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AN INTELLIGENT HYBRID INTRUSION DETECTION SYSTEM WITH VIRTUAL

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ABSTRACT

Wildlife and people are getting pushed into closer, more dangerous proximity as wild spaces shrink and fragment. On the other hand, conservation success with habitat restoration and species protection often results in wildlife dispersing out of protected areas and right into a deadly collision course with humans. Fences can both enhance and detract from the conservation of wildlife, and many detrimental impacts are associated with creating physical barriers. By contrast, virtual fences can restrict, control or minimize animal movement without the creation of physical barriers, and present key benefits over traditional fences, including: no need for construction, maintenance or removal of traditional fences; rapid modification of boundaries both temporally and spatially based on specific conservation concerns; application of novel conservation management and social psychological

INTRODUCTION

Virtual fencing offers the possibility of controlling herbivore by placing a visually unseen boundary around individual animals or on landscapes. However, the predominant virtual fencing research has involved keeping animals in or out of a particular area (polygon) on the landscape.

Virtual fences incorporate many of the advantages of herding by using electronic technology to replace manual labour without being encumbered with the biggest challenge of conventional fencing, its being static and difficult to move. The growth of environmental awareness and public concern for wildlife that began in the 1980s has continued into the 21st century. Large-scale alterations of thelandscape such as hydroelectric development, or the cumulative effects of timber extraction over many years, have continued the demand for high-quality studies of impacts on wildlife and their habitats. Many resource agencies have shifted their management approach to a landscape scale to address issues such as conservation of biodiversity and habitat fragmentation. To overcome some of the limitations of existing technology and provide the detailed information required by studies undertaken to address environmental concerns and evaluate new policies, telemetry systems based on the Global Positioning System (GPS) were developed in the1990s.Since commercial development of GPS-based telemetry systems for tracking animals began in 1991, a variety of configurations have been designed for use by researchers in different situations. In addition, numerous improvements have been made to the size and performance of GPS systems and their cost has been dramatically reduced. The enormous quantities of data generated by these systems clearly present a challenge to data management and analytical procedures. Given the variety of configurations and features of current GPS systems, researchers must

carefully plan and select an appropriate system to address particular biological issues. It provides a historical overview of the development of GPS-based telemetry systems and the operating features of the various configurations currently available to researchers. It will also describe the improvements in cost, size and performance that have been achieved in the first 10 years since their initial development. It also identifies the key issues that researchers must consider in selecting an appropriate system to meet their research objectives. Lastly, considering the implications for data management and analysis resulting from the quality and quantity of data attainable from GPS based telemetry systems. Since India being an agricultural country, farming is a very common activity. Animals need to be crowded frequently to prevent overgrazing of any grazing land. There are various fencing techniques such as conventional, electric fencing etc, but having limitations such as less flexible, expensive. These limitations are overcome by a concept called virtual fencing.

LITERATURE SURVEY

"Virtual fencing–past, present and future1." Anderson, Dean M. *The Rangeland Journal* 29.1 (2007): 65-78.

Control occurs by alteringan animal's behaviour through one or more sensory cues administered to the animal after it has attempted to penetratean electronically-generated boundary. This boundary can be of any geometrical shape, and though unseen by the eye,is detected by a computer system worn by the animal. The most recent autonomous programmable systems use radiofrequency (RF) signals, emanating from global positioning system (GPS) satellites to generate boundaries. Algorithmswithin a geographic information system (GIS) within the device's computer use the GPS and other data to determine whereon the animal a cue, or cues, should be applied and for how long.

"Virtual fencing for animals management using RF module." Vermani, Ashita, VidhiRana, and SurabhiGovil.*Proceedings of the Conference on Advances in*

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Communication and Control Systems-2013. 2013.This paper presents protecting and maintaining biodiversity. Grazing system employed today demands for new fencing techniques. Here RF module based virtual fencing is proposed. The main object of system aims at whenever the object (animal) tried to cross the range of transmitter, the receiver part will alert and show on LCD, animal is out of range and buzzer will move your attention to the animals area.

