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Fall Support Assistant for Elderly and Aged People

Swapnil Anand[1], Kiran Kumar Bonthu[2], Rimi Sarkar[3], Sandeep Kumar[4], Simran Sharma[5]
[1, 2, 3, 4, 5]*Information Science & Engineering, New Horizon College Of Engineering, Bangalore, India*

Abstract: The Android application that can identify older people who may fall. Android is an operating system that Anyone can easily construct their own application on an open source platform. Families and medical experts are often concerned about older people falling. According to experts, falls are the seventh rank for death cause in the US. Adults 68 and older who fall untreated run the risk of major health problems because 21% of falls necessitate emergency medical attention and 11% of falls will result in the fractures. This is the rationale for the creation of a system for the elderly that can detect falls and alert the caregiver. The software keeps tabs on the person and notifies the caregiver if anything is wrong. This Android app's ability to send alarm messages to the caregiver with the necessary information is one of its important features. Important details like their geolocation and directions are included in the alert messages. The individual has the authority to put an end to a false alarm before taking any further action. This project is to help the elderly. Through a user-friendly interface, the smartphone application can spot possible falls and provide alerts to families, doctors, and other caregivers.
Keywords: Android, Fall Detect, Tracker App.

I. INTRODUCTION

The second most common cause of fatalities and bodily harm among the elderly has been shown to be falls. If an elderly person falls, then results could be life-threatening, debilitating, or severe organ damage. It is not advantageous that understanding how to utilise advanced detection and analysis daily activity and recognige falls among elderly has become crucial due to of smartphones.

For smartphones with Android-based operating systems, Android phones are used to develop new applications, as well as to alter already-existing ones. A tool for distributing created applications to Android consumers is the Android Market. The creation, sharing, and updating of apps for the Android OS is made simple by the abundance of online tools and documentation.

The purpose of this article is to make android-based application that will enable caregivers to be notified as soon as possible when a person falls so can be done to assist that person. The application allows the caregiver to keep track of the person and receive alarm notifications when something goes wrong. It also gives them the person's geolocation and map instructions so they can easily find them. If any erroneous alerts are created, a buffer time is offered. This Android application offers all of this capabilities. All of the inputs are provided by smartphone sensors. All that is required of the user is to keep this app on their smartphone and the app will take other responsibilities.

II. LITERATURE REVIEW

Hen Wijay et al. suggested using a micro controller with ESP and Lofa sub modules as well as PIR to monitor movement in order to detect falls. Since all the sensors are exclusively deployed in bathrooms, the detection of falls only occurs there. When the sensors fail to detect any movement, a fall is recognised. The LoRa network is used as the communication arrangement for the PIR indicator. The source and destination of sensor data are both Lofa devices. As notifications to responsible family members, Lofa recipients transmit alarms and SMS messages [1].

Finding the characters that can effectively represent a drop is the key to identifying it, according to Xiadan Wu et alfall .'s dataset collection is required for the deep learning idea. The dataset is used ML model, and automatic fall detection is carried out. [2].

Zhiin Liou, et al. describe an affordable, easily constructed, and highly accurate non-contact approach for determining the status of the human body using a UV array sensor device. The method uses uncomplicated placement to find prospective body fall sites rather than simple motion analysis in an effort to achieve real-time implementation and data-free research is avoided. Additionally, a drop function is introduced to account for the impact of the human body's radiation temperature, and a grouping strategy is offered to avoid the issue of incorrectly recognising the area brought on by the Otsu area detection. After that, a simulation of a double-layered threshold approach is displayed in order to get rid of the fall-proportional jogging activity. The characteristics and random forest classifiers are combined to increase classification rate. [3].

