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Sharing Of Tactical Information Between Ugv's Using Vanet In Military Battle Field

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ABSTRACT

Unmanned ground vehicle are playing vital role in military services. The aim of this paper is to provide tactical information for management system of unmanned ground vehicle (UGV), using VANET (Vehicular ADHOC Network). VANET is a perfect option for point to point communication between the vehicles in battle field to share information with each other. In the proposed system, an system information control unit will be attached with UGV. The point to point communication between the mobile vehicles in the war field use WI-FI module for sharing information. The tactical information by UGV sends to a personal computer that will be operated by soldiers and they pass the commands to the UGV. When failure occurs for an UGV due to enemy attack, that tactical information will be shared with neighboring UGV among the VANET. The damaged UGV will be replaced immediately with the help of tactical information.

KEYWORDS--Sensors, UGV (unmanned ground vehicle), VANET (Vehicular ADHOC network), wireless fidelity

I. INTRODUCTION

Within a decade technological advances could leave human operators out of the kill chain. To fully realize similar capabilities to today's manned systems, semi-autonomous UGVs must be developed that demonstrate increasingly tactical human like behaviours in route planning and execution, obstacle avoidance, and mission performance. Additionally, new technologies must be investigated to improve mobility of UGV platforms in unstructured environments including complex terrain and urban settings using novel locomotion means and intelligent control systems. Department of Defence (DOD) Unmanned Ground Vehicles (UGV) save lives and improve national defence capabilities by providing agencies of the Department of Defence (DOD) with the control system architectures, advanced sensor systems, research services, and standards to achieve autonomous mobility for unmanned ground vehicles.

The DOD initiated plans for the deployment of robotic vehicle platforms in the battlefield and plans to standardize the architecture and interfaces. This will encourage the use of commercially available "plug-and-play" components and provide reusability and interoperability on a variety of ground vehicles.

An unmanned ground vehicle (UGV) is a vehicle that operates while in contact with the ground and without an onboard human presence. UGVs can be used for many applications where itmay be inconvenient, dangerous, or impossible to have a human operator present. Generally, the vehicle will have a set of sensors to observe the environment, and will either autonomously make decisions about its behaviour or pass the information to a human operator at a different location who will control the vehicle through teleoperation.

The UGV is the land-based counterpart to unmanned aerial vehicles and remotely operated underwater vehicles. Unmanned robotics is being actively developed for both civilian and military use to perform a variety of dull, dirty, and dangerous activities. There are a wide variety of remote-operated UGVs in use today. Predominantly these vehicles are used to replace humans in hazardous situations. Examples are explosives and bomb disabling vehicles. Furthermore, UGVs are now being used in rescue and recovery missions. An autonomous UGV is essentially an autonomous robot that operates without the need for a human controller. The vehicle uses its sensors to develop some limited understanding of the environment, which is then used by control algorithms to determine the next action to take in the context of a human provided mission goal.

A fully autonomous robot may have the ability to: Collect information about the environment, such as building maps of building interiors. Detect objects of interest such as people and vehicles. Travel between waypoints without human navigation assistance. Work for extended durations without human intervention. Avoid situations that are harmful to people, property or itself, unless those are part of its design specifications. Disarm, or remove explosives.

II.LITERATURE REVIEW

An existing work in previous paper is to provide tactical information between the unmanned ground vehicles that we called as TACTICAL INFORMATION MANAGEMENT SYSTEM FOR UNMANNED

VEHICLES USING VANET. In this, when the radar is detecting an UGV by sending and receiving the reflection pulse from the UGV, the tactical information can be shared between the vehicles. The GPS and the sensor information will be computing platform with the RADAR information. This paper presents the tactical information management system for UGV vehicles to provide more security and information sharing. The event data recorder will record each and every event visually.

Another existing system is compared to previous paper is automatic vehicle location in cellular communication. In this paper, the information control unit will be attached with UGV. A control system consists of radar, data recorder, GPS, sensors, communication system. When failure occurs for any UGV due to enemy attack, the tactical information is shared with neighbor UGV among the VANET. It consists of ground robots capable of carrying wireless communication equipment. Elements of the dynamic networking architecture have developed to support information operation for autonomous UAV teams. The mobile internetworking technology is actually deployed. This paper presents about the secret information among UGV's. Due to unfortunate breakdown of radar signal, ADHOC network will be helpful in creating cluster head among the remaining vehicles.

