROLLER

The STM32F103 microcontroller is settled by ST merchant. The controller encases the high performance of ARM Cortex money supply processor. The controller is engaging at a most extreme come of 72 MHz. The controller works at intervals the forty to +105o C temperature extend, from 2.0 to 3.6 V power offer. Loads of intensity convertible mode is employed to rearrange of low management applications.

This controller has 32 memory of non-volatile storage and ten computer memory unit of Random-Access Memory (RAM). The controller

able to communications like Universal Synchronous and Asynchronous Serial Communication (UART), Serial Peripheral Interface (SPI), Inter-Integrated Circuit (I2C), Universal Serial Bus (USB) and management area Network (CAN) that are utilized to manage with altogether totally different gadgets. It's clocks and Analog to advanced device (ADC), Pulse breadth modulation that's want to screen and management the gadgets. The ARM Cortex money supply processor is that the ongoing peers of ARM processor that's debase on ARM v7 basic structure. It has been discovered to produce a nominal effort stand that meets the wants of tiny Controller Unit (MCU) usage, with less no of pins and takes low power, current extraordinary procedure shows and propelled framework reaction to special cases. The ARM Cortex money supply might be a 32-bit reduced instruction set computing processor that has excellent code productivity and conveyance the beginning presentation foreseen from an ARM center at intervals the reminiscence quantum.

IV. ARM CORTEX M3 PROCESSOR

The Cortex-M3 mainframe could also be a superior 32-bit processor designed for the foremost microcontroller market. It's designed on the superior computing machine core, with 3-stage pipeline Harvard planning and making it unspoiled for exacting embedded applications. The, a range of specific cycle and SIMD multiplication and multiply with gather and stopping arithmetic and committed division.

The Cortex-M3 processor diligently shares a configurable NVIC, to deliver industry-leading split performance. The NVIC contains a Non-Mask prepared Interpose (NMI) which will hand over to 256 interrupt import levels. The serf like integration of computing machine core and NVIC offers fast effecting of ISR, dramatically dipping the exception latency. This will be professional through hardware grouping of registers and conjointly the flexibility to append load-multiple and store-multiple operations.

To adjust low power designs, the NVIC participates with the sleep modes, which can perceive of associate elective deep sleep occupation. This supports the total device to be hurriedly hopped-up down whereas still recalling program state.

Preferences:

- Thumb instruction set combines elevated code thickness with 32-bit presentation
- Code-patch capability for store system keep denote
- Fast code accomplishment growths sleep mode time
- Deterministic, superior interpose handling
- Power switch improvement of system components
- Integrated Sleep modes for low power intake
- Tight merger of the system peripherals decreases house and development price
- Code-patch capability for store system updates
- Optional MPU for safety-critical solicitations
- Implementation-defined mend and trace capabilities

V. GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM)

GSM could be a mobile communication modem; it's stands for global system for mobile communication (GSM). The concept of GSM was developed at Bell Laboratories in 1970. It's wide used mobile communication system within the world. GSM is an open and digital cellular technology used for transmittal mobile voice and information services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

GSM system was developed as a digital system exploitation time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the information, then sends it down through a channel with 2 totally different streams of consumer information, every in its own specific slot. The digital system has a capability to hold 64 kbps to a hundred and twenty Mbps of information rates.

GSM (Global System for Mobile communication) could be a digital mobile network that's wide employed by transportable users in Europe and different components of the globe. GSM uses a variation of your time division multiple access (TDMA) and is that the most generally used

of the 3 digital wireless telephone technologies: TDMA, GSM and code-division multiple access (CDMA). GSM digitizes and compresses information, then sends it down a channel with 2 different streams of user information, every in its own slot. It operates at either the 900 Mc (MHz) or 1800 megacycle per second waveband.

Why GSM?

