

A Review of Applications of Wireless Networks

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Abstract- Wireless communication is the fastest growing segment of the communications industry. It has captured the attention of the media and the imagination of the public. Wireless local area networks currently supplement or replace wired networks in many homes, businesses and campuses. Many new applications including Smart Homes and Appliances, Remote Telemedicine, Automated Highways and Factories are emerging from research ideas around the globe. In this paper, we have discussed some important applications of Wireless Networks.

Keywords- Wireless Communication, Smart Homes and Appliances, Remote Telemedicine, Palmtop Computers, Automated Highways and Factories.

I. INTRODUCTION

A long way in a remarkably short time has been achieved in the history of wireless networks and mobile communication technologies have revolutionized the way people Communicate. There are more than 5 billion wireless network users worldwide. Wireless communication is the fastest growing segment of the communications industry. Wireless networks currently supplement or replace wired networks in many homes, businesses and campuses. In fact they have replaced the wired networks in homes, business and campuses [2]. Many new applications including Smart Homes and Appliances, Remote Telemedicine, Palmtop Computers, Automated Highways and Factories are emerging from research ideas around the globe. In this paper, we have discussed some important applications of Wireless Networks.

II. APPLICATIONS OF WIRELESS NETWORKS

Some important applications of Wireless networks are:

- A. Smart Homes and Appliances
- B. Remote Telemedicine
- C. Automated Highways and Factories

A. Smart homes and appliances [1]

Some examples of smart home products and their functions are (see in fig. 1):

- Cameras will track your home's exterior even if it's pitch-black outside.
- Plug your tabletop lamp into a dimmer instead of the wall socket, and you can brighten and dim at the push of a button.

- Video door phone provides more than a doorbell - you get a picture of who's at the door.
- Motion sensors will send an alert when there's motion around your house, and they can even tell the difference between pets and burglars.
- Door handles can open with scanned fingerprints or a four-digit code
- Audio systems distribute the music from your stereo to any room with connected speakers.
- Channel modulators take any video signal - from a security camera to your favorite TV station and make it viewable on every television in the house.
- Remote controls, keypads and tabletop controllers are the means of activating the Smart home applications.

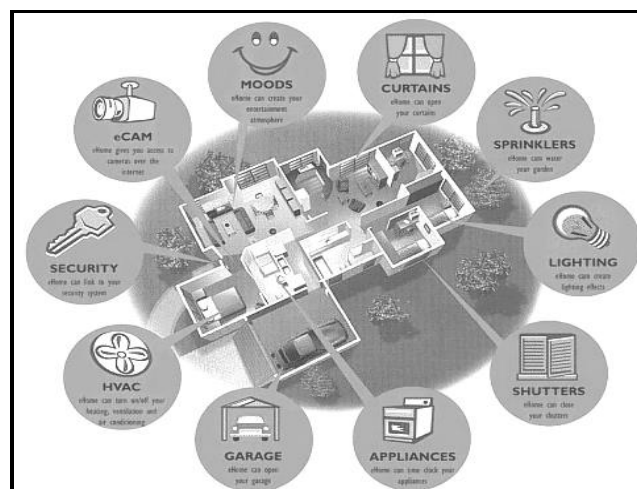


Fig.1: Smart Home

1. Smart Home Appliances for Physically Challenged Individuals

If an individual has difficulty moving around effectively, they are often forced to depend on others for care. With the implementation of smart home appliances, such as an effective security system, those with physical challenges are often able to live on their own. A smart home security system allows the homeowner to remotely view visitors on a camera, and speak to them via microphone and speakers. If the visitor is welcome, the security system unlocks and opens the door to allow the visitor access to the home. Smart home security systems can also learn which visitors are always allowed, and what areas they may have access to.

2. Features of smart appliances

- **Information of Electricity Price:** Dynamic electricity pricing information is delivered to the user, providing the ability to adjust demand of electrical energy use.
- **Save Energy:** Household energy use can be reduced by 60–70% if energy smart design and energy saving appliances are used. It can respond to utility signals, contributing to efforts to improve the peak management capability of the Smart Grid and save energy by:
 - Providing reminders to the consumer to move usage to a time of the day when electricity prices are lower, or
 - Automatically reduce usage based on the consumer's previously established guidelines or manual overrides.
- **Response to Emergency Situation:** Integrity of its operation is maintained while automatically adjusting its operation to respond to emergency power situations and prevent any collapse.
- **Override Previous Instructions:** The consumer can make all previously programmed selections or instructions ineffective from the Smart Grid, while insuring the appliance's safety functions remain active.
- **Deploy According to Requirement:** When connected through a Home Area Network and/or controlled via a Home Energy Management system, Smart Appliances allow for a —total home energy usage approach. This enables the consumer to develop their own Energy Usage Profile and use the data according to how it best benefits them.
- **Shift of Power to Renewable Energy Source:** It can leverage features to use renewable energy by shifting power usage to an optimal time for renewable energy generation, i.e., when the wind is blowing or sun is shining.

