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Human Presence Detection in Remote Area(Prohibited Area) Through Remote Sensing

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Abstract : In today's world, where everything is becoming internet based and everyone are money minded, and everyone started to buy many valuable things, manmade disasters also increasing. Manmade disasters include theft, smuggling, trapping of victims, killing innocent people for money, bomb blast etc.. Not only one person involve in those kind of activities. There will be group of people involved in planning these activities and execution. These activities planning are mostly done in the remote area or forest area where there will be less or no human presence. It's not possible for monitoring all those areas manually. It involves more human resource to be deployed in those areas specially for monitoring. And also not every time the same place is chosen to plan those activities. Hence we can't suspect anything and we can't waste human resource for monitoring. So it is necessary to develop some mechanism through which the monitoring should happen for human presence in those areas to avoid any future disaster without any manual intervention which can reduce cost of implementation. In this paper, we study different mechanisms involved in human presence detection and propose a model which is based on Microwaves Doppler radar technology sensors which will be helpful in sending alerts to required person for taking action.

Index Terms: Human presence detection, Doppler, Radar, Remote sensing, PIR, UWB sensor, Remote monitoring

I. INTRODUCTION

Remote detecting is the way toward identifying and checking the physical attributes of a territory by estimating its reflected and transmitted radiation at a separation from the focused on region. It might be part into "Active" remote detecting (i.e., when a flag is radiated by a satellite or flying machine and its appearance by the article is distinguished by the sensor) and "Passive" remote detecting (i.e., when the impression of daylight is recognized by the sensor). Remote detecting makes it conceivable to gather information of risky or blocked off territories. Human detecting (likewise called human discovery or human nearness identification) envelops a scope of advancements for recognizing the nearness of a human body, regularly without the deliberate support of the distinguished individual.

II.LITERATURE REVIEW

Paper [1] discusses about Manmade disaster problem in Chhattisgarh, in which naxalites creates many losses to state in terms of killing innocent villagers, blasting railway tracks, blasting power supply unit etc., Below are the methodologies proposed : Remote sensors alongside GIS used to trap the naxalites entering in open spots, Phases of fighting catastrophe incorporate Detection, Preparedness, Prevention. Changing over satellite picture to digitized map, dissect the territory as indicated by satellite information, choose activity plan as per investigation of the guide.

Survey of Microwave Wireless Techniques for Human nearness identification and characterization is talked about in report [2]. Radar procedures have been created for estimating time changing dispersing comes back from different pieces of human body amid movement. 36Ghz CW Doppler radar utilized for human location and characterization.

In today's world where money is the most required for every level of human life, safeguarding those valuables becomes really important in every house and ATM bank vaults. But monitoring of those sensitive areas using camera will increase unnecessary storage and power consumption. Those are discussed in paper [3,21]. Smart monitoring using PIR sensor for detecting human presence became necessary. On detection of movement, camera will trigger surveillance and sends alert messages to required personnel. Blowfish encryption and decryption algorithm used for secure transmission of data over Internet.

[4]Incase of any post catastrophe salvage, it is imperative to distinguish any human nearness in the fiasco are for safeguarding action. It is additionally vital to get the data on the precise spot of caught unfortunate casualty and the separation between the human target and the best mass of the pit. UWB Radar flag handling is utilized to recognize human nearness. The framework[21] included modules for monostatic radar recieving wire, advanced flag handling, show, control supply and correspondence.

Because of expanding interest for natural investigation and the travel industry, the geographic states of Qinghai-Tibet Plateau were assessed for human settlement in document[5]. foresee the future appropriateness for human settlement under environmental change by supplanting the present atmosphere information with future atmosphere

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reenactment information[22]. The present human settlement map was given by nearby government and digitalized in ArcGIS 9.3 Desktop (ESRI) condition. These unique 288 points were mapped by the regulatory division. They changed them to the geographic examples dependent on enlisted HJ pictures and GPS focuses recorded in field overview.

Paper [6,23] talks about detecting human presence in environments like smart homes, hospitals, campuses etc. No single sensors can provide sufficient information to detect human presence and to differentiate human from other objects. Fusion of sensors can be adopted to provide this information. PIR and Ultrasonic sensors are used and voting based approach has been used to classify signals from human and non-human objects.

[7,24] In Medical technology, chest strap monitors are used for human respiration monitoring and health monitoring. These may cause discomfort and skin irritation. To avoid those problems, we can use Microwave Doppler radar phase modulation which is able to measure the heartbeat and respiration without any contact to the subject.