"Transforming agriculture through pervasive wireless sensor networks." Wark, Tim, et al. *IEEE Pervasive Computing* 6.2 (2007).

A large-scale, outdoor pervasive computing system uses static and animal-borne nodes to measure the state of a complex system comprising climate, soil, pasture, and animals. Agriculture faces many challenges, such as climate change, water shortages, labor shortages due to an aging urbanized population, and increased societal concern about issues such as animal welfare, food safety, and environmental impact. Humanity depends on agriculture and water for survival, so optimal, profitable, and sustainable use of our land and water resources is critical.

"Crop irrigation control using wireless sensor and actuator network (WSAN)."Shaikh, Zubair A., et al. *Information and Emerging Technologies (ICIET), 2010 International Conference on*.IEEE, 2010.

In this paper we have presented the crop irrigation control to better utilize water resource which is getting scarce. The one of the major hindrances on the way of WSAN adaptation in the third world countries like Pakistan is the factor of hardware/system cost. To cope up with cost factor, there is a need of the indigenous development of sensor and actuator motes. In addition to crop irrigation control, we also presented our efforts of indigenous design and development of WSAN and its protocol.

"Monitoring animal behaviour and environmental interactions using wireless sensor networks, GPS collars and satellite remote sensing." Handcock, Rebecca N., et al.*Sensors*9.5 (2009): 3586-3603.

Remote monitoring of animal behaviour in the environment can assist in managing both the animal and its environmental impact. GPS collars which record animal locations with high temporal frequency allow researchers to monitor both animal behaviour and interactions with the environment. These ground-based sensors can be combined with remotely-sensed satellite images to understand animal-landscape interactions. The key to combining these technologies is communication methods such as wireless sensor networks (WSNs).

"A technical framework for designing wireless sensor networks for agricultural monitoring in developing regions." Kabashi, Amar H., and J. M. H. Elmirghani.*Next Generation Mobile Applications, Services and Technologies, 2008.NGMAST'08.The Second International Conference on*.IEEE, 2008.

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This paper extracts the lessons learned in an on going project which aims at delivering agricultural intelligence to build a capable decision support system that improves agricultural practice and decision making in sub-Saharan Africa. By generalizing the research challenges experienced so far, this paper provides a framework for designing Wireless Sensor Networks for agricultural monitoring in developing regions, taking into account all the particularities of such environments. In this framework, new solutions and research ideas are proposed for sensor network design to address the special challenges of the developing world.These include a zone-based joint topology control and power scheduling mechanism, a multi-sink architecture with associated back-link/storage aware complementary routing and a parameter-energy-environment aware task scheduling approach.

COMPONENTS DESCRIPTION

PIC16F877A

The PIC microcontroller is a 40 pin package.It is made up of RISC architecture.It has five input output ports and thirty three input output linesPIC consist of three timers which are independent.It includes multi level of interrupts.It has 10 bit analogto digital convertor with 8 channel multiplexer.Inbuilt USART in PIC supports both synchronized and asynchronized channels.

INFRARED SENSOR

Infrared sensor is used for object detection.It uses comparator to provide required logic level for microcontroller .This device emits and/or detects infrared radiation to sense a particular phase in the environment. Generally, thermal radiation is emitted by all the objects in the infrared spectrum. The infrared sensor detects this type of radiation which is not visible to human eye.It is used to detect the obstacles in its path.Here the IR sensor is used for detecting the intrusion of animals.

PASSIVE INFRARED SENSOR

A Passive Infrared sensor(PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of *PIR*-based motion detectors.A PIR-based motion detector is used to sense movement of people, animals, or other objects. The term passive in this instance means that the PIR device does not emit an infrared beam but merely passively accepts incoming infrared radiation.

ULTRASONIC SENSOR

Ultrasonic sensors use sound waves rather than light, making them ideal for stable detection of uneven surfaces, liquids, clear objects, and objects in dirty environments. These sensors work well for applications that require precise measurements between stationary and moving objects.

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GSM MODEM

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). . It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose.

RELAY

A relay is an electrical switch that opens and closes under control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts.Relays are used to control a high-voltage circuit with a low-voltage signal, as in some types of modems.