Approaches and techniques for designing andriod system referred from[4-10].
To find intruders in cloud environments, Sravananan sir et al. have presented an effective SSA-based DBN intrusion chronological detection approach. First, the database's source records are retrieved, and those records are then managed using the DBN classifier, which is based on fuzzy scores. Since no new record is created or inspected in their research, sharing data is not appropriate for this technique [11].
The suggested technique by Kiran Kumar et al. expands on the goal and potential for work to improve blocking control within the traveller transporter and considers numerous use scenarios including Intelligent transportation, buildings and other demographics where spacing is applied social [13].
Methodologies for Android-Based Fall Detection and Tracking Systems are cited [14-20].
The structural accessibility layout of a system which can monitor thousands of elderly individuals, spot falls, and notify caregivers was illustrated by Dariiiusz Mrozekku et al [21-25]. Experiments on scalability were also conducted to determine the requirements for large-scale system operations [26-30]. A number MLmodels have also been verified to assess how well they perform during the detection phase [31-34]. Of all the models tested, Boosted Decision Trees achieved the best categorization performance. Additionally, they examined drop detection in IoT Edge devices and cloud-based data centers. [33].
A reliable automatic fall detection system that can also recognise a range of ordinary activities was presented by Oussaoma Kerdjjidj and colleagues (ADL). The technology is based on a portable Shimmer device that transmits inertial signals to a computer wirelessly. The quantity of data transferred may be compressed while consuming less energy by employing compression sensing (CS) technology.

III. SYSTEM DESIGN

A. A Flowchat for the System Data

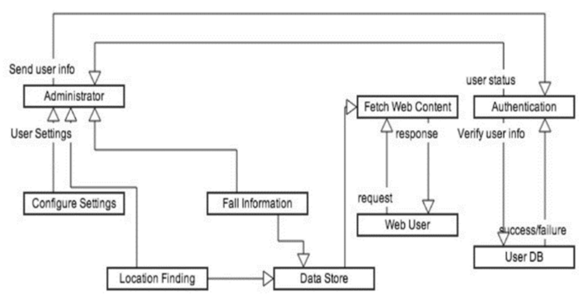

Fig 1. Diagram of the location-finding system's data flow

The administrator submits the user information for authentication in the location locating system flow diagram (Figure 1), and the system then verifies the user database to determine if the user information is accurate.

B. Sequence Diagram

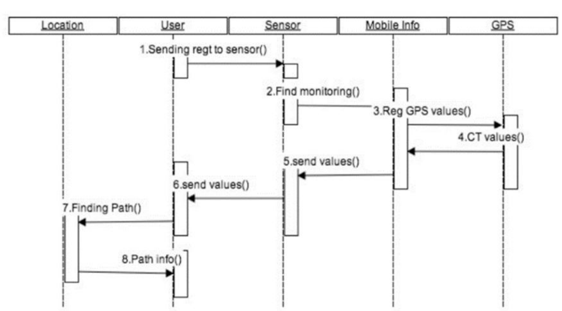

Fig 2. steps taken to describe events in Android application happened in order.

Figure 2 above provides a flow diagram of the actions taken to explain the order of events in the Android application.

IV. METHODOLOGY

The general method for fall detection is covered in this chapter. The computer watches the magnetic and accelerometer sensors in the background, looking for variations that mimic the acceleration and orientation fall patterns that occur up close. We will employ the Sensor Manager class to access the sensors since we need to monitor changes in acceleration and orientation. The method's sensor is given the sensor event class object. event listener each time a sensor value changes. It stores details such as the event timestamp, the type of sensor, the sensor data, and the accuracy.

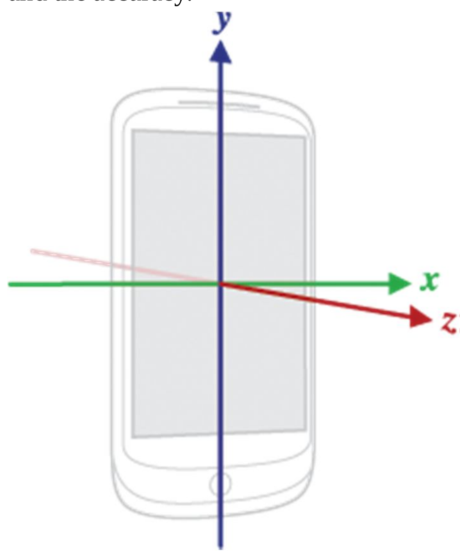

Figure 3. SensorEvent API Coordinate System

The Senson Event Coordinate system is depicted in figure 3 above; the X and Y axes are horizontal and point in the right direction, respectively, points away from the front face of the screen.
The results of accelerometer are utilised to calculate the mobile
device's orientation.
When someone falls, their posture rapidly changes down. The tone changes as a result of this. The fall causes the acceleration model to first produce a peak down and then a peak up. The acceleration typically decreases below 6 m/s when it drops, rises upto 12 m/s, and it then stabilises at 10 m/s. These sensors are being used by our app to determine when a fall occurs.

