



# DESIGN AND IMPLEMENTATION OF AUTOMATIC BRAKING SCHEME USING WIRELESS COMMUNICATION

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## Abstract

**This manuscript offers an interpretation regarding the existing position of wireless and mobile expertise, recapitulates their existing states of expansion and defines the supplementary sources and escorts towards application of this bluetooth equipment for evading mishaps in our everyday transportation. SAFAR shall be amended if automobiles shall be prepared for forming clusters for interconnecting information between themselves. The Bluetooth protocol shall be employed for communicating amongst vehicles prepared with Bluetooth strategies. This work grants a methodology for increasing the protection during road travels by the ideas of wireless sensor network and the Bluetooth protocols. We deliberate how automobiles shall form mobile ad-hoc network and interchange information sensed by the on-board sensors. The combination of these information shall offer improved understanding regarding surrounding traffic environments. The probability of employing Bluetooth for information interchange between vehicles has been assessed. Coverage zone and possibility of detection schemes for isotropic and non-isotropic sensors are mitigated for studying their usage in avoiding probable hazardous circumstances during traffic.**

**Keywords: Automobiles, Bluetooth, Sensors and Wireless communication strategies.**

## 1. INTRODUCTION

Being human beings, we have the greatest ability to communicate in an effective manner. If we speak or write according to a pre-defined

set of linguistic rules when it comes to electronic communication, however, there is very little that can be assumed or taken for granted. Communication between electronic devices can only be achieved when they also abide by a set of predetermined rules and standards like Wireless technology, which is increasing in our day to day life, for the data broadcasting. It can be of many forms, where the wireless

communication is the “Cable-Replacement”. There are many wireless communications such as infrared, Bluetooth etc. that are existing around us and helping us in our daily life in many ways. out of which Bluetooth technology plays a vital role for the communication which is helpful to people all over the world is given with a broad description about its features, applications and about its development [1,2].

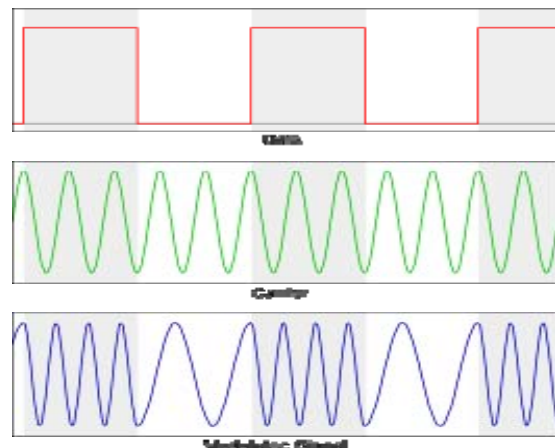


Figure 1: Concept of Modulation

## 2. WIRELESS TECHNOLOGIES

To understand relative positioning of each wireless standard it is important to first understand there are three primary usage scenarios for wireless connectivity.

- Wireless Personal Area Networking (WPAN)
- Wireless Local Area Networking (WLAN)
- Wireless Wide Area Networking (WWAN)

WLAN on the other is more focused on organizational connectivity not unlike wire based LAN connections. The intent of WLAN technologies is to provide members of workgroups access to corporate network resources be it shared data, shared applications or e-mail but do so in way that does not inhibit a user's mobility. The emphasis is on a permanence of the wireless connection within a defined region like an office building or campus [3].

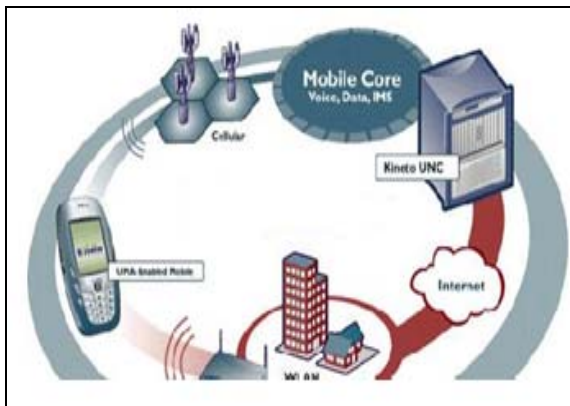


Figure 2: Using wireless communication concept

## 3. BLUETOOTH – AN INVASION

Blue tooth is a wireless technology (as Wireless PANs). Originally conceived as a low-power short range radio technology designed to replace cables for interconnecting devices such as printers, keyboards, and mice, its perceived potential has evolved into far more sophisticated usage models. The requirement to do this in a totally automated, seamless, and user-friendly fashion, without adding appreciable cost, weight, or power drain to the associated host is an enormous engineering challenge. Bluetooth is a cable-replacement