[8,25] Nowadays Cooperative Network is radically developing and connected in different applications. In this paper, Military application is taken for example, inspected the handiness of the supportive framework. In this paper it is planned to screen and perceive intruders among entire troopers in Military-Network. Human wearable sensor contraptions are used to screen the human development inside a Military area. HBSIDS recognizes an interloper center point inside entire centers in the region using the identified human sensor properties[26,27]. These properties exhibits the static characteristics which describes the sensor center point qualities like stature, weight, shape, internal development of the center with the ID [DNA-pattern]. The center point information are checked with the transmitted data.

III. EXISTING MODEL

A. Doppler Radar :

Radars are dynamic remote detecting frameworks that light up an article or scene and procedure the signs that are dissipated back to the accepting reception apparatus. While lighting up an item that is moving, for example, a mobile individual or the chest developments of an individual breathing, an improved rendition of the flag got at the radio wire is given by

$sRX(t) = \alpha e{-}j2\pi\ f\_t{+}2c\_n\ Rn(t)$ where α is the adequacy, which is influenced by the dispersing properties of the human body and the spread, f is the transporter recurrence of the transmitted flag, c is the speed of light, and $Rn(t)$ is the time-shifting reach to the nth moving piece of the individual. Since human developments are transiently powerful, the reaches to each body part hange nonlinearly as an element of time, yielding time-changing Doppler recurrence shifts. For instance, a streamlined model of a mobile individual would accept the arms as two dissipating objects, the legs as two dispersing objects, and whatever is left of the body as a solitary, bigger dispersing object. The flag reflected once more from a mobile individual at that point contains five recurrence shifts, four of which are transiently powerful because of the development as the arms and legs push ahead and back, and one recurrence, which is generally a static recurrence move, because of the mass movement of the middle. Actually, the dispersed flag is increasingly convoluted. Notwithstanding, this straightforward model catches the foremost angles associated with Doppler discovery and grouping of individuals. Human breath and heartbeat likewise produce time-differing signals with numerous recurrence parts. The chest pushes ahead and in reverse consistently amid the breathing cycle, and over this development are littler developments because of weights produced by the heart thumping. Therefore, one can quantify both the recurrence of breath and the pulse at the same time if the frequencies in the arrival flag can be settled.

It is these adjustments in stage granting recurrence shifts and their time-fluctuating nature, the structure of which can be diminished to conspicuous marks much of the time, that are chiefly of enthusiasm for microwave and millimeter-wave remote estimations of human properties. Range and sufficiency, utilized far less as often as possible in these applications, contain valuable data now and again. Nonetheless, the prevailing wellspring of data is contained in the stage, and along these lines, explicit types of radar equipment and flag preparing have turned out to be favored for remote human estimations.

The capacity to determine motions in recurrence is reliant on the mix time; hence, it is critical that a rational waveform is utilized. CW radar frameworks, where a solitary tone is produced and got, are a well known decision because of its inborn effortlessness. To execute a CW radar, without transmission capacity or any transient limitations on the waveform, a straightforward oscillator might be utilized as the transmit flag generator, and the beneficiary, after down change, need not have a quick digitizer. The primary property is waveform length that is utilized for combination, and this is then decided in computerized handling. While CW radar effortlessness in equipment and handling is an advantage, the powerlessness of a CW radar to decide range can be a downside in certain applications. Recurrence regulated CW (FMCW) radars confer a tweak onto the CW tone, along these lines enabling some range data to be determined notwithstanding estimating the frequencies. Heartbeat Doppler radars are additionally utilized, where the CW flag is occasionally abundancy balanced in an ON–OFF-keyed configuration, empowering higher pinnacle control in the transmitted flag while keeping up a lower normal power. While giving reach, beat Doppler radars likewise yield better affectability, since the pinnacle control is more prominent. The disadvantage is the nearness of range ambiguities coming about because of the intermittent "inspecting" of the CW waveform.

B. Raspberry Pi and PIR

In the present quick paced world, it has turned out to be hard to screen our working environments and homes for security. In this way, there is an expanded requirement for camera observation frameworks. By utilizing these frameworks, it is conceivable to constantly screen the working environments and homes for security purposes and store it for future references. Be that as it may, the primary downside of these framework are-manual observing, enormous capacity prerequisites and broad power utilization. To beat these issues, we have concocted a computerized shrewd observation framework. For this framework, we are utilizing Raspberry Pi with Passive Infrared (PIR) Sensor for movement location and a remote camera for video recording (Figure 1). The camera is associated with Raspberry Pi by means of the USB port and the PIR Sensor is associated through General Purpose Input Output (GPIO) pins of the Raspberry Pi. Movement is distinguished utilizing PIR sensor which turns on the camera for observation. The length for account can be set by the client accommodation.

