Salud, Ciencia y Tecnología - Serie de Conferencias. 2024; 3:624
doi: 10.56294/sctconf2024624

Category: Science, Technology, Engineering and Mathematics (STEM)

ORIGINAL

Smart Commodities Public Distribution System using IoT

Sistema inteligente de distribución pública de productos básicos mediante IoT

N. Murali[1], S. Palani Murugan[2], K. Sivakumar[3], Manojkumar Vivekanandan[4], Mishmala Sushith[5], S.Manikandan[6]

[1]Department of Computer Science and Engineering, E.G.S. Pillay Engineering College. Tamil Nadu, India.
[2]Department of Artificial Intelligence and Data Science, E.G.S. Pillay Engineering College. Tamil Nadu, India.
[3]Department of Atificial Intelligence and Data Science, Nehru Institute of Engineering and Technology. Coimbatore, Tamil Nadu, India.
[4]Department of Computer Science & Engineering, School of Engineering and Applied Sciences (SEAS), SRM University-AP. Amaravati, Andhra Pradesh, India.
[5]Department of Information Technology, Adithya Institute of Technology. Coimbatore, Tamil Nadu, India.
[6]Department of Information Technology, E.G.S. Pillay Engineering College. Nagapattinam, Tamil Nadu, India.

Cite as: Murali N, Palani Murugan S, Sivakumar K, Vivekanandan M, Sushith M, Manikandan S. Smart Commodities Public Distribution System using IoT. Salud, Ciencia y Tecnología - Serie de Conferencias 2024; 3:624. https://doi.org/10.56294/sctconf2024624

Received: 27-08-2023 **Reviewed:** 03-10-2023 **Accepted:** 29-12-2023 **Published:** 30-12-2023

ABSTRACT

In non-modern countries like India, the approach of allocating basic local goods to plight families is a significant approach to meeting the needs of a large number of people. The ongoing public dissemination system in Allot stores necessitates manual sum evaluation and trade record maintenance. The ongoing system has a ton of issues. One example is the IOT-based shrewd public appropriation framework project, which proposes a programmed method for getting products to verified cardholders. Similar to this, an informational index keeps track of the nuances of trades. Clients should enter their ID and mystery expression to get to their record through the High level cell. They are able to see the stock availability when they are successfully endorsed in. This structure uses a Raspberry Pi as the controller and uses a Specifics extraction-based extraordinary imprint coordinating computation, which has a higher accuracy score than previous versions. DC engines that are directly controlled by a Raspberry Pi for programmed product appropriation are used to open and close the valves. All along, one of the relatives need to enter one of a kind username and secret articulation. Right when client is supported in, he/she can see things that is open for that specific family account. The customer must provide a remarkable finger impression to the next level of confirmation in order to manage the items.

Keywords: IoT; Smart Computing; Prediction; Performance; Accuracy.

RESUMEN

En países no modernos como la India, el planteamiento de asignar bienes locales básicos a familias en apuros es un enfoque importante para satisfacer las necesidades de un gran número de personas. El sistema de difusión pública en curso en los almacenes Allot requiere la evaluación manual de las sumas y el mantenimiento de registros comerciales. El sistema en curso tiene un montón de problemas. Un ejemplo es el proyecto de marco de apropiación pública astuto basado en el IoT, que propone un método programado para hacer llegar los productos a los titulares de tarjetas verificadas. De forma similar, un índice informativo realiza un seguimiento de los matices de las operaciones. Los clientes deben introducir su ID y su expresión misteriosa para acceder a su registro a través de la celda de alto nivel. Podrán ver la disponibilidad de existencias cuando se hayan registrado correctamente. Esta estructura utiliza una Raspberry Pi como controlador y utiliza un cálculo de coordinación de huellas extraordinario basado en la extracción de Specifics, que tiene una puntuación de precisión más alta que las versiones anteriores. Para abrir y cerrar las válvulas se utilizan

motores de corriente continua que son controlados directamente por una Raspberry Pi para la apropiación programada del producto. Todo el tiempo, uno de los familiares necesidad de introducir uno de un nombre de usuario tipo y la articulación secreto. Justo cuando el cliente es apoyado en, él / ella puede ver las cosas que está abierto para esa cuenta específica de la familia. El cliente debe proporcionar una impresión notable dedo al siguiente nivel de confirmación con el fin de gestionar los elementos.

Palabras clave: IoT; Smart Computing; Predicción; Rendimiento; Precisión.

INTRODUCTION

Food, oil, and fuel are provided by the government to financially disadvantaged individuals at supported rates and distributed to the general public through allot shops. The farmers will give the stocks to these distribution shops, which will then, at that point, be sold at supported rates. These stores reliably get new stock, which should be made accessible to the general population. The majority of distribute shops' owners engage in shady behavior, and the appropriate amount is not distributed to those in need. This structure, which coordinates the going with features, has been constructed to combat these dishonest activities.