technology designed to wirelessly connect peripherals, such as mice and mobile phones, to your desktop or laptop computer and to each other [4,5]. An inexpensive, low-power, short-range radio-based technology, Bluetooth is not a wireless networking solution, such as AirPort. Rather, it is an alternative to the IrDA (Infrared Data Association) standard. Although the IrDA standard, too, supports wireless communication between peripherals and computers, it has two limiting requirements. First, IrDA devices must be very close, no more than about 1 meter apart. Second, the communicating devices must have a direct Line of sight to each other. Since Bluetooth devices are capable of monitoring and communicating with eight other devices simultaneously.

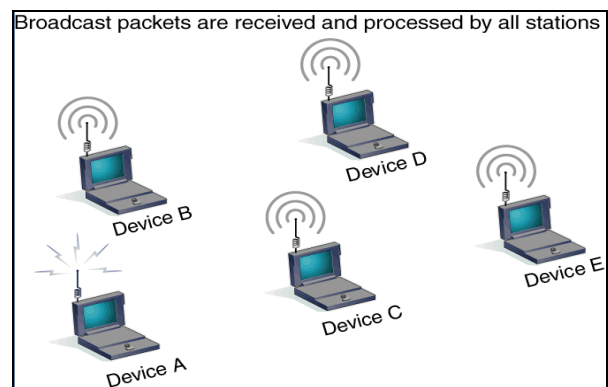


Figure 3: Connectivity via Bluetooth

Let's examine just why we would want to connect without wires, and what it might offer us in tangible terms; we can use the paradigm of our own Personal Area Network (PAN). We have a PC with its ubiquitous mouse and keyboard, a laptop, a Personal Digital Assistant (PDA), a mobile phone with a "hands free" kit and a printer.

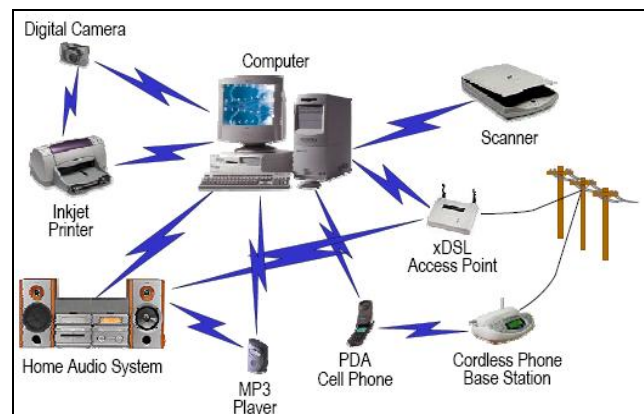


Figure 4: Numerous devices connected to the server

Bluetooth is both a hardware-based radio system and a software stack that specifies the linkages between layers. This supports flexibility in implementation across different devices and platforms. It also provides robust guidelines for maximum interoperability and compatibility. This technology is designed to be small and inexpensive. Bluetooth technology has no line of sight requirements making it a potential replacement for infrared ports. Bluetooth can operate through walls or from within your briefcase. Portable PCs can wirelessly connect to printers, transfer data to desktop PCs or PDAs, or interface with cellular phones for wireless WAN (Wide Area Networking) access to corporate networks or the Internet.

How do we currently communicate between these devices? The answer is: with a rather unwieldy network of cables, hubs, and Connectors, plugging, unplugging, and synchronizing often with the compulsory intervention of the overworked and often less-than-friendly because it relies on radio waves, however,

Bluetooth communication overcomes these strict requirements: Bluetooth devices can communicate at ranges of up to 10 meters. Bluetooth devices do not need to be in direct sight of each other.