While the video is being recorded, utilizing picture handling we are diagnosing a specific region named as red-ready zone for any suspicious movement. The entire account is sent to the server in a scrambled structure. On the off chance that any suspicious action occurs in the red-ready zone, at that point an uncommon flag is sent to the client. Current camera surveillance structures can be used for watching yet they require a gigantic proportion of data storing in view of predictable video recording. Be that as it may, our framework possibly screens the territory when movement is recognized and there is a probability of certain action. Our system also sends a notice, in case of suspicious development all things considered past the domain of creative ability to tirelessly keep a watch on such activities

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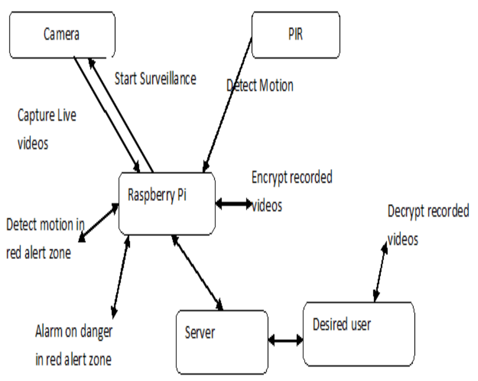

Figure 1 Architecture of Surveillance system

The working of surveillance system is divided into four units.

1. Streamer
2. Image Processing
3. Secured data transmission
4. Routing

C. UWB Radar

The framework incorporates modules for monostatic radar reception apparatus, computerized flag handling, show, control supply, and correspondence. For inquiry and-salvage reason, the UWB radar should address the issue of both great entering capacity and range goals. To make a tradeoff, the transfer speed is picked as 500 MHz. The radar is intended to be little, lightweight, and versatile. A LED screen is installed in the framework to show preparing results. The framework can likewise be constrained by a PC phone, the correspondence between them is brought out through a remote Ethernet connect. The power is provided by a lithium battery, and low power cost ensures long working hours. All the previously mentioned attributes make the UWB radar framework all around adjusted in post disaster situations. The square chart of the UWB radar framework is appeared in Fig. 1. Past investigations in street assessment demonstrate that, by distinguishing the layer interface reflections and contrasting and the earlier learning, structure data, for example, layer thickness can be evaluated.

Be that as it may, in post catastrophe situations, the circumstance is considerably more multifaceted: There is no earlier information of the rubble structure; the fallen building demonstrates no consistency, and this makes the reverberation flag troublesome for elucidation. Despite the fact that it is practically difficult to gauge the accurate structure, brief data would be alluring. Under the most broad circumstance, numerous survivors are caught in the depressions under rubbles brought about by the breakdown of structures, and there is some separation between a human target and the best

mass of the hole. This is a vital earlier learning for rubble structure data estimation, and the separation, on the off chance that it tends to be evaluated, is extremely useful for choosing the ideal salvage plan. Structure examination is executed upon A-filter follow information, in light of the fact that, in post debacle situations, usually difficult to get B-sweep or C-check information. Radar waves are reflected where the interface of two distinct layers is available. The got A-filter follow information Y are identified with the reflectivity coefficients R, which show up at the intersection of two homogeneous geographical layers, through a convolution condition. The convolution part is the occurrence wavelet w transmitted by the UWB radar. n speaks to the commotion instigated in the output system. The convolution condition can be communicated as

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Y = R ∗ w + n

To recreate reasonable signs, i.e., reflectivity coefficients R, a progression of GPR-flag preparing techniques is essential. In this system, human-target position is required as an earlier information. The following are the downsides :

- Overhead on preparing the video
- None of them are detecting for 360 degrees

I. PROPOSED MODEL

The proposed RCWL sensor model (Figure 2) is less expensive than existing system. And also detects for distance upto 7 m. It can detect both human and animals but not objects. Below are the required components for implementation.