B. Remote Telemedicine [3]

The use of technology to deliver health care from a distance is known as telemedicine. Example of Telemedicine is shown in fig. 2 and Typical Remote Telemedicine System is shown in fig. 3.



Fig.2: Telemedicine



Fig.3: Typical Remote Telemedicine System

Features:

- **Videoconference between Patient and Physician:** Today, a physician can realistically conduct a videoconference with a patient from both of their mobile devices. While that is considered amazing, it is not much different than the telemedicine consultations conducted between two different medical clinics or a physician's office and a patient's home.
- **Size of a Matchbox:** A modern smartphone (or mobile platform) can take on many functional forms. They can be as small as an old fashioned matchbox or a 10-inch tablet.
- **Overcome Certain Barriers to Care:** It has been demonstrated as an effective way of overcoming certain barriers to care, particularly for communities located in rural and remote areas. In addition, telemedicine can ease the gaps in providing crucial care for those who are underserved, principally because of a shortage of sub-specialty providers.

- **Wireless Connection between Monitor on Patient's Body and the Physician:** This mobile platform can probably be connected wirelessly to physiologic monitors worn on a patient's body or embedded into a patient's garment. Physiologic monitors may be organized into a home health/ medical station with minimal space requirements. Some of the small monitors such as blood glucose, blood pressure, temperature, kinematic, EKG, imaging and electromagnetic field monitors are currently available and can be interfaced with portable micro sample blood chemistry test sets, which are also available today. It is not difficult to imagine a patient being given a specific set of monitors tailored to his or her specific health care needs, and the data from these monitors and systems can be routed to the physician for either evaluation or to a monitoring program designed to give the doctor an alert or warning based on observed findings.
- **Helps to Tackle Problem before Approaching Care Center:** The use of this wearable/portable embedded physiological and cognitive monitoring system will enable a medical team to closely monitor patients without bringing them into a hospital or a specialty care center. This real/near-time monitoring could enable a healthcare team to address patient problems before they require major intervention in a specialty care center.
- **Manage Chronic Diseases and Reduce Mortality Rate:** This monitoring can be ideal for managing chronic conditions such as diabetes, hypertension, and cardiovascular disease and has been shown to reduce hospitalization and, in some cases, reduce mortality rates. The collection and integration of patient data could also be used by medical teams to tailor patient educational sessions that address actual observed patient conditions. Moreover, these patient education or consultation sessions can now be delivered directly to patients via their smartphones.
- **Virtual Medical Phone:** This readily available information network will also change society's expectations of our medical system. It will become a standard of care to offer and deliver proactive patient educational/ informative sessions. These sessions could be face to face and in person, but economics will probably favor distributed text or video messages tailored to the specific needs of the individual patient. The often mentioned medical home will, in most likelihood, be a virtual medical home distributed over a secure wireless network accessible by the patient and his/her healthcare team regardless of who is part of the team today or where the patient is located.
- **Assures Health Care to Entire Population:** The standardized platform and operating systems of mobile platforms coupled with the ability to collect and manage large distributed data sets opens the way to not only

targeted health care to individual patients but to targeting health care to entire populations. Through the application of data mining and data fusion techniques along with anonymous geographical information, we may be able to monitor a disease as it emerges and migrates across our nation.

- **Knowledge of Food Systems and others of Particular Region:** Distributed systems that monitor body temperature could be used to track probable influenza outbreaks, and examining consultations for nausea and diarrhea could help identify a contaminated food distribution chain. Given the ability to collect and use unprecedented amounts of patient and population information in near real-time presents opportunities unimagined 10 years ago.

In addition to offering the healthcare community a better way to serve our patient population, this ability to capture and use data poses real and imagined risk. The medical and the telecommunications industries will have to develop plans and policies to protect individual patients from privacy violations, particularly with issues surrounding access to medical information, confidentiality and security. Methods of ensuring privacy such as controlled access, encryption and authentication can and must be employed to assist in securing and protecting privacy of medical data. Increasing access and, at the same time, decreasing the cost of healthcare delivery. Advances in sensor networks are making remote monitoring an actuality, contributing to a level of quality of care that is unprecedented.