RELAY DRIVER

ULN 2003

ULN2003 is a high voltage and high current Darlington array IC. It contains seven open collector Darlington pairs with common emitters. A darlington pair is an arrangement of two bipolar transistors

BUZZER

A buzzer is a signalling device.A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric.

WORKING

An operating principle of virtual fence can be defined as a structure serving as an enclosure or a boundary without physical barrier. So hidden fencing has been created using RFmodule and whenever the animals tried to cross the fence itwill alert the user as well as animal. Receiver part is with user while transmitter part i.e. electroniccollar is worn around animal's neckTransmitter (electronic collar) willcontinue to send digital data when animal is within the range and receiver (user end) will continue to receive it. As animaltry to cross the fence transmitter will stop sending data and receiver will not receive anything, which activates the buzzer and LCD will alert the person at user end for immediate action. HT12E encoder is mainly used for interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format. HT12Econverts the parallel inputs into serial output. HT12Ddecoder is used for remote control applications. HT12Dconverts the serial input into parallel output.III. RF BASED WIRELESS REMOTE USING RX-TXMODULES (434MHz.)This circuit utilizes the RF module (Tx/Rx) for making a wireless remote, which could be used to drive an output from a distant place. RF module, as the name suggests, uses radiofrequency to send signals. These signals are transmitted at a particular frequency and a baud rate. A receiver can receive these signals only if it is configured for that frequency. A four channel encoder/decoder pair has also

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been used in this system. The input signals, at the transmitter side, are taken through four switches while the outputs are monitored on a set off four LED's corresponding to each input switch. The circuit can be used for designing Remote Appliance Control system. The outputs from the receiver can drive corresponding relays connected to any household appliance. This radio frequency (RF) transmission system employsAmplitude Shift Keying (ASK) with transmitter/receiver(TX/Rx) pair operating at 434 MHz . The transmitter module takes serial input and transmits these signals through RF. The transmitted signals are received by the receiver module placed away from the source of transmission. The system allows one-way communication between two nodes, namely, transmission and reception. The RF module has been used in conjunction with a set of four channel encoder/decoder ICs. Here HT12E& HT12D have been used as encoder and decoder respectively. The encoder converts the parallel inputs (from the remote switches) into serial set of signals. These signals are serially transferred through RF to the reception point. The decoder is used after the RF receiver to decode the serial format and retrieve the original signals as outputs. These outputs can be observed on corresponding LED's.

RESULTS

Transmitter (electronic collar) will continue to send digital data when animal is within the range and receiver (user end)will continue to receive it. As animal try to cross the fence transmitter will stop sending data and receiver will not receive anything, which activates the buzzer and LCD will alert the person at user end for immediate action. Figure below shows the prototype of virtual Fencing. Receiver (at user end) prototype virtual Fencing Protocol Virtual fencing seeks to extend the basic principle of the commonly used electric fence. Instead of controlling animal location using a physical fence, we use a combination of auditory and mild electrical stimuli applied by a position-aware device worn by the animal. Strict animal ethics requirements guide all such experiments to ensure animal welfare. The ethics behind this approach parallel the principle behind conventional electric fences in which animals have a visual association with the fence location. With the virtual fence, a quiet acoustic soundidentifies the fence's location. When the animals cross this virtual fence, they receivea mild electrical stimuli.

CONCLUSION

The project "VIRTUAL FENCING" has been completed successfully and the output results are verified. The results are in line with the expected output. The project has been checked with both software and hardware testing tools. In this work "LCD, PIC Microcontroller, Traffic commands and Traffic signals" are chosen are proved to be more appropriate for the intended application. The project is having enough avenues for future enhancement. The project is a prototype model that fulfils all the logical requirements. The project with minimal improvements can be directly

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applicable for real time applications. Thus the project contributes a significant step forward in the field of **"**ADVANCED AUTOMATION"**,** and further paves a road path towards faster development s in the same field. The project is further adaptive towards continuous performance and peripheral up gradations. This work can be applied to variety of industrial and commercial applications.

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