- Arduino Nano
- Bluetooth Module
- Jumper Wires
- RCWL-0516 sensor
- LED

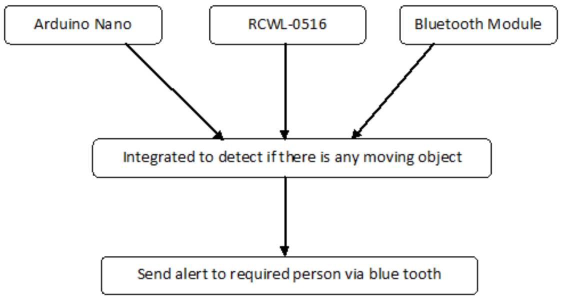

Figure 2 Proposed system model

RCWL-0516 (Figure 3) is a microwave radar sensor module Human body induction switch module Intelligent sensor. RCWL-0516 is a Doppler radar microwave movement sensor module which can go about as an option in contrast to a PIR movement sensor. This git store is an endeavor to gather the somewhat meager data on this board in one place. The forward side of the board is the agree with parts. This side should confront the items being distinguished. Try not to discourage forward agree with anything metallic. The posterior ought to have leeway of more than 1cm from any metal.

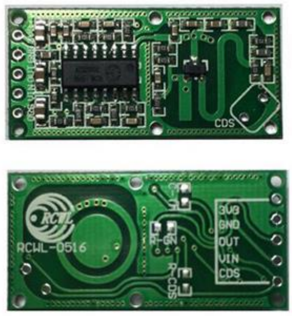

Figure 3 RCWL-0516 chip

IV.CONCLUSION :

The proposed RCWL sensor implementation effectively detects the moving objects in particular area. It effectively senses 360°. This seems to be cost effective when compared to PIR and Radiometers for short range sensing. Further it can be implemented in prohibited area or remote area to detect the human presence. An application with Arduino that empowers the client to detect movement through dividers and different materials. In spite of the fact that the RCWL-0516 microwave module does not permit coordinate treatment of the recurrence data, the Arduino sensor shows the capacities of the microwave innovation. The intensity of the Doppler move enables innovation to rough data about voyaging objects basically by breaking down the arrival recurrence. Many applications from police radar and even airplane localization utilize this frequency shift. In the motion sensing case, it is just a simple case of the true capabilities of frequency shifting using microwaves.

V.FUTURE ENHANCEMENT

In future work, aim is to classify the moving objects whether its object, animal or human. It is planned to use any of the image processing algorithms for classification. Furthermore aim is to integrate all the sensors together for data communication and bring it in one umbrella in cloud for monitoring the wide area remotely and avoid any disasters. And also this can be possibly implemented in the areas like hospitals (to avoid any unnecessary entry of human in prohibited area), bank vaults and safe (to avoid robbery), forest boundaries (to avoid unnecessary entry of naxalites or to avoid trapping of victims),.

REFERENCES

1. Saru Chandrakar, Ani Thomas, "Combating Man-Made Disaster using Remote Sensing", Second International Conference on Emerging Trends in Engineering and Technology, ICETET-09
2. Jeffrey A. Nanzer,, "A Review of Microwave Wireless Techniques for Human Presence Detection and Classification", IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, VOL. 65, NO. 5, MAY 2017
3. Akshat Jain, Shraddha Basantwani, Yogita Bang, Owais Kazi, "Smart Surveillance Monitoring System", 2017 International Conference on Data Management, Analytics and Innovation (ICDMAI), Zeal Education Society, Pune, India, Feb 24-26, 2017

Retrieval Number:F11000476S519/19©BEIESP

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Blue Eyes Intelligence Engineering & Sciences Publication

