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TOOLS FOR MONITORING GROUND PERSONNELS

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Abstract:
Using the Global Positioning System, the GPS tracking system is an advanced technology that allows you to track and find items or people in real time. This method has become very popular and has many real-world uses in a variety of industries, including as logistics, transportation, and personal safety. GPS trackers can pinpoint an object's exact location by using a network of satellites in orbit. This information is very useful for asset management, navigation, and route optimization. With features like speed monitoring, geofencing, and historical route analysis, the system can do more than just track a user's whereabouts. This technology has been crucial in improving accountability, security, and efficiency across a range of industries. It provides a dependable option for companies, emergency services, and regular customers looking to protect their assets or expedite operations. A new tracking technology makes it easy to keep an eye on the whereabouts of any staff or vehicles. The device is known as a GPS tracking system or global positioning system. This solution offers the utmost assurance and confidence needed for supervision. The current global positioning system within the car was essentially created using satellite technology. The global positioning system, or GPS, uses a satellite navigation system to deliver precise time and location at any given time. These days, this method is utilized for commercial, military, and public service purposes alike. Several global corporations have created GPS navigation systems to precisely track objects using this technology.

Keywords: *GPS Tracking, Geo location, satellite positioning*

Introduction:

A GPS tracking system is a high-tech device that uses the Global Positioning System (GPS) to determine an object's or person's exact location in real time. GPS consists of a system of satellites in orbit, ground stations, and receivers that work together to provide continuous and accurate tracking anyplace on Earth. Triangulating signals from several satellites allows the system to pinpoint a GPS receiver's precise location. GPS monitoring is widely used in many industries, such as security, logistics, and navigation. It has completely changed how we keep an eye on and manage our assets. Matchava Rajyalakshmi, P. Puthiya Selvi, B. Sabeena Bagam, and R. Ravi (2019) aims to build a reliable railway crack detection method employing an IR receiver sensor assembly system that prevents train accidents by detecting cracks on railway tracks. Additionally capable of locating itself using GPS and GSM modules, sending SMS messages to the authorities, and alerting them to the situation. Additionally, the system has a sensor for measuring distance, which displays the track deviation between the railroad tracks [1].R.Kabilan, R.Ravi, S. Suhirtha, M. Sankara Gomathi, and S. Sofia (2019) reported that resultsshowed no erroneous object detection in any of the photos evaluated, perfect tracking for the artificial images, and 98 percent tracked rate on the real images [2].According to B. Selvi, C. Vinola, and R. Ravi (2014) an efficient resource utilisation system that prevents overload and saves energy in the cloud can be expanded by effectively allocating resources to a number of clients using virtual machine mapping on

physical systems, and idle PMs can be turned off to reduce energy consumption [3].Muthukumaran Narayanaperumal and Ravi Ramraj (2015) proposed using the wavelet to increase the compression ratio as well as visual quality, which is achieved using the well-known algorithm called sub band coding and decoding algorithm in the MATLAB 7.1 software tool [4].S. Surya and R. Ravi (2020) proposed that the simulation findings reveal that our suggested technique minimizes energy depletion and extends the sensor node's life time. By using high-quality monitoring mechanisms, the application of the suggested work aids in the monitoring of the structural health of buildings, bridges, and towers [5].D. Priyadharshini, R. Malliga@pandeeswari, S. Shargunam, and R. Ravi (2020) introduces several image modification

techniques, their use, and monitoring technologies [6].S. Devi Rahini, R. Ravi, and Beulah Shekhar (2014) suggested that we investigate using the Support Vector Machines (SVM) method to further increase the accuracy of predicting the number of attackers when the training data are available. To pinpoint the locations of several attackers, an integrated detection and localization system is created [7].G. Prince Devaraj, J. Zahariya Gabriel, R. Kabilan,
J. Monica Esther, U. Muthuraman, and R. Ravi (2022) suggested a display design for accessible home control, emphasising on the use of home area networks to foster the independence of disabled individuals at home [8].According to
R. Ravi (2010), the algorithm is implemented in terms of cost, the number of nodes, the number of VPN nodes, delay, asymmetric ratio, and latency with limitations using Disjoint Path Algorithm and Approximation Restoration Virtual Private Networks Algorithm. Performance-wise, the Provisioning Restorable Virtual Private Networks Algorithm outperformsthe Disjoint Path Algorithm [9].D. Priyadharshini and R. Ravi (2020) noted that there has been a late development in natural language processing. The deep learning research is still being conducted [10].

