

## Complex RFID system on vehicle for ACC

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*Abstract* : - In this paper, we have designed RFID application for Transport Information System. This system has two merits for safety driving on vehicle that consist of two parts which identify and monitoring from forward and backward direction on vehicle. first, RFID interrogator carry out speedily identified driver behind the wheel. It is possible for an anti-theft device to confirm the identification of driver and the location tracking system. Identification is able to send alarm of anti-theft for the owner of vehicle. Second, It will be anticipate emergencies and avoid the need for sudden maneuvers. Motion detect sensor make use of microwave in 10.525 GHz that using Doppler effect. This sensor play the role of RADAR on vehicle for forward and backward monitoring. This constitution is make up for weak points that will be offered low cost system for ACC (Adaptive Cruise Control) using combine with USN and RFID.

*Key-word*:- RFID, USN, Motion detect sensor, Adaptive Cruise Control, Complex monitoring

### 1. Introduction

RFID system is one of the major technologies in this ubiquitous world. The technology of RFID system has advanced faster and faster. It means to augment products and everyday objects with information technology invisible to human users. Future, it is use to observe the proper distance between cars for automatic navigation system that make an offer break system in control part. Doppler RADAR system is very useful as sensor which can detect moving objects. This system selected motion detect sensor which has tolerance to environment variables like dust and humidity in road. This function is important characteristic that get traffic information. In addition, this system refer to communication for traffic information from OBE (On-Board Equipment) to RSE (Road Side Equipment). It is improve to repeat recognition at active type RFID tags. Motion detect sensor decision to recognition information in normal state.

This system make use of frequency range 5.8 GHz for DSRC(Dedicated Short Range Communication) system [1].

The used sensor based on principle of Doppler effect that used to radiate microwave signal from sensor to object. This signal is low power that is affected object in line of sight. It detect moving object that compared radiation wave with return wave. The difference between radiation wave and return wave is linear variance in the whole frequency. In case, frequency have increase a small frequency. This frequency reckon by distance for measure velocity of moving object. It attaches the Microwave motion detect sensor which uses a 10.525 GHz RF(Radio Frequency) [2].

RFID technology make up for weak point to add USN Technology. It will combine RFID interrogator and multiple sensor for wireless sensor networks. This system is designed to improve base of sensor networks for telematic that have more safety and accuracy than ever before.

This system is base on Bluetooth and USB controller for interface an external devices. It also show that prevent atmospherics in urban traffic environment. It uses a frequency hopping spread spectrum (FHSS) air interface in the

unlicensed 2.4GHz band. This Dongle connect to a remote network using multiple devices. Such a connection is called a "multi-link" connection [3].

This system consist of main display device for navigation, DMB display and multiple sensor for wireless sensor network. This system proposed multiple device interface that substitute USB for IEEE 1394 in ACC(Adaptive Cruise Control). This system purpose that have a universal and easy interconnection sensor networks for ACC on vehicle.

The Universal Serial Bus (USB) has all of these qualities. USB was designed from the ground up to be an interface for communicating with many types of peripherals without the limits and frustrations of older interfaces. USB is versatile enough to be usable with a variety of peripheral types. Instead of having a different connector type and supporting hardware for each peripheral, one interface serves many [4].

The applications described in this paper make use of motion detect sensor-enabled active complex RFID system also referred to as BT nodes.

## 2. System concept

In this paper, the proposed system based on RFID technology that play an important role in burglarproof system. As driver got on, they certify that process identification of driver for anti-theft.

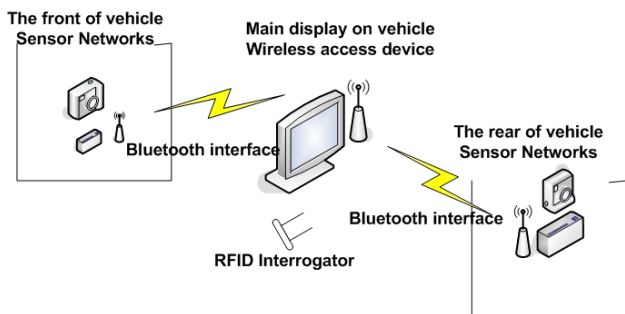


Fig. 1 Complex RFID for wireless networks  
Fig. 1 shows the structure of complex RFID and multiple sensor networks.