4. Zhu Zhang, Xiao Zhang, Hao Lv, Guohua Lu, Xijing Jing, and Jianqi Wang, “Human-Target Detection and Surrounding Structure Estimation Under a Simulated Rubble via UWB Radar”, IEEE GEOSCIENCE AND REMOTE SENSING LETTERS
5. ZHAO Jian, XU Min, LU Shi-lei, CAO Chun-xiang, “Human Settlement Evaluation in Mountain Areas Based on Remote Sensing, GIS and Ecological Niche Modeling”, Science Press and Institute of Mountain Hazards and Environment, CAS and Springer-Verlag Berlin Heidelberg 2013
6. Sonia(B), Manish Singh, Rashmi Dutta Baruah and Shivashankar B. Nair, “A Voting-Based Sensor Fusion Approach for Human Presence Detection”
7. Harikesh Dalal, Ananjan Basu, Mahesh P. Abegaonkar, “Remote sensing of vital sign of human body with radio frequency”, SPECIAL ISSUE VISVESVARAYA 2016 OF CSIT
8. R.Gopal, V.Parthasarathy, “HBSIDS: Human Body Sensor Based Intrusion Detection System in a Cooperative Network”, 2014 International Conference on Science Engineering and Management Research (ICSEMR)
9. Alexander G. Yarovoy and Leo P. Ligthart, “Signal Processing for Improved Detection of Trapped Victims Using UWB Radar,” IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, VOL. 48, NO. 4, APRIL 2010
10. Alexander S. Bugaev, V. Chapursky, Sergey I. Ivashov, Bauman, “09. Mathematical simulation of remote detection of human breathing and heartbeat by multifrequency radar on the background of local objects reflections,” IEEE Trans. Parallel Distrib. Syst., vol. 25, no. 6, pp. 39–50, Jun. 2014
11. B.Uma Shankar, “Novel Classification and Segmentation Techniques with Application to Remotely Sensed Images”, Springer-Verlag Berlin Heidelberg, 2007.
12. Rupinder Kaur, Dolly Sharma, “A Review of Various Categories of Satellite Image Processing in Remote Sensing”, Intelligent Communication, Control and Devices, Advances in Intelligent systems and computing 624.
13. Wei Gui, Wen Yang, Haijian Zhang, Guang Hua, “Geospatial Object Detection in High Resolution Satellite Images Based on Multi-Scale Convolutional Neural Network”
14. A.I.Alexanin, M.G.Alexanina, P.V.Babyak, “Satellite Image Structure Analysis with the GRID Technologies”, Institute of Automation and Control Processes, Far Eastern Branch of Russian Academy of Sciences.
15. Risnandar, Masayoshi Aritsugi, “Real-time deep satellite image quality assessment”, Journal of Real-Time Image Processing, 2018.
16. B.Stark, Y.Chen, C.Coopmans, K.P.Valavanis, “Concept of Operations of small unmanned Aerial system basis for Airworthiness towards Personal Remote Sensing”, Springer Science Business Media Dordrecht, 2015.
17. J.K.Lein, “Forensic Remote Sensing”, Springer Science Business Media, LLC 2012.
18. M.A.Gomarasca, “Digital Image Processing”, Springer Science Business Media, B.V.2009.
19. Bjoern Froemmer, Nils Roeder, Elke Hergenroether, “Interpret Human Gestures with a Time of Flight Camera Using Standard Image Processing Algorithms on a Distributed System”, Springer-Verlag Berlin Heidelberg, 2013.
20. V.F.Krapivin, A.M.Shutko, “Typical remote sensing technologies and data processing algorithms”, Springer-Verlag Berlin Heidelberg, 2012.
21. BalaAnand, M., Karthikeyan, N. & Karthik, S.” Designing a Framework for Communal Software: Based on the Assessment Using Relation Modelling”, Int J Parallel Prog (2018). https://doi.org/10.1007/s10766-018-0598-2
22. M.BalaAnand, S.Sankari, R.Sowmipriya, S.Sivaranjani "Identifying Fake User’s in Social Networks Using Non Verbal Behavior", International Journal of Technology and Engineering System (IJTES), Vol.7(2), pg:157-161.
23. Maram, B., Gnanasekar, J.M., Manogaran, G. et al. SOCA (2018). https://doi.org/10.1007/s11761-018-0249-x
24. M. BalaAnand, N. Karthikeyan, S. Karthick and C. B. Sivaparthipan, "Demonetization: a Visual Exploration and Pattern Identification of People Opinion on Tweets," 2018 International Conference on Soft-computing and Network Security (ICSNS), Coimbatore, India, 2018, pp. 1-7.
25. doi: 10.1109/ICSNS.2018.8573616
26. K. Anupriya, R. Gayathri, M. Balaanand and C. B. Sivaparthipan, "Eshopping Scam Identification using Machine Learning," 2018 International Conference on Soft-computing and Network Security (ICSNS), Coimbatore, India, 2018, pp. 1-7. doi: 10.1109/ICSNS.2018.8573687.
27. CB Sivaparthipan, N Karthikeyan, S Karthik “Designing statistical assessment healthcare information system for diabetics analysis using big data” Multimedia Tools and Applications, 2018
28. Zemedkun Solomon, C.B. Sivaparthipan, P. Punitha, M. BalaAnand, N. Karthikeyan “Certain Investigation on Power Preservation in Sensor Networks” ," 2018 International Conference on Soft-computing and Network Security (ICSNS), Coimbatore, India, 2018, doi: 10.1109/ICSNS.2018.8573688

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