DISASTER MANAGEMENT AND RESCUE SYSTEM USING AD-HOC NETWORKS

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ABSTRACT

Wireless Ad Hoc Networks (MANETs) can to provide first responders and disaster management agencies with a reliable communication network in the event of a large-scale natural disaster that devastates majority of the existing communication infrastructure. Without requiring a fixed infrastructure, MANETs can be quickly deployed after a large-scale natural disaster or a terrorist attack. On the other hand, MANETs have dynamic topologies which could be disconnected because of the mobility of nodes. The majority of the proposed frameworks don't provide adequate security services for reliable and secure information exchange.

Keyword: - *Emergency response communication, Mobile ad hoc networks, Wireless sensor networks, VANET/MANET, Security, Reliability.*

1. INTRODUCTION

With the Popularity of laptops, cell phones, PDAs, GPS devices, RFID and intelligent electronics in the post-PC era, computing devices have become cheaper, more mobile, more distributed and more pervasive in daily life.

It is now possible to construct, from commercial of the-shelf (COTS) components, a wallet size embedded system with equivalent capability of a 90's PC. Such embedded systems can be supported with scaled down Windows or Linux operating systems. From this perspective, the emergence of wireless sensor networks (WSNs) is essentially the latest trend of Moore's Low toward the miniaturization and ubiquity of computing devices.

Typically, a wireless sensor node (or simply sensor node) consist of sensing, computing, communication, actuation, and power components. A sensor node powered by 2 AA batteries can last for up to three years with a 1% low duty cycle working mode. A WSN usually consist of tens to thousands of such nodes that communicate through wireless channels for information sharing and cooperative processing.

2. PROPOSED SYSTEM

Disaster management and response operation system as shown in fig 1 is a vital communication agency. Wireless communication has achieved many milestones but application during disaster is panic. However, communication systems including cellular networks were crashed due to disorganized disaster. It is essential to have a reliable communication platform to save life from disaster. The suggested system which reliably works during catastrophe to save human life and to make relief measures possible at the right time. The system does not use any commercial channels like GSM and GPS.

The dedicated system uses sensors, which will not affect by any interference and intrusions. A disaster control room is to be developed, where the complete geographical area will be marked with alert system. The relief measures are done by communication through VANET/MANET from the relief measures to all resettlement.

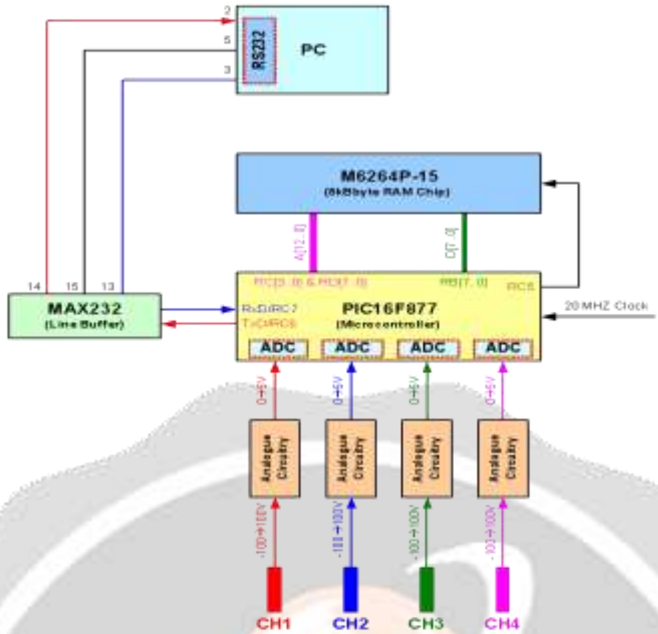

Fig -1: Block diagram

- In present scenario, after the disaster occurs, then information passed to all places through base station only.
- Creating awareness for improving preparedness among the communities using media the network of the building centre.
- When disaster occurs the VANET nodes create a temporary Ad-hoc network.
- In these networks is used to select the nearest VANET
- Every VANET in Ad-hoc networks act as a transmitter & receiver.
- The information is passed from source to destination through intermediate VANETs without using base station.