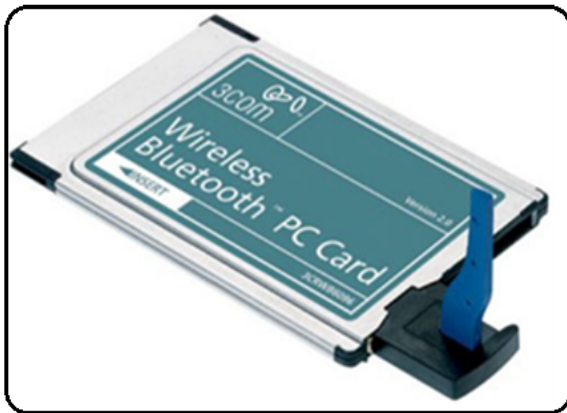


Figure 5: Articulation of Bluetooth transmitter

This makes Bluetooth communication much more flexible and robust. It's also important to note that because Bluetooth excels at low-bandwidth data transfer, it is not intended as a replacement for high-bandwidth cabled peripherals. For high-bandwidth devices, such as external hard drives or video cameras, cables

are still the best option. Other applications may need to access Bluetooth-specific attributes and messages.

#### 4. REAL-WORLD APPLICATION

We can apply this Bluetooth technology in various fields in which one of the applications is using in the cars to avoid the fatal accidents, Because of traveling at highsPEEDS there is a possibility of having accident. The below figure shows that when two cars or more come within the distance of 10 m at high speeds there is a possibility of having accidents.

#### 5. USAGE OF MINI COMPUTER

For this, we have place mini computer inside the car, where it alerts the driver about the other vehicles around the car. The Bluetooth radio is a short distance, low power radio operating in the unlicensed spectrum of 2.4 GHz and using a nominal antenna power of 20 dBm. At the 20 dB the range is 100 meters, meaning equipment must be Within 100 meters to each other (about 328 feet) to communicate using the Bluetooth standard. With the help of this technology we can send data to the eight devices. The group of eight devices is known as piconet. Here we have a piconet and a scatter net, in the piconet M is the master and S1 to S7 are the slaves.

Radio communication is subjected to noise and interference, as the 2.4 GHz frequencies is shared between the all devices in piconet. So the Bluetooth specification has solved this problem by employing what is called as spectrum spreading, in which the Bluetooth radio hops among different frequencies very quickly. There are 79 hops starting at 2.402GHz and stopping at 2.480 GHz, each of which is displaced by 1 MHz, the Bluetooth avoids interference by hoping around these 79 frequencies 1600 times per second.

So in order to avoid it we use Bluetooth equipped car, in which each car have Bluetooth transmitter and receiver. And the every car should have mini computer to monitor the relative position of the car with the other car. When any car comes close together Bluetooth device sends warning signal to the car. Based on the type of warning signal received the computer sends signal to the brake control system to slow down the speed of the car.

BLUETOOTH DISTANCE DEVICE NAME	
CAR1	6M
CAR 410m	
CAR 6 30m	
CAR 8 40m	
CAR 250m	
CAR 560m	
CAR 770m	
CAR 390m	

There are two types of control signals. First type of signal control the speed of the car and the second type of signal is to overtake the car which is moving forward.

**6. AUTOMATIC BRAKING SYSTEM**

The automatic brake system is the next generation braking system for controlling the speed of the car. On receiving the control signal from the travelling car the computer inside the car manipulates the signal and gives control signal to the braking system.



There are four main components in an automatic braking system: **Speed sensors, Pump, Valves and Controller.** The computer constantly monitors the distance between each of these cars and when it senses that the car is getting too close it moves the hydraulic valves to increase the pressure on the braking circuit, effectively increasing the braking force on the wheels. If the distance between two vehicles is within the 100m the Bluetooth devices get enabled and if the distance comes closer within 10m the automatic braking system takes the control. After the speed of the car is reduced

and distance increased the hydraulic valves decreases the pressure on the braking circuit, thus effectively decrease the braking force on the wheels. The following steps show the various functions of the hydraulic valves,

- In position one, the valve is **open**; pressure from the master cylinder is passed right through to the brake.
- In position two, the valve **blocks** the line, isolating that brake from the master cylinder. This prevents the pressure from rising further.
- In position three, the valve **releases** some of the pressure from the brake.