V. DISCUSSION

A. *Real-Time Fall Detection Challenges*

There are some issues that need to be resolved while creating a real-time fall detection system. We had to take into account embedded systems' restrictions on things like processing power because we decided to deploy the system on a mobile platform.
The evaluation process, which includes obtaining sensor data, computing the full set of 1214 attributes, applying model coefficients, and determining the fall probability, must take fewer than 5.2 seconds since sensor data must be tested for a fall every 5.2 seconds. The sensors readings are gathered by a different thread in order to accomplish this in real-time, and the full data bundle is then sent to the fall detection model.
Battery life is one of the key issues with the real-time fall detection technology. The Purple Robot programme was the only one we used to evaluate battery life, and it was able to function properly for more than 24 hours without recharging. We must test it in more actual circumstances, such as when making calls, sending texts, using the internet, etc. It would need to be taken into account for various phone models that subjects might desire to use.
Assuming an internet connection is available, the Purple Robot application now transfers all the data to a server in realtime. Data is accumulated on the device, which has a limited storage capacity, when there is no internet access. The device alerts the user to obtain a Wi-Fi connection as quickly as possible if there is insufficient storage space and data cannot be communicated since there is no internet connection. However, if the storage restrictions are reached, the oldest data records will be replaced by new data. We advise users to connect their devices to the internet at least once every day in order to avoid the problem of data loss regardless of wireless connectivity.

Not all data loss scenarios involve the storage cap. The data must pass the data quality test before being processed further, as was mentioned in the section on the methodologies. In the majority of the cases we saw, phone hardware issues led to invalid data clips, which could be resolved by restarting the computer. Such errors would be challenging to spot during deployment, and repeated failures go undiscovered. This could result in a missing response to a fall in addition to a loss of data. An additional update to the Purple Robot application can be created to detect hardware problems and either inform the user to reboot the device or do the reboot automatically to prevent this situation.

In conclusion, we were able to overcome the majority of the problems encountered, leading to an effective real-time fall detection system. Although more testing and certain upgrades could be beneficial, the fall detection system is generally dependable.

B. Future Efforts

The idea is to deploy a system that can detect falls, categorise them, analyse environmental data, and, if necessary, notify the user or other people for assistance. Fall detection is simply one component of this approach. The Rehabilitation Technologies and Outcomes lab will take the actions listed below to get this plan forward.

Increasing the amount of amputee data on real-world everyday activities and falls is one of the key objectives. To that aim, we will ask a select group of participants to carry a phone throughout the day for an extended amount of time (at least 6 months). The data will be closely watched at this time. There are no plans for medical intervention because we anticipate receiving a few false alarms each day for each individual at this stage. Once a week, we will check in with the subjects to make sure they didn't fall during that period. The collection of fall-like data (false positives) and real-life falls (if they happen) will help to fine-tune the detection algorithm for eventual deployment.

Additionally, a post-fall and pre-fall activity study will be done. Activity recognition could be used to analyse the 15 minutes before and after the fall to assess the accuracy or seriousness of the identified fall event (for example, did the individual move after the fall?). For further investigation, the GPS location, speed, and meteorological data can be gathered. By better comprehending the causes and conditions of actual falls among the amputee population, this vital knowledge should help develop more effective preventative measures in the future.

Not to mention, the user interface will be greatly enhanced to make it simple to use. The Purple Robot background process has many more features that would be confusing to consumers, thus it is likely that a separate programme would be created that will connect with it. It will probably take several iterations based on user feedback to create a user-friendly interface, but it is essential to have the best compliance for long-term use.

VI. CONCLUSION

A fall tracking and detection software for Android is employed to identify elderly persons who may fall, locate them, and notify security personnel of any problems. This Android app's ability to send a message warning to the caretaker with all pertinent information is one of its key features. Important details like location and routes are provided in warning messages. The person has the authority to put an end to a false alarm before proceeding with action in further case.