3. VIBRATION SENSOR

Vibration measurement is complex because of its many components – displacement, velocity, acceleration, and frequencies. Also, each of these components can be measured in different ways – peak-to-peak, peak, average, RMS; each of which can be measured in the time domain (real-time, instantaneous measurements with an oscilloscope or data acquisition system) or frequency domain (vibration magnitude at different frequencies across a frequency spectrum), or just a single number for "total vibration."

Vibration measurement is sometimes used as an indirect measurement of some other value. The final measurement goal determines the approach to the measuring vibration. Often, condition monitoring– predicting or monitoring wear, fatigue, and failure – requires vibration measurements meant to determine the kinetic energy and forces acting upon an object. This is often called inertial vibration. Monitoring machinery motors (especially the bearings) in critical applications is an example. In these cases, the measurement of acceleration provides an easy conversion to units of force assuming the mass of the object is known.

Other applications are concerned with the displacement of the object of interest because unintended displacements degrade performance of a system. Hard-disk drives and machine tools are examples of this type of vibration measurement, sometimes referred to as positional vibration or relative vibration as shown in fig 2.
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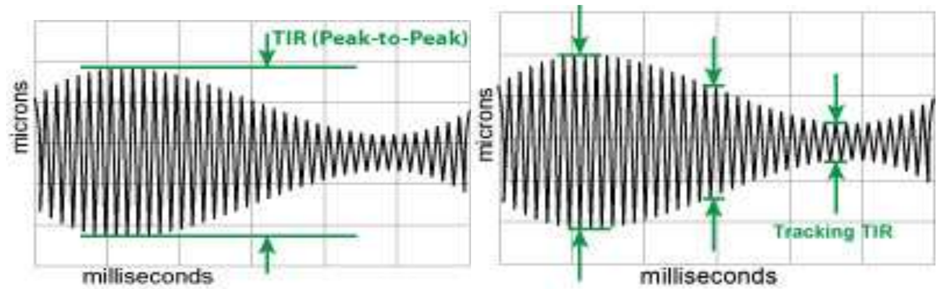

Fig -2: Output of vibration sensor

4. INSTANTANEOUS AND TOTAL VIBRATION

Total Vibration can be measured with TIR (peak-to-peak) captures of the vibration signal. Changing “total vibration” can be measured with Tracking TIR option of the Module. Displacement produces outputs that can be observed in real-time on an oscilloscope or with a data-acquisition system. This real-time, instantaneous data provides precise vibration data which can be used to determine a machine’s performance as a function of time or angular location of a rotating part.

In other applications, a simple “total vibration” number is required. To obtain such a number, the sensor output will need to be processed. If you are using Elite series capacitive displacement sensors, the MM190 Signal Processing and Meter module can derive a total vibration measurement. The peak capture functions include a TIR (Total Indicator Reading) option which displays the difference between the most negative and most positive measurements. A Reset button clears those captured values so new values can be captured. This single peak-to-peak (peak-to-valley) measurement is an indication of total vibration.

5. MEASURING VIBRATION WITH ACCELEROMETERS

Accelerometers are small devices that are installed directly on the surface of (or within) the vibrating object. They contain a small mass which is suspended by flexible parts that operate like springs. When the accelerometer is moved, the small mass will deflect proportionally to the rate of acceleration. A variety of sensing techniques can be used to measure the amount of deflection of the mass. Because the mass and spring forces are known, the amount of deflection is readily converted to an acceleration value. Accelerometers can provide acceleration information in one or more axes.

6. VEHICULAR AD-HOC NETWORKS

We characterize the unicast performance available to applications in infrastructure less vehicular ad hoc networks (VANETs) in terms of connection duration, packet delivery ratio, end-to-end delay, and jitter in both highway and urban VANET environments. The results show the existence of several stringent QOS constraints for unicast applications in infrastructure less VANETs.

Vehicular Ad hoc NETWORKS (VANETs) have been envisioned for safety, traffic management, and commercial applications: vehicles can inform other vehicles of hazardous road conditions, traffic congestion, or sudden stops; furthermore, commercial services (e.g., data exchange, infotainment, rear-seat multiplayer games) can create an incentive for faster adoption of VANET technology.