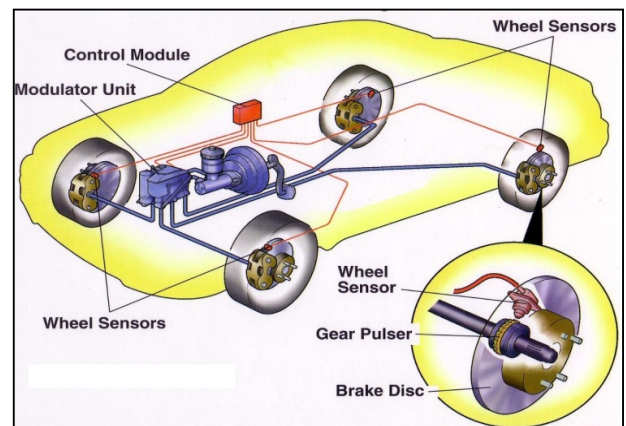
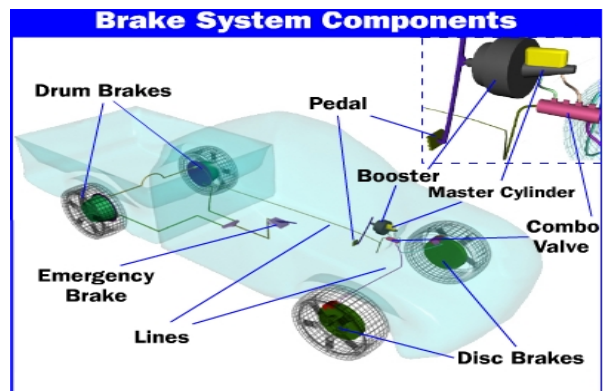


Figure 6: Operational diagram

When car A and car B come within the range of 100m both the Bluetooth devices get enabled and if any one of the car comes too fast then the Bluetooth device sends a warning signal to the other car and it processes the signal and gives it to the automatic braking system of the car. With the application of Automatic braking pump and valves



Figure 7: Automaticbraking pump and

bluetooth in the car's we can avoid accidents as the transmitter sends the warning signal to the another device to alert the driver about the other cars around it. And it controls the car if it enters the shortest distance between the two cars. then the car automatically slow downs the speed without the reference of the driver .the controller present in the braking system controls the speed.

#### 7. PROS OF PROPOSED MODEL

- The Bluetooth technology is cheap to implement.
- Bluetooth technology is accepted world wide, with it gaining so much popularity, you can rely on it for years to come with an advent of more and more devices started to use Bluetooth technology.
- Setting up Bluetooth connectivity is automatic Bluetooth and doesn't need professionals. When two or more devices enter a range of up to 30 feet of each other the communication automatically begins between them.
- Upgradeable Bluetooth, standard versions of Bluetooth offers various new advantages and backward compatibility with older versions.
- The advent of recent local and state legislations requiring the use of hands-free devices only while driving has increased the market of Bluetooth headsets among cellular phone users. Bluetooth headsets work well with various accessories like Bluetooth adapters, antenna, car kit, card drive and dongle.

#### 8. CONS OF THE PROPOSED MODEL

- The only real downsides are the data rate and security. Infrared can have data rates of up to 4 MBps, which provides very fast rates for data transfer, while Bluetooth only offers 1 MBps.
- Although there are very few disadvantages, Bluetooth still remains the best for short range wireless technology. Those who have tried it love it, and they know for a fact that Bluetooth will be around for years to come.

#### 9. CONCLUSION

The Bluetooth technology is being widely adopted by the Industry leaders. The possibility for new applications is very exciting with this versatile technology. The Bluetooth communication device will thus be a small, low powered radio in a chip that will talk to other Bluetooth enabled products. Bluetooth has been designed to solve a number of connectivity problems experienced by the mobile workers & consumers. Thus, this technology helps make the electronic devices more users friendly and helps address various other problems like accidents.

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