III. PROPOSED SYSTEM

A vehicular ADHOC network (or) VANET turns a participating vehicle into a wireless router or node, allowing vehicles to connect to create network. As vehicles fall out of the signal range and drop out of the network, other vehicles can join to connect vehicles one another so that a mobile internet is connected. A VANET is a technology that uses moving vehicles as nodes in a network to create a mobile network. VANET turns every participating vehicles into a wireless router or node , allowing vehicles approximately 100 to 300 meters of each other to connect and in turn create a network with a wide range. VANET is a subgroup of MANET where nodes refer to vehicles. Since the movement of vehicle is restricted by roads, traffic regulations we can deploy fixed infrastructure at critical locations. Inter vehicular communication services such as intersection collision warning, local danger warning and the de-central dissemination of real time traffic flow information. The mobile terminals not only provide a function for information relay i.e., provides the function of router. ADHOC network provides anytime, anywhere access environment which describes army's vision of the future force. Address army needs and challenges in high performance embedded computing (HPEC) to enable transformation to future force.

IV.SYSTEM OVERVIEW

This paper chooses an embedded field, and that field has been executed in real time application for this concept. An Arduino processor plays an important role in open source hardware and open source software. The main advantage of the Arduino board is direct dumping of programs in the language of C and C++. The Arduino board processor is at mega 2560 microcontroller has the capability of operating frequency of 16 MHZ. An operating voltage is 4 to 5.5V. The flash memory is of 256 KB. The SRAM and EEPROM is similar to mega 328 microcontroller i.e., 8KB and 4KB respectively.

In this paper, the two modules has been created, one of the module is mobile vehicle with IR sensor, ultrasonic sensor, proximity sensor and WI-FI module. All these tools have been embedded or interfaced on the 2560 microcontroller and this has been connected with personal computer with WI-FI module and the second module is mobile vehicle with battery, solar system, limit sensor, smoking sensor, IR sensor and WIFI module that also embedded 2560 microcontroller. This will act as a client mobile vehicle. The first module acts as a server mobile vehicle. These two will interconnect each other, one to one communication used to give battle field information about the opposite soldiers. Variousinformation will be transferred by mobile vehicle to the soldiers in the war field. The main module of the server is to collect all the information i.e., bomb blast, shooting, hiding attack of the opposite soldiers from the client mobile vehicles.

V. BLOCKDIAGRAM

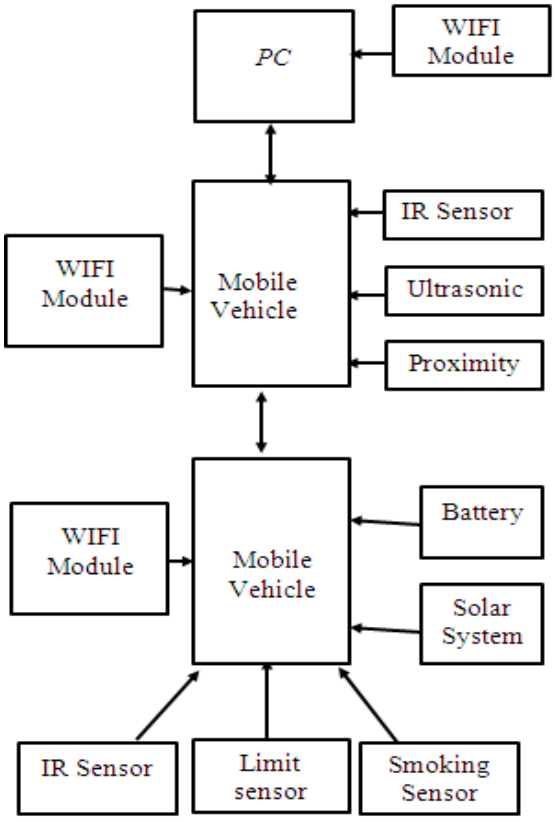

Figure1: Block diagram of VANET

Wi-Fi or Wi-Fi is a technology that allows electronic devices to connect to a wireless LAN (WLAN) network, mainly using the 2.4 gigahertz (12 cm) UHF and 5 gigahertz (6 cm) SHF ISM radio bands. Wi-Fi works with no physical wired connection between sender and receiver by using radio frequency (RF) technology -- a frequency within the electromagnetic spectrum associated with Radio wave propagation. Wi-Fi is supported by many applications and devices including video game consoles, home networks, PDAs, mobile phones, major operating systems, and other types of consumer electronics.