Communication in pervasive settings occurs between sensor networks and main display on

complex RFID, between main display and background infrastructure services. It is necessary that background infrastructure services is ITS (Intelligent Transport System) or UTIS(Urban Transport Informations System). Sensor networks consist of motion detect sensor, CMOS camera and Bluetooth interface.

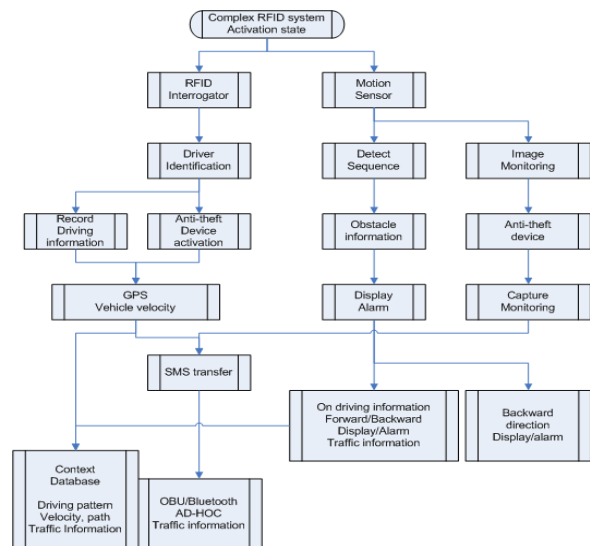


Fig. 2 Complex RFID system flow chart

This system expected to activate sequence of flow chart Fig. 2. This sequence transferred message of driving information on vehicle. It is necessary for anti-theft to send message and information of driving for the owner of vehicle. It is possible to prevent is used to CMOS camera that take a photograph of surrounding circumstances in driving a car. This recording process is important function that interlink to embark on vehicle black box technologies in future.

## 3. Specification

### 3.1. Sensor of motion detect

Doppler radar system is very useful as sensor which can detect moving objects. The principle of operation for this sensing system is very simple. If the target has velocity toward the direction of the radar, the reflected signal on the surface of moving target is shifted in frequency in proportion to the velocity of target toward the direction of the radar. This highly sensitive, real

time wireless sensor has used direct conversion method. the reflected signal from the object is mixed with the reference signal of transmitter to produce an output signal with its magnitude proportion to the phase difference between them.

When the incident wave is radiated on the target which has a velocity component, the frequency of the reflected wave will be shifted in frequency in proportion to the velocity of the target. The Doppler radar system has a simple structure, since a continuous wave signal is used[5]. The Doppler effect is the change in frequency and wavelength of a wave that is perceived by an observer moving relative to the source of the waves. For waves, such as sound waves, that propagation a wave medium, the velocity of the observer and of the source are reckoned relative to the medium in which the waves are transmitted. The total Doppler effect may therefore result from either motion of the source or motion of the observer. It attaches the Microwave motion detect sensor which uses a 10.525 GHz Radio Frequency band. Position of sensor is very important a decisive factor that is restricted detect area of coverage in sensor front side. Fig.3 show the front side of motion detect sensor.

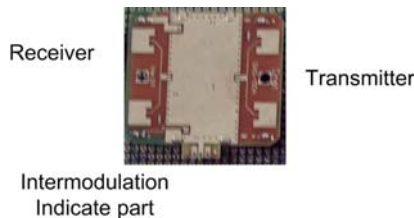


Fig. 3 Motion detect sensor

### 3.2. RFID Interrogator

This system selected inductive coupling type of RFID interrogator that consume low power and prevent EMI. RFID interrogator operates at 13.56 MHz and uses ISO-15693 tags transmission protocol. This RFID Tag is an electronic key that confirms driver identity and contains information used in driving information connections to owner on vehicle. This RFID tag checks the identification of driver to prevent theft. It belongs in the same common starter disablers. It's may be used to prevent the flow of electricity of fuel to the engine, thus making

it impossible for the thieves to get the car running. This system send message of driving and position information on vehicle to owner. This system expect to connection traffic information system between OBU(On Board unit) and RSE(Road side equipment).