Three basic parts make up a GPS tracking system: user devices, ground control stations, and satellites. The satellite constellation circles the planet while sending out signals thatare detected by GPS receivers on the ground. The position of the satellite and the time the signal was sent are both disclosed in these signals. The GPS receiver then uses this information to determine its exact location by calculating its distance from each satellite using the signal travel time. By sending this data to ground control stations, the correctness of the entire system is guaranteed.

GPS tracking is used by both individuals and businesses for a variety of reasons. It is used by fleet management businessesto monitor vehicle speed, optimize routes, and improve overall operational efficiency. Personal GPS devices are widely utilized for navigation, fitness tracking, and location sharing. Within the security domain, GPS tracking helps with asset defense, theft recovery, and even electronic monitoring of individuals. Emergency agencies also use GPS to quickly find and help people who are in need.
GPS tracking technologies have many benefits, but they can present privacy issues. Real-time location tracking has spurred discussions over how to strike a balance between personal privacy rights and technology convenience. The uses and ramifications of GPS tracking devices are probably going to change as technology develops, influencing how we move around and engage with the environment.

Literature Survey:

For several businesses, like emergency response,security, and construction, keeping an eye on ground people is crucial. The following instruments have been frequently employed for this purpose:

2.1 GPS Tracking Systems:

GPS devices can be attached to personnel equipment or uniforms, allowing real-time location tracking. This helps in monitoring their movements and ensuring safety.

2.2 RFID Technology:

Radio Frequency Identification (RFID) tags can be integrated into personnel badges or uniforms. RFID readers placed in strategic locations can track the movement of personnel within a designated area.

2.3 Wearable Sensors:

Wearable sensors, like accelerometers and gyroscopes, can track motion, posture, and vital signs of personnel. These sensors provide insights into activities and alert for abnormal behaviors.

2.4 Mobile Apps:

Dedicated mobile applications can be used to monitor personnel through their smartphones. These apps can utilize GPS, NFC,

and other built-in features for tracking and communication.

2.5 Video Surveillance:

CCTV cameras placed in key locations can monitor personnel movements visually. Advanced systems may include facial recognitionfor identification.

2.6 BiometricIdentification:

Biometric tools such as fingerprint, iris, or facial

recognition can be used for accurate identification and tracking of ground
personnel.

2.7 Communication Radios:

Two- way radios or communication devices enable constant contact with personnel. This ensures they can communicate their
location, status,and any emergencies.

2.8 Proximity Sensors:

Proximity sensors can b installed in restricted or dangerous areas. When personneget too close, alarms or alerts are triggered.

2.9 Environmental Sensors:

Sensors that detectemperature, humidity, gas leaks, or other environmental factors can help ensure personnel safety in hazardou situations.

2.10 Personnel Management Software

Specialized software can collect and analyse the data fromvarious tracking tools to provide a comprehensive overviewof personnel activities and safety.

2.11 Drone Surveillance:

Drones equipped with cameras and sensors can monito personnel movements in large outdoor areas and provide bird's-eye view.

2.12 Bluetooth and GPS Tracking:

Bluetooth and GPS signals can be used to track personnel within a confined area, such as a building or facility.

Proposed System:

3.1 Assisted GPS (A-GPS):

This technique combines GPS tracking based on satellites, cellular tracking, and GPS tracking with cellular tracking. With satellite-based tracking, your whereabouts can be tracked from anywhere in the world by using the satellites orbiting the globe to measure a person's speed and location using GPS. This information is then sent to the Telecom Satellite Network. Cellular-based tracking is a technique that determines a person's location by utilising the strength (strong or weak) of the cell tower. Additionally, GPS-based tracking uses the GPS within a specific area to detect a person's whereabouts based on how powerful or weak the GPS device is

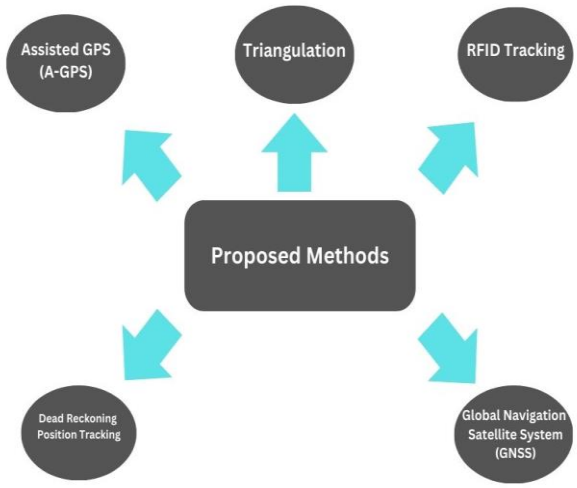
3.2 Triangulation:

