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Survey on Missing Object Using IoT

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Abstract: Internet of Things is quite vital for many applications including theft prevention. The aim of this paper is to survey the various existing technologies that exist for theft prevention using Internet of Things. The idea of the survey is to come up with a new technology or an innovative idea how to prevent precious object theft and if theft happens how to track the missing object.

Key words: Internet of Things, Global Positioning System, Global System for Mobile Communication.

1. Introduction

Internet of Things (IoT) is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. IoT is network of interconnected computing devices which are embedded in everyday objects, enabling them to send and receive data. To people like hobbyists, electronic enthusiasts or sensor researchers the IoT is new opportunity and at the same time a new challenge for managing the data we acquire from our embedded electronics and controlling their outputs. Imaging having a small device atthe size of a matchbox, that can sense temperature, humidity and light conditions of your room,and can report them directly to a web-based service. The readings by the sensors can be accessed only by you through your favorite browser, by your mobile phone and by other devices in you place, like the central heating /air conditioning system or the indoor lights control system. The latter can adjust the heat and lighting inside your place automatically, making sure you have always the most preferable conditions as defined in the web-based service by you.IOT refers to the infrastructure of connected physical devices which is growing at a rapid rate as huge number of devices and objects are getting associated to the Internet.

Main components used in IoT:

- Low-power embedded systems: Less battery consumption, high performance are the inverse factors that play a significant role during the design of electronic systems.
- Sensors : Sensors are the major part of any IoT applications. It is a physical device that measures and detect certain physical quantity and convert it into signal which can be provide as an input to processing or control unit for analysis purpose.

Different types of Sensors :Temperature Sensors ,Image Sensors ,Gyro Sensors, Obstacle Sensors,RF Sensor, IR Sensor, MQ-02/05 Gas Sensor, LDR Sensor, Ultrasonic Distance Sensor.

- Control Units : It is a unit of small computer on a single integrated circuit containing microprocessor or processing core, memory and programmable input/output devices/peripherals. It is responsible for major processing work of IoT devices and all logical operations are carried out here.
- Cloud computing: Data collected through IoT devices is massive and this data has to be stored on a reliable storage server. This is where cloud computing comes into play. The data is processed and learned, giving more room for us to discover where things like electrical faults/errors are within the system.
- Availability of big data: IoT relies heavily on sensors, especially in real-time. As these electronic devices spread throughout every field, their usage is going to trigger a massive flux of big data.
- Networking connection: In order to communicate, internet connectivity is a must where each physical object is represented by an IP address. However, there are only a limited number of addresses available according to the IP

naming. Due to the growing number of devices, this naming system will not be feasible anymore. Therefore, researchers are looking for another alternative naming system to represent each physical object.

There are two ways of building IoT:

- Format separate internetwork including only physical objects.
- Make the Internet more expansive, but this requires hard-core technologies such as rigorous cloud computing and rapid big data storage (expensive).

In the near future, IoT will become broader and more complex in terms of scope. It will change the world in terms of "anytime, anyplace, anything in connectivity."

IoT Enablers:

- RFIDs: Uses radio waves in order to electronically track the tags attached to each physical object.
- Sensors: Devices that are able to detect changes in an environment (ex: motion detectors).
- Nanotechnology: As the name suggests, these are extremely small devices with dimensions usually less than a hundred nanometers.

  Smart networks: (ex: mesh topology)

Cloud computing: Data collected through IoT devices is massive and this data has to be stored on a reliable storage server. This is where cloud computing comes into play. The data is processed and learned, giving more room for us to discover where things like electrical faults/errors are within the system.

Availability of big data: It is known that IoT relies heavily on sensors, especially in real-time. As these electronic devices spread throughout every field, their usage is going to trigger a massive flux of big data.

Networking connection: In order to communicate, internet connectivity is a must where each physical object is represented by an IP address. However, there are only a limited number of addresses available according to the IP naming. Due to the growing number of devices, this naming system will not be feasible anymore. Therefore, researchers are looking for another alternative naming system to represent each physical object.

2. Literature review

The main goal of this paper is to provide the position and trail of an item. It will alsoenable everyone to monitor any stationary or relocating item, such as automobiles, wallets, Lorries, and so on. This gadget can relay the position information of the object'slocation to the user or anyone who is tracking it. This technology may be used by transportation firms as well as individuals in their everyday routines. There are some constraints that can be overcome with IoT. They could acquire the location of the thing that requires to be monitored by using GPS, but if the signal is delivered via geolocation, the transceivers will not be able to obtain it straight. As a result, Global System for mobile communication module (GSM) technology has been incorporated to send such signals for data transmission.