### 3.3. Bluetooth Module

The Bluetooth USB Dongle is replaced to wireline interface between host computer and peripheral devices. This Dongle consist of USB-to-UART bridge controller and Bluetooth module. The bridge controller includes a USB 2.0 full-speed function controller, USB trans ceiver, oscillator, EEPROM, and asynchronous serial data bus (UART) with full modem control signals. This Dongle allows to be configured as either a USB bus-powered device or a USB self -powered.

This USB Dongle have consume transmission power mode is Class 2 (max +4 dBm) communication distance recognition receiving sen sitivity is -84dBm. This Dongle interconnection distance maximum range is 30 m in LOS (Line of Sight) between RFID interrogator and host computer. It uses a frequency hopping spread spectrum (FHSS) air interface in the unlicensed 2.4GHz band. This Dongle connect to a remote network using multiple devices. Such a connection is called a "multi-link" connection.

This connection is available from detection of objects in motion detect sensor. It allows activation of RFID interrogator and photograph of moving or stay objects.

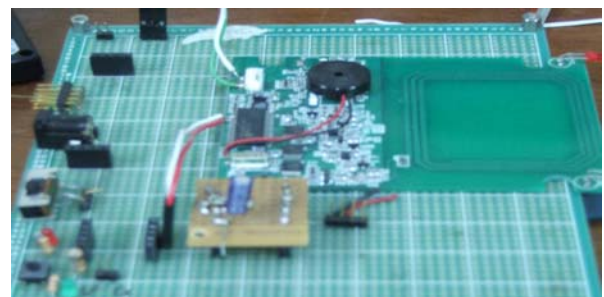


Fig. 4 RFID Interrogator and Bluetooth Interface

Fig.4 shows RFID interrogator and bluetooth interface.

### 3.4. Web camera

The web camera consist of single-chip back end processor to pair with a CMOS image sensor. It reads a 9 or 8 bits input raw image data (RGB Bayer pattern) from an image capturing device and outputs through a USB port into the PC. This chip includes a simply color processing engine, an image compression engine, a dark calibration, a hardware image windowing with random image size selection, panning and scaling functions.

The single-chip processor can directly transmit the compressed or un-compressed image data to the USB port without any extra memory support. Its multi-powerful functions and special designed architecture make this chip suitable for extra low cost USB PC camera application.

### 3.5. Capture image processing

This program is base on source code by microsoft that customized application program for complex RFID on vehicle. This program make corrections for embedded operating system. It is able to proffer information of driving for safety at unforeseeable circumstances that prevent accident for decision of automatic cruise control.

This program provide benefit that analysis the accident of traffic and prove liability for an accident. This program feature is almost equal to black-box on air plane for record driving system.

### 3.6. Main display device

This system adopt test board for main display device that is PXA-255 by intel. This test board embedded winCE 4.2 that compatibility will be preserved for client applications.

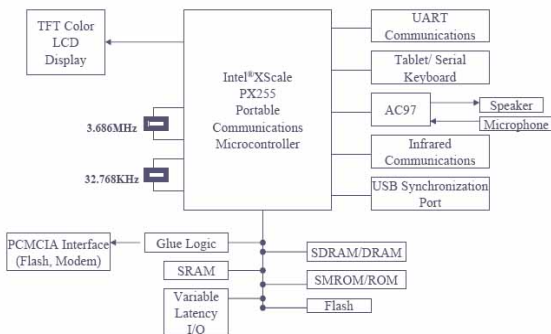


Fig. 5 test board system

Fig.5 shows test board. This test board take a porting USB controller for USB client mode support that is a highly-integrated USB-to-UART Bridge Controller providing a simple solution for updating RS-232 designs to USB using a minimum of components and PCB space.

### 4. Conclusion

This paper investigated interaction patterns in ACC where multiple sensor networks are attach to communication with peripheral devices for the driving system. In these environments hybrid approaches for the association of interaction partners become important. By using the concept of USN, multiple sensor networks that provide more safety and accuracy the driving system then ever before. Furthermore, interaction with them does not require explicit human actions to be initiated. This approach enables novel ACC system in which require drivers to explicitly scan codes, or wireless communication devices, which often need manual alignment to ensure line-of-sight for communication. It come out the real world for invisible convenience.

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