With respect to the applications a comprehensive classification of VANET applications based on their underlying network requirements. The study showed that unicast communication (both single-hop and multi-hop) will be one of the key communication paradigms required for a number of VANET applications. Apart from the unicast-based applications, there are numerous others envisioned to be suitable for VANET environments (e.g., real time audio/video communication, instant message exchange, coordinated movement of two or more vehicles, etc.). To determine the feasibility of such applications, in this paper we determine the level of Quality of Service (QOS) that will be available in VANETs. In order to determine achievable QOS performance in VANETs for a defined set of parameters, we implement a simulation model with the following characteristics: a) realistic implementation of PHY and MAC layers of the Dedicated Short Range Communications (DSRC) technology.

7. VANET ENVIRONMENT CONSIDERED

Seeking to understand the achievable QOS in infrastructure less VANETs, we build a realistic simulation environment which assumes the optimal values of the unspecified VANET characteristics. The specified VANET characteristics include all of those that currently cannot be influenced by VANET protocol design: vehicle density, vehicle mobility, road topology, signal propagation, and DSRC as the emerging standard (we note that vehicle density and mobility could be affected by future VANET deployment). On the other hand, the routing protocols, the transport protocols, and the interference as a function of the employed routing and transport protocols, are unspecified characteristics (i.e., those that can and will be optimized by VANET research community). To ensure optimal functioning of the routing layer, we opted for the following solution. For every message between the observed sender and receiver, all of the available paths (i.e., routes over intermediate nodes) are analyzed, and the optimal path is selected based on the minimum-delay criteria. The network layer forwards a message over each available path (if any) between the sender and receiver to determine the best path for the specific message. The process is then repeated for every message. Consequently, if the PHY and MAC layers of DSRC are able to relay the message between the sender and receiver, the network layer will deliver each message over the optimal path without additional loss or overhead. Furthermore, we employ only one sender/receiver pair per simulation run, in order to avoid the interference generated by other data sources. Coupled together, the optimal path selection and the environment with minimal interference ensure that every message is delivered with minimum delay and without any loss initially placed next to each other and proceeded to move in the same direction. In the opposite direction scenarios, the sender/receiver vehicles were placed approximately 10 km apart and they moved towards each other.

The remaining vehicles were distributed randomly. In urban scenarios, the sender/receiver vehicles were initially placed next to each other and moved in a random direction. The remaining vehicles were distributed randomly. The effective range in urban scenarios was up to a maximum of 400 meters, with the vast majority of messages (90+ %) received within the 150 meter radius. Message size and frequency were selected to model a real time unicast communication. The desired speed of vehicles for both environments was based on the normal distribution, often used in traffic engineering literature. Vehicle densities in highway scenarios were based on US DOT metrics of “low”, “medium”, and “high” traffic levels. Each simulation run was 900 seconds, with 200 seconds of warm-up time before any packets are sent, in order to achieve the steady state of the implemented.

8. CONCLUSION

When stricken by a catastrophic natural disaster, many communication systems crashed, including cellular networks. The loss of communication system may have a catastrophic consequence. From Chi-Chi Earthquake and 88 Flood, we learn that power outage and backhaul link breakage were the two common problems that crushed base stations. It is difficult to enhance the availability of power lines and backhauls since they are highly dependent on the robustness of roads and bridges.

9. FUTURE ENHANCEMENT

The future of ad- hoc networks is really appealing, giving the vision of anytime, anywhere and cheap communications.

Before those imagined scenarios come true, huge amount of work is to be done in both research and implementation. At present, the general trend in MANET is toward mesh architecture and large scale. Improvement in bandwidth and capacity is required, which implies the need for a higher frequency and better spatial spectral reuse. Propagation, spectral reuse, and energy issues support a shift away from a single long wireless link (as in cellular) to a mesh of short links (as in ad- hoc networks). Large scale ad hoc networks are another challenging issue in the near future which can be already foreseen. As the involvement goes on, especially the need of dense deployment such as battlefield and sensor networks, the nodes in ad-hoc networks will be smaller, cheaper, more capable, and come in all forms. In all, although the widespread deployment of ad- hoc networks is still year away, the research in this field will continue being very active and imaginative.

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