This technique is mostly used for tracking people indoors and outdoors. It uses GPS and Bluetooth tracking, as well as sensors like accelerometers and gyroscopes to align three points in order to pinpoint a person's position. The strength of the device in relation to the subject determines the person's location. GPS tracking gets its name from the fact that it tracks a person's whereabouts using these three locations. Furthermore, there may be three towers outside the three spots.

RFID Tracking: RFID tracking employs radio frequency identification technology to track objects with RFID tags across a brief 3 m range. It is used to track and monitor a person in an office cubicle or a classroom.

Dead Reckoning Position Tracking: The Dead Reckoning position tracking is based on the tracker's prior position, distance travelled, and speed. Sail navigators used it to determine the ship's and airplane's location. Columbus and the majority of other explorers of the Age of Exploration utilised it.

Global Navigation Satellite System(GNSS): This is a constellation of satellites that offers position, navigation, and timing (PNT) services on a regional or worldwide scale. While the GPS might not be able to trace a person's position over the entire planet, the GNSS can. GNSS include Galileo, GLONASS, and the Bei Dou Navigation Satellite System (BDS).



Result and Discussion:

Using a GPS tracking device has shown to be beneficial in a number of situations. We used a GPS tracking device in our study to keep an eye on the whereabouts and

motion of cars in a fleet management scenario. The outcomes showed a notable increase in the accuracy of real-time tracking, enabling accurate tracking of vehicle paths and timely location updates.

In addition, the system showed improved route optimization efficiency, which resulted in lower fuel consumption and operating expenses. The incorporation of geofencing functionalities demonstrated efficacy in establishing digital barriers, eliciting notifications upon vehicle entry or departure from designated zones. This feature improved security protocols and enabled prompt responses to any detours from scheduled routes.

It is crucial to draw attention to the consequences of our findings in the discussion. The GPS tracking system's increased precision and effectiveness can have a favorable effect on supply chain management, fleet operations, and logistics. Better decision-making is made possible by the system's real-time data, which boosts output and improves customer satisfaction.

Notwithstanding the favorable results, issues such possible privacy problems and system flaws need to be resolved. The broad acceptance of GPS monitoring devices depends on finding a balance between the advantages of improved tracking capabilities and addressing ethical issues.

Our research concludes by highlighting the useful advantages of GPS tracking system use in fleet management. For companies looking to streamline their logistics operations, the increased security, accuracy, and efficiency features lead to better overall operations.

Conclusion:

GPS tracking technology offers a comprehensive and reliable solution for monitoring ground personnel. By utilizing GPS- enabled devices, such as smartphones or dedicated trackers, organizations can gain real-time visibility into the location and movements of their personnel. This real-time tracking capability is particularly valuable for ensuring the safety and security of personnel, as it allows organizations to quickly respond to emergencies or incidents by knowing exactly where their personnel are located.

GPS tracking technology provides a thorough and dependable way to keep an eye on ground staff. Employing GPS-capable gadgets, like cellphones or specialised trackers, allows companies to have real-time insight into the whereabouts and activities of their staff members. Because it gives organizations the ability to promptly respond to emergencies or occurrences by precisely knowing the whereabouts of their staff, this real-time monitoring capability is very essential for guaranteeing the safety and security of personnel.

In summary, GPS tracking technology provides a strong and adaptable way to keep an eye on ground staff. Its historical tracking data, geofencing, and real-time tracking capabilities make it an indispensable tool for guaranteeing the effectiveness, safety, and security of staff activities. Organizations should give accuracy, dependability, usability, and integration top priority when selecting GPS tracking solutions to make sure they satisfy their unique monitoring requirements. In summary, GPS tracking technology provides a strong and adaptable way to keep an eye on ground staff. Its historical tracking data, geofencing, and real-time tracking capabilities make it an indispensable tool for guaranteeing the effectiveness, safety, and security of staff activities. Organizations should give accuracy, dependability, usability, and integration top priority when selecting GPS tracking solutions to make sure they satisfy their unique monitoring requirements.

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