VII. ACKNOWLEDGMENT

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REFERENCES

[1] Arvind S Kapse, Ritom T., Shanmugan S., Ayush S., Shruti Banta S. “Android based fall detection and tracking application for ageed people”
[2] Lukas Tanutama, Henly Wijaya, Dhevy Ardianti, “Elderly Fall Detection and Warning System”, International Conference on Eco Engineering Development, 2021, pp. 1-8
[3] Xiaodan Wu, Yumeng Zheng, Chao-Hsien Chu, Lingyu Cheng, Jungyoon Kim, “Applying deep learning technologys for automatic falsl detection using mobile sensors”, Biomedical Signals Processing and Control, Volume 72, Part B, pp. 1-12
[4] Zhixin Liu , Ming Yang, Yazhou Yuan, Kit Yan Chan, “Fall Detection and Personnel Tracking System Using Infrared Array Sensors”, IEEE Sensors Journal (Volume: 20, Issue: 16, Aug.15, 2020, pp. 9558 – 9566
[5] Prashanth,P., Anandhi, R. J.(2019). A Review on Data Science Approach Towards Decision-Making. International Journal of Scientific Researcsh in Computer Sciencse, Engineering and Information Technology,9(4),692-697
[6] Sowmya, H.K., & Anandhi, R. J.(2020).DCUIS: An Exhaustive Algorithm for PreProcessing of Web Log File. International Journal of Engineering Trends and Technology, ISSN: 2231-5381 ,36-41
[7] Shobha, T., & Anandhi, R. J.(2020).Robust Classifier Design with Ensemble Neural Network using Differential Evolution. International Journal of Engineering Trends and Technology,ISSN: 2231-5381 ,174-181

[8] Patil, S., & Anandhi, R. J. (2020).Diversity based self-adaptive clusters using PSO clustering for crime data . International Journal of Information Technology, 12, 319–327

[9] Kalaivanan, S. (2021). Quality of servicse (QoS) and priority awasre models for eneergy efficient and demand routing proceduree in mobilee ad hoc networrks. Journal of Ambient Intelligent and Humanised Computer, 12(3), 4019-4026.

[10] Arvind, S. K.(2020).Personalized Web Search: A Review. International Journal of Scientific Research in Computer Sciences, Engineering and Information Technology,11(4),31-34

[11] Mangayarkarasi, P., & Muhammad Shahbaz, K., & Sunil, K., & Pramod, S.(2020).Smart Vision System for Visually Impaired People. International Research Journal of Engineering and Technology,4(7),943-946.

[12] Loheswaran Karuppusamy, Jayavadivel Ravi, Murali Dabbu, Srinivasan Lakshmanan, “Chronological salp swarm algorithm based deep belief network for intrusion detection in cloud using fuzzy entropy”, Int J Numer Model. e2948, 13 August 2021, pp. 1-19

[13] K. Saravanan , S. Anthoniraj , S. Kumarganesh , T. Senthil Kumar , K. Martin Sagayam, “WMLP: Web-based Multi-Layer protocols for Emergency Data Transmission in Mobile Ad Hoc Network”, E3S Web of Conferences 297, 01065 (2021), pp. 1-15

[14] K S Gautam, et. al., “Video Analytics baseed Intelligenttt Transporrtt Sysstem for passenger flow forecasts and Social Dissttancing Indication”, Turkish Journal of Computer and Mathematics Education (TURCOMAT), Vol. 12 No. 7 (2021), pp. 1-9

[15] Karthiyayini, J., & Prapul kumar, A., & Pawan Jenu, & Pawan kumar, S.,(2020). Food and Nutrition Evaluation for the Visually Impaired. Internationaal Jouurnal for Research in Applied Science & Engineering Technology (IJRASET),5(8), (1893-1896)

[16] Shanmugam Shobha, M., & Rekha B Venkatapur, (2020). Enhancement of Signature Schemes for Heightening Security inBlockchain. Internatiional Journaal of Scientific Research in Computer Sciences, Engineeeering and Informations Technology © 2019 IJSRCSEIT, 9(4), (645-656).

[17] Vandana, C.P., & Ajeeth A. Chikkamannur, (2020). Feature Selection: An empirical Study. International Journal on Emerging Trends in Technology (IJETT), 2(69), (165-170).

[18] Rafega Beham, & Anush D Singh, & Bharani Prabhakaran, & Joshua Linton, J.,(2020). Human Detection using Unmanned ground vehicle. Internationall Journnal of Scientific Research in Computer Science, Engineering and Information Technology, 3(6), (304-311).