- Listed below are the options of GSM that account for its quality and wide acceptance
- Improved spectrum potency
- International roaming
- low-priced mobile sets and base stations (BSs)
- High-quality speech
- Compatibility with Integrated Services Digital Network (ISDN) and different phone company services
- Support for brand new services

VI. RFID

In recent years, frequency identification technology has affected from obscurity into thought applications that facilitate speed the handling of factory-made product and materials. RFID (Radio Frequency Identification) permits identification from a distance, and in contrast to earlier bar-code technology, it will thus while not requiring a line of sight. RFID tags support a bigger set of distinctive IDs than bar codes and might incorporate further knowledge like manufacturer, product kind, and even live environmental factors like temperature. what is more, RFID systems will distinguish many alternative tags situated within the same general space while not human help. In distinction, think about a grocery counter, wherever you need to orient every bar-coded item toward a reader before scanning it. thus, why has it confiscated fifty years for this technology to become mainstream? the first reason is value. For electronic identification technologies to contend with the reduced rating of written symbols, they need to either be equally affordable or give enough side worth for a corporation to recover the value elsewhere. RFID isn't as low cost as ancient labeling technologies; however, it will supply side worth and is currently at a crucial worth purpose that would modify its large-scale adoption for managing shopper retail goods. Here, we tend to introduce the principles of RFID,

discuss its primary technologies and applications, and review the challenges organizations can face in deploying this technology.

VII. GLOBAL POSITION SYSTEM (GPS)

The Global Positioning System (GPS) is a house offensive radio navigation system. It's endemic by the U.S. government and promoted by the U.S. Air Force. It caters the geo-location and time in sequence to GPS receiver. GPS could be a satellite based mostly navigation system. It embodies set-up of twenty-four orbiting satellites.

The twenty-four satellites positioned in house in six discrepancies orbital ways in twenty-four hours, the satellites end 2 end circles around Earth. The satellites area unit move with consistent speed. In Feb 1978, the most GPS satellite was propelled.

The satellites use 3 frequencies to transmit knowledge. The civilian GPS uses L1 frequency. The L1 frequency is 1575.42MHz. The satellite weighs one metric ton and length is five meters with star panels extended. The satellite has fifty watts of transmit power. The GPS receiver acquires the distinctive signals and orbital parameters from every satellite. The GPS device interprets the signals and obtains the correct location of the satellite. The GPS recipient appraises the precise location of the user by applying trilateration calculations. The GPS recipient appraises the gap flanked by every satellite to receive the transmitted signals. By critical the aloofness of a tiny low variety of satellites, the recipient will conclude the user's positions. To investigate the latitude and line of longitude, the GPS recipient is duty-bound to be fast on the signal of a minimum of three satellites.

VIII. INFRARED SENSOR (IR)

Infrared technology addresses a good sort of wireless applications. The measures are sensing and remote controls. Within the spectrum, the infrared portion is split into 3 regions: close to infrared region, middle infrared region and much infrared region.

An infrared emission emitting diode (IR light-emitting diode) could be a special purpose LED emitting infrared rays starting from 700 nm to 1-millimeter wavelength. totally different IR LEDs might turn out infrared emission of differing

wavelengths, rather like totally different LEDs turn out lightweight of various colors.

The appearance of IR light-emitting diode is same as a typical light-emitting diode. Since the human eye cannot see the infrared radiations, it's impossible for an individual to spot if AN IR light-emitting diode is functioning.

An IR light-emitting diode could be a sort of diode or easy semiconductor. electrical phenomenon is allowed to flow in mere one direction in diodes. because the current flows, electrons fall from one the diode into holes on another part. so as to comprise these holes, the electrons should shed energy within the kind of photons, that turn out lightweight.

IX. WORKING

Microcontroller with components Interfacing is completed then start the working. We can use 16x2 LCD display and its helps as shows any data or information or working process. The first initialization of LCD, GPIO configure and GPS/GSM modem general instructions.

When the power on the board then LCD shows "initialization". After the GSM and GPS is active and send the present location of longitude and latitude continuously. That data is shows on LCD display continuously and that date send to the could server.