Figure2:Wi-Fi Device

Wi-Fi networks have a range that's limited by the transmission power, antenna type, the location they're used in, and the environment. A wireless router in an indoor point-to-multipoint arrangement using 802.11b and a stock antenna might have a range of 32 meters (105 ft.).

Sensors

Active ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object.

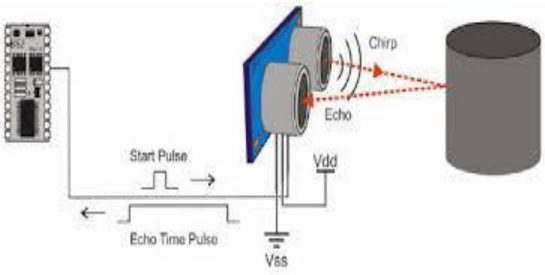

Figure3:Ultrasonic sensor detection

Ultrasonic transducers are transducers that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. Active ultrasonic sensors generate high-frequency sound waves and evaluate the echowhich is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object.

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field.

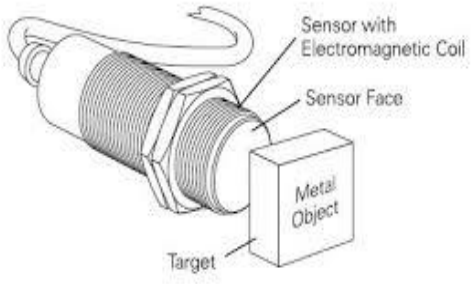

Figure4:Proximity Sensor

The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target. Proximity sensors can have a high reliability and long functional life. Proximity sensors are commonly used on smartphones to detect (and skip) accidental touchscreen taps when held to the ear during a call.

The infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it. That is called as a passive IR sensor.

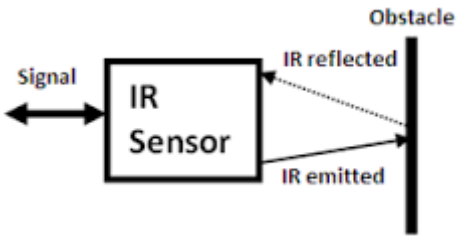

Figure 5: IR Sensor

Applications of infrared radiation: Measurement without direct contact with the object, Fast response, Easy pattern measurements.

A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part

of a fire alarm system, while household detectors, known as smoke alarms, generally issue a local audible or visual alarm from the detector itself.

Figure6

Limit Sensor:

Limit Switch are basic switches that have been encased to protect them from external forces, water, oil, and dirt. Many models are available, such as those resistant to head, cold, or corrosion, as well as high-precision models. A Limit Switch is enclosed in a case to protect a built-in basic switch from external force, water, oil, gas, and dust. Limit Switches are made tobe particularly suited for applications that require mechanical strength or environmental resistance.

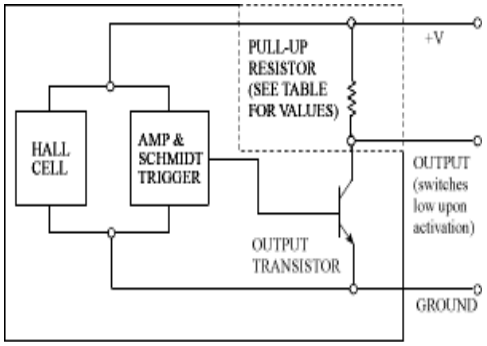

Figure7:Limit Sensor

CONCLUSION AND FUTURE WORK

This project presented about the secret information among UGVs. Due to the unfortunate breakdown of RADAR signal, ADHOC network will be helpful in creating a cluster head among the remaining vehicles. Then these sensors which have been provided will collect and send information to the UGV which will be very helpful in preventing the enemy attack. A solar system along with battery for storage will sort out the issues occurring due to power failure. Our future work is to implementation of capturing the image in efficiency manner by extracting the object without error.

VI. REFERENCE

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