When it comes to real-life minimalistic lifestyle objects like keys, remotes, and others, they are more commonly gone missing than the above-said items, but they cannot be embedded with stuff like GPS embedded chips because of the simple reason of their size and the number of random spaces they can be lost and can't be found. Objects embedded with the latest technology are not only highly valuable but are also more prone to theft than others. It's the reason why most of them come with some kindof anti-theft technology and also the common practice of live tracking using Global Positioning System (GPS) [1]

The approach in this paper is that whenever an IR sensor detects motion and sends a signal to a Raspberry Pi, the system uses image processing to recognize an exact location of motion occurrence and highlights it appropriately. The technology now sends photographs of the occurrence over IoT for the user to examine online, The user can now decode data transmitted over the internet via IoT, and use the IoT system to view photographs of motion occurrences live over the internet. As a result, the system offers a novel method for IoT-based Theft Detection.

Here they have used a camera, a Raspberry Pi, and a circuit with an LCD display with infrared for night vision and a USB drive for storage in this system. When a camera detects motion, the system employs image processing to pinpoint the exact location of the motion and highlights it. The technology now sends photographs of the occurrence to the user's computer via IoT, where they may be seen online. They have used image processing on live video to detect theft using motion and also highlight the area where motion occurred in this project, in which we use image processing on live video to detect theft using motion and also highlight the area where motion occurred. [2]

The goal of the research is to track vehicles to monitor the movement of the object, specially for unmanned vehicle. GPS is a system that consisted of three main segments. These segments are space segment, control system segment, and user segment. Satellites as space segment must be controlled by control system segment, in order not to collide with each other. GPS provides information about coordinate values; they are latitude and longitude. Latitude and longitude are represented an x-axis and a y-axis of the earth, respectively. GPS is connected to microcontroller by serial communication Receiver and Transmitterpin with baud-rate used.

Such of the sensors provide information about data angle, data from each sensor must be combined because each sensor data still has a noise signal. The sensor data must be filtered with complementary filter, so the result turned to good.

Global Positioning System (GPS) and Inertial Measurement Unit (IMU) sensor can be used to obtain information about object location and attitude. IMU consists of several sensors, such as accelerometer, gyroscope, and magnetometer sensor. [3]

The main motive behind the formulation of this paper is to develop a home security system which automatically notifies the neighbours using a buzzer alarm if it detects any unusual movement. The unusual movements are tracked using a Passive Infrared (PIR) sensor. The system also contains a mobile application which receives the alerts from the PIR sensor and in turn alerts the user on his/her cell phone. The system can also be continuously monitored with the help of the ThingSpeak IoT platform which is connected to the circuit. The entire simulation of this Smart Home Security System is being carried out in the Autodesk . This can automatically detect the object which keeps the home objects safely. Here they have used a Passive Infrared (PIR) sensor , Wi-Fi Module (ESP8266 module), mobile application , microcontroller (ATMEGA328P).

The complexity and depends of the external platform . The securitycan still more be increased where in this only buzz alarm and notifies but do not capture the imageor helps to track the missing object.by this the security of the house can be increased and will be monitored continuously without any human need or attention. This helps to keep the essentials objects safe and looks after all kinds of security. [4]

The purpose of this project is to design a system which will protect our house or any place from thief in our absence by using a camera module operated by Arduino. This system mainly consists of a Web camera to detect guests, Arduino, Wi-Fi module, sensors, servo motor, resistor, ESP32 and a Mobile device for interfacing with the system. Whenever someone is entering in the house, immediately their movement will be sensed by the sensor which passes on the signal to Arduino controller. If the controller finds the request as valid after processing, then it turn on the camera which is linked to the controller to the area where the motion was detected and then sends it to the user over the Internet to check the footage. Sensors are linked to the Arduino processing unit.

An input signal is generated by the sensors when they detect the motion. Once input signal is generated it will be transmitted to Arduino unit and it validates the request. Every time checking mail would be the disadvantage therefore an developed application would be better to used and get the notifications .[5]

The proposed system in this paper includes NodeMCU with Esp8266 Wi-Fi module based on microcontroller, PIR sensor to use the motion detection, ultrasonic sensor to know the distance from the obstacles, buzzer to use the alarm system, Blynk application to use the reporting message and light bulb to illuminate around the environments. When sensor detected the movement of objects, sends a message to phone, lights up the bulb, and then alert alarm because Esp8226 Wi-Fi module is connected to Blynk application. The problems found with existing systems were that they can only identify the intruder after the theft, or cannot distinguish between human and non-human objects. So, this system will be essential for every building because it is not just easy to use but is also inexpensive.Basically, the design and development of this system are divided into two main parts: hardware architecture and software details. In the hardware architecture, the design of the circuit was constructed and the prototype of the system was built. While in the software development, the whole complete prototype was operated via programming code.