[19] Mounica, B., & Sudarshan, C., & Pranav Pandhi , & Somya Singh, & Ashwini Holla, (2020). Breast Cancer Prediction Using ML Techniques. Internationaal Journral of engineering Research & Technology, 5(9), (573-580).

[20] Gangadhar Immadi, (2020), Crop health monitoring system using machine learning. International Journal of Scientific Research in Computer Science, Engineering and Information Technology © 2019 IJSRCSEIT, 9(4), (678-686).

[21] B.Swathi. Multi-Objective Optimization Approach to Generate String Test Data. International Journal of Scientific Research in Computer Science, Engineering and Information Technology © 2019 IJSRCSEIT | Volume 4 | Issue 9 | ISSN : 2456-3307

[22] Divya, K.V. Association Rule Based Recommendation System Using Mapreduce. International Journal of Scientific Research in Computer Science, Engineering and Information Technology © 2019 IJSRCSEIT | Volume 4 | Issue 9 | ISSN: 2456-3307

[23] K M Bilvika. Automotive Industry Redefined By Information Technology: Review. International Journal of Scientific Research in Computer Science, Engineering and Information Technology © 2019 IJSRCSEIT | Volume 4 | Issue 9 | ISSN: 2456-3307.

[24] Gowri , Prasad, Vrinda Raveendran, Sri Vidya B M, & Tejavati Hedge.(2020). Machine Learning Approaches on Diabetic Retinopathy Prediction. Intesrnational Journal of Scientifcic Research in Computer Science, Engineering and Information Technology, © 2020 IJSRCSEIT | Volume 6 | Issue 3| ISSN: 2456-3307.

[25] Mangayarkarasi, P., & Muhammad Shahbaz, K., & Sunil, K., & Pramod, S.(2020).Smart Vision System for Visually Impaired People. Internatioional Researsch Journasl of Engineering and Technology,4(7),943-946.

[26] Karthiyayini, J., & Dhanya Shree, & Simran Killedar, & Ummadi Pawan Kumar, & Kishan Kumar,(2020). Charging station for E-Vehicles using solar with IOT. International Joursrnal for Research in Applied Science & Engineerimnng Technology (IJRASET), 5(8), (2040-2043).

[27] Karthiyayini, J., & Bikash Prajapati, & Aaditya Chaudhary, (2020). Android based Hearing Aid with Gestures. Internatioional Journal for Ressearch in Applied Science & Engineering Technology (IJRASET), 5(7),(2052-2058).

[28] Karthiyayini, J., & Pramod, M., & Vamsipriya, A., & Armaan Sheriff, & Gaurav Anand, (2020). Assisting Visually Impaired for Shopping using OCR(Optical Character Recognition), International Journal for Research in Applied Science & Engineering Technology (IJRASET), 5(7), (1324-1327).

[29] Karthiyayini, J.,(2020). Robot Assisted Emergency and Rescue System with Wireless Sensors. Internatsdional Journal of Research and Scientific Innovation, 12(4), (28-32).

[30] Vandana, C.P., & Siddarth Indoria, & Sharan Gouda, & Sinchana Bhaskar, (2020). A Literature Review on Sentiment Analysis. Internatiodsnal Journal of Scientific Research in Computer Science, Engineering and Information Technology, 3(6), (204-362).