C. Automated Highways

Benefits offered by automated highways are:

1. Tomorrow's Highways will Improve Travel Reliability: Nonrecurring congestion will be reduced through new technologies. Smoother traffic flow will prevent many crashes that cause nonrecurring congestion. In addition, vehicle mechanical failures will be reduced dramatically by onboard diagnostic and correction features. Proactive identification of possible mechanical problems by the vehicles themselves, and automatic communication with repair services, will reduce the possibility of "random" mechanical failures that can strand motorists and cause safety and traffic flow problems for other drivers.

2. Pre Detection of Mechanical Problems: Any mechanical failures that do occur will be identified immediately by on-board vehicle systems and communicated to emergency responders and traffic management authorities so that help can be provided quickly. Information on the problem, and potential route guidance suggestions, then can be provided automatically to other drivers through their own on-board

vehicle systems, so that most of the safety and delay consequences of the incident can be avoided.

3. Driver can Perform other Productive Tasks: On tomorrow's super highways, the driver's tasks will be easier than they are today. Some vehicles will be driven automatically, so the vehicle's owner will not have to steer and can do other productive tasks. Automation of some commercial driving functions will reduce costs, enhance service, and expedite the handling of goods at origin, transfer, and destination.

4. Elimination of Crashes: New technologies will eliminate many crashes, dramatically reduce injuries and fatalities, and make highway travel much safer than it is today. Today's cars and highways strive to minimize the effects of a crash when it occurs. Tomorrow's cars and highways will prevent the crash altogether.

- Communications between the vehicle and the infrastructure will reduce intersection collisions by warning drivers of likely traffic signal violations and then helping them maneuver safely through the intersection. If a crash is imminent, the vehicle will apply the brakes automatically to stop safely before a crash occurs.
- Advanced run-off-the-road and curve warning systems will help prevent the driver from leaving the roadway — a major cause of crashes and fatalities today, particularly in rural areas.
- Rear-end crashes will be significantly reduced because vehicles will communicate with each other and will recognize, before a driver could, that the leading vehicle is stopped or stopping too fast for a following vehicle to avoid. The onboard system will warn the driver to take evasive action and will brake automatically, if necessary, to avoid the crash.
- Similarly, through communication and sensors, vehicles will know where they are, where they are heading, and possibly whether people or animals are in the roadway. This technology will enable the vehicles to maneuver to avoid potential conflicts so that such collisions will be avoided.
- Should a crash occur, onboard vehicle systems will alert emergency responders immediately, providing the crash location and other advance information those will improve a responder's ability to provide assistance.

These systems will reduce significantly, and possibly almost even eliminate, the major types of vehicle crashes.

5. Change in Driver's Role:

- Future mobility and safety benefits will be achieved not only through technology and operational improvements,

but also through fundamental changes in how drivers access and use the highway systems of the future.

- Improved technologies will allow many more vehicles to use a freeway or arterial street than today. But there always are limits, so demand still must be managed in the future, too. Because vehicles and traffic management systems will be in constant communication, the highway systems will know how many vehicles can be accommodated effectively at any time and will allow only that many vehicles to use the highway.
- In the car, the driver could submit a route request through the car's navigation system, or possibly the car itself might recognize a personal travel pattern automatically and order an optimal route for the driver. Comparable systems could be available for commercial motor vehicles. Travel requests also can arise as the traffic management system recognizes opportunities to route, or reroute, trips based on expected demands or incidents.

Tolls may be charged for facilities where demand exceeds supply and can be varied to allow more effective utilization of the highway system. Drivers will always be kept "in the loop" by direct communication of travel information, including any expected toll charges, and they can alter their travel plans accordingly. Pervasive communication will enable drivers to receive needed information in advance of their trip, or during their trip as needed, rather than being surprised right before they enter the toll facility.

III. CONCLUSION

Mobile Networks have revolutionized the way people live. In fact, they have currently supplemented or replaced wired networks in many homes, businesses and campuses. Many new applications including Smart Homes and Appliances, Remote Telemedicine, Automated Highways and Factories are emerging from research ideas around the globe. In this paper, we have discussed some important applications of Wireless Networks viz. Smart Homes and Appliances, Remote Telemedicine, Automated Highways and Factories.

IV. REFERENCES

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