The research on this system mainly focused on solving the security problems. It is hoped that it will help people across the country reduce theft. It has provided a novel wireless sensing system for the surveillance and detection of a human intruder as well as instant notification of the intrusion to prevent theft. This system is suitable for small personal area surveillance, i.e., offices, departments, classrooms, homes and buildings. The main advantage of the system is easy to use, low cost with high quality. New research challenges of security and privacy have arisen due to an increase in products that connect the cyber and physical worlds. It is expected that these research problems will be further resolved in the upcoming future. [6]

The purposed system can be used to enhance the security that can be run over IOT. This system makes use of A Raspberry Pi board, Piezo sensors, Servo motors, Buzzers and capacitors. The purposed system can be used in existing IOT based home security system. We design and develop the components based on the devices given above. The development consists of the hardware and software components. The software components focus on UI and control of the system, the hardware components. The software components focus on UI and control of the system, the hardware components give the mechanical working of the system.

The system consists of various different components which work together to complete a specific purpose. The system we have implemented rather works on detection of any contact rather than sensing any movement which as a result makes the system much more competent. The Piezo sensors are organized and connected in the walking zone of a floor. A Piezo sensor is a device that uses the piezoelectric effect to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge. These sensors, when it detects any abnormalities in pressure or strain while it is monitoring. The alert is sent of the location where those anomalies are detected. The camera is in turn activated and captures the cause of anomalies. The owner is then alerted of this event through the internet who is left to decide either it's just a false alarm or a potential threat. Thus, the efficiency of this system is incremented and made more effective as it responds on the owners' feedback prior to taking any action. [7]

The proposed approach can be applied to an IoT-based smart home monitoring system in near real-time. A smart home designed and developed on an integrated framework of sensors, cameras, and customized hardware to analyze unauthorized access. The system operates at two different levels: through a hardware interface and through a software interface. The project aims to design a framework for providing a house owner/member with the immediate notification of an ongoing theft or unauthorized access to their premises. For this purpose, a rigorous analysis of existing systems was undertaken to identify research gaps. The problems found with existing systems were that they can only identify the intruder

after the theft, or cannot distinguish between human and non-human objects. The proposed system consists of two units. Wi-Fi module and Microcontroller unit with sensors. Connection established between ADC and output of all the sensors. Sensed data from the sensors are spontaneously processed by the microcontroller and if something is sensed above the limit it sends an alert message to the owner of the house. Wireless Sensors Networks (WSNs) combined with the use of Internet of Things (IoT) are expanding smart home concepts and solutions, and their applications.

This paper presents an innovative method to prevent smart home theft by providing spontaneous notification of ongoing intrusion. The research has provided a novel wireless sensing system for the surveillance and detection of a human intruder as well as instant notification of the intrusion to prevent theft. It eliminates the use of DVR for recording as well as the use of large amounts of memory for storage. The system can effectively identify a human intruder and prevent false alarms when the intruder is a non-human, by distinguishing between human and non-human objects. All of these processes lead to the instant notification of intrusion by providing real-time notification about the potential theft. The main advantage of the proposed system is that it is cheaper than the DVR and other surveillance-based solutions available on the market. If an intruder disables WiFi connection using DoSattack then the proposed system will not be able to notify the house members about the ongoing theft. However, the proposed system is equipped with Bluetooth network, which can still record the ongoing theft but cannot send the notification to the house owner due to the lack of WiFi/Internet connections.

New research challenges of security and privacy have arisen due to an increase in products that connect the cyber and physical worlds. It is expected that these research problems will be further resolved in the upcoming future. [8]

3. Conclusion

Internet of Things is very much in demand in the 21st century and has a wide range of applications. This survey paper mainly focuses on the missing object and tracking of the essential object using IoT. It helps the user and also notifies, so that the user can take action. This aids in securing the important object.

With an idea of the existing technologies that are used in tracking object theft, the future scope is to come up with an innovative idea as to how to prevent precious object theft.

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