When the person came then IR sensor is active, RFID Reader active and "one person is coming" and "shows the id card" shows on LCD. That id card is checked by the RFID is valid "Person count" or invalid "invalid card" shows on the LCD display. And also, navigation by using GPS continuously. And if the any emergency situation purpose, we can use emergency button and indication by LED.

X. RESULT

Interfacing LCD display with Controller:

The shows interfacing LCD with Controller in fig. Data pins of D0 to D7 are connected to Controller pins of A0, A1, A4, A5, A6, A7, B0 and B1. And enable pin is connected to pin of B10 and RS pin is connected to pin of B11 of Controller. And LCD contrast pin is connected to variable resistor.

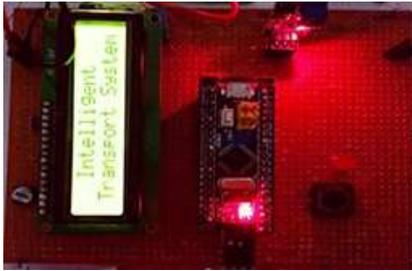


Fig interfacing LCD display with Controller

Interfacing GSM and GPS modem with Controller:

The SIM900A GSM electronic equipment is communicates with the controller victimization UART communication. The controller UART transmit pin A2 is connected to the SIM900A receive pin and also the controller UART receive pin A3 is connected to the SIM900A transmit pin. The basis is connected. The quality baud of the SIM900A is 9600 to 115200. The SIM900A takes 12V power provide.

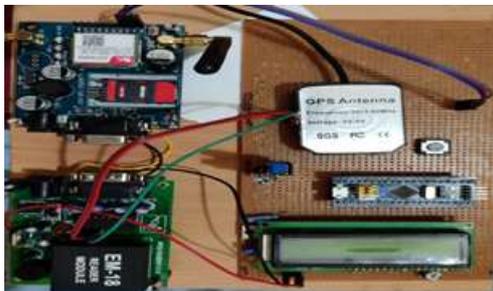


Fig Interfacing SIM900A with STM32F103

The blue colour wire is connected to the transmitter of the controller to the receiver of the SIM900A electronic equipment. The green colour wire is connected to the receiver of the controller to the transmitter of the SIM900A electronic equipment. The gray colour wire is connected to the grounds of each devices.

UART Communication Protocol:

The Universal Asynchronous Receiver/Transmitter protocol could be a serial communication interface. The correspondent and recipient each area unit communicate asynchronously. They each can concur on temporal arrangement framework known as information measure. The UART frame incorporates begin bit, five to eight information bits, discretionary bit and stop bit.

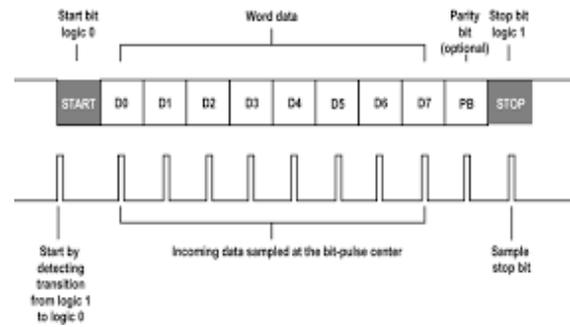


Fig UART Frame Format

Interfacing IR and RFID with controller:

The IR sensor pin out is connected to the controller pin of the B12. And supply power is 3.3v or 5v and Ground. The RFID reader of transmits pin is connected to the receiver of controller pin B7 and receiver pin is connected to the transmits of controller pin B6.

And Emergency alert indication purpose we can use switch button and LED. The switch is connected to the pin B14 and LED is connected to the pin B13 of controller.



Fig Interfacing RFID and IR sensor with controller

XI. CONCLUSION

This project as design of urban and rural intelligent transportation system and available options are identified. Its wireless or could functions be investigated. And also, additional emergency alert wireless communication and technologies are overviewed within the rural. Evaluation considers the urban and rural intelligent transportation system application requirement priority.

XII. REFERENCES

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