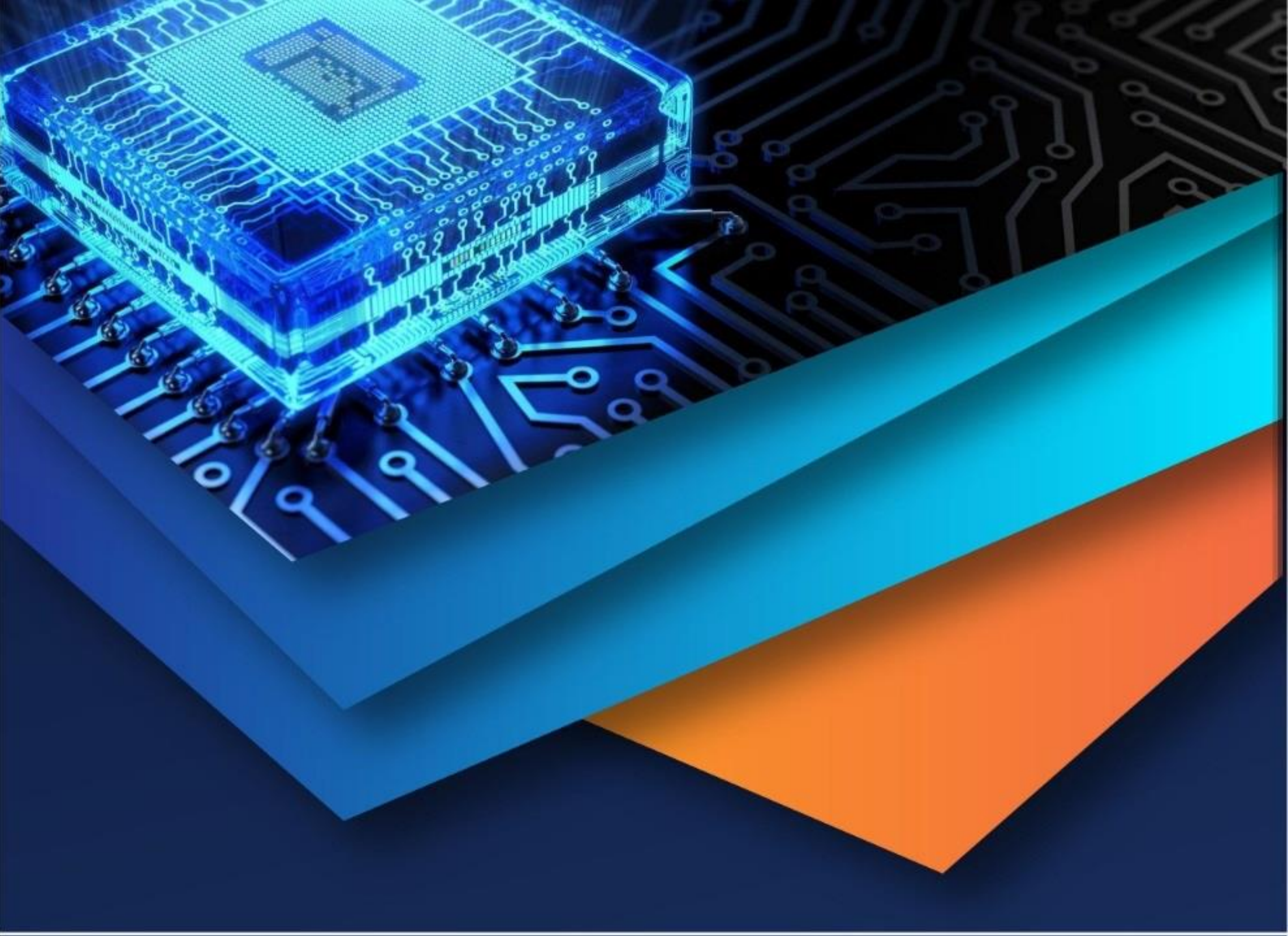
[31] Vandana, C.P., & Aashika M Suresh, & Nikitha Nanju, K., & Sanjana V Nagvekar, (2020). Solar Energy Equipped IoT Based Vacuum Cleaner. Internatiosanal Journasl of Scientific Research in Computer Science, Engineering and Information Technology, 3(6), (325-331).

[32] Shanmugam Shobha, M., & Nymisha, P., & Shanmathi Kailasam, & Bhawik Tanna, (2020). Covid-19 Visualizer. Internationasll Journasl for Research in Applied Science and Engineering Technology, 5(8), (2796-2804).

[33] Shobha, M., S., & Deepa, S., & Ashwini Singh, A., & Pavithra, P., S., (2020). Waste Bifurcation. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 2(6), (453-459).

[34] Dariusz Mrozek, Anna Koczur, Boz˙ena Małysiak-Mrozek, Fall detection in older adults with mobile IoT devices and machine learning in the cloud, Elsevier Inc. Information Sciences 537 (2020) 132–147.

[35] Oussama Kerdjidj, Naeem Ramzan, Khalida Ghanem, “Abbes Amira, Fatima Chouireb, Fall detection and human activity classification using wearable sensors and compressed sensing”, Journal of Ambient Intelligence and Humanized Computing, 11(9), January 2020, pp. 349–361



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