- The system is secure thanks to a novel finger impression approval structure that can identify a specific customer.[1]
- The Android app should be used to select the item and its price.[2]
- Information that has been predetermined about the proportion that will be distributed.[3]
- Specialized tool for allotment conveyance. From the distribution structure that was prevalent during The Subsequent Extraordinary Conflict to a massive government-backed retirement program designed to ensure the nation's food security, the country's public transportation system has undergone frequent changes. The central government acquires and supplies exceptional basic goods at fixed central issue costs under the public course Structure (PDS).[4,5,6,7,8,9]

In general distribution system various products are included such as oil, ghee, candle, sugar, etc., were distributed by the PDS, but the current division of food and supplies has restricted the fair value allocation to a small number of cereals, wheat, rice, sugar, and light oil. India is the world's biggest appointment association, with 478 000 extent stores working the nation over's numerous districts, towns, and metropolitan regions. In light of the residents' financial circumstances, the Division of Food and Supplies is handing out distribute cards. There are basically two kinds of cards:[10,11,12,13,14,15]

Smart card based distribution

Hardcopy poster and attached sheet: there are a ton of misleading exercises happening in unregulated expense shops disregarding the essential merchandise act. Customers are limited to standing in long lines for a long time together for purchasing items and commodity. General's subtleties are dealing with in the system. As a result, the card holder should clearly mark each transaction in the book. The book's backing of records is annoying. In this way, a strong and mechanized structure should limit the misappropriations. The amount allotted for these cards is determined by taking into account the members of the cardholder's. The assortment of information and proof of renouncement of the significant control demands and moves made against them under the arrangements of the Essential Products Act comprise execution.[16,17,18,19,20]

Related Works

The distribution system that the English introduced during The Subsequent Extraordinary Conflict served as the foundation for the expansion of public distribution of essential items in India. The organization began operations in Bombay in 1939 and maintained consistent contact with various metropolitan networks and cities. Thirteen metropolitan regions were brought under consideration of proportioning close to the end of 1943, metropolitan networks. There were also a few provincial areas with a persistent shortage. PDS is available in light of the fact that it is following a comparable model. In the field of PDS, there is simply little change.[7,8,21,22,23,24]

The client is at first requested to swipe the RFID card and Raspberry pi considers the astute imprint ID with the information base. Tolerating the imprint ID orchestrates, the client is moved closer to channel the finger. Right when the client character is endorsed, the item and total can be looked over voice orders. The structure controls the actual product, accepting that the item and sum are significant. The client receives a message outlining the specifics of the transaction. Anyway, expecting the endorsement fizzles the construction hangs on for genuine endorsement.[9,25,26,27,28] Sana et al.[10] presents a direct and essentially adaptable Degree Dissipating structure with biometric endorsement. The clever card takes the place of the traditional distribute card that is made of paper. The framework is connected with the server through web. Each time before dispense blend each client needs to login into the framework.[29,30,31,32,33,34]

Since the legitimate balance is taken from the client's monetary balance, there is no immediate relationship between the extent retailer and the client. As a result, the client does not have to pay any actual money. The exchange details are sent to variable clients. Bhalekar et al.[11] assert that, this paper proposes a RFID and biometrics-based web-based savvy distribution card system. The RFID label will contain family information. RFID mark given to a specific client needs show to the RFID peruser. It will use biometrics to determine whether client validation is carried out and whether the card is substantial. The family members will display the month-to-month offer if the client is examined. The electronic informational index keeps records up to date even after the extent moves. A Close to Provide details regarding Novel Imprint Matching Computations for EVM, by Ashok Kumar et al.[12]. Quick organizing, specific planning, and matching with distance in mind are the three matching methods. By selecting 20000 card dataset and the outcomes were seen by driving political race with the help of these matching methods and the best matching methodology is found. This study, in accordance with Sharath et al.[5], addresses the issue of finger impression qualification by determining the amount of information available in specific features to select the result of biometric inputs.

Smart System

Counterfeit Focal points Takeoff: at this point, misdirected edge breaks and edge get affiliations caused by over-inking cannot be completely discarded. Additionally, some of the earlier strategies include some fictitious image-centered subtleties. So to keep the attestation structure reliable these bogus particulars should be killed. The first step is to ascertain the bury edge distance D, which is the typical distance that separates two adjacent edges. Clear each line to record the cover edge distance in this way. Using a MATLAB morphological action BWLABEL, we mark all decreased edges in the finger impression picture for further action.[35,36,37,38,39,40]

Phase of the plan: choose one moment from each of the two images of finger impressions you need to coordinate to compare the edges of the two referred to seemingly insignificant details. If the resemblance is greater than an edge, switch each specific game plan to a different coordination structure whose start is at the point mentioned and whose x turn is accidental with the point's heading.[41,42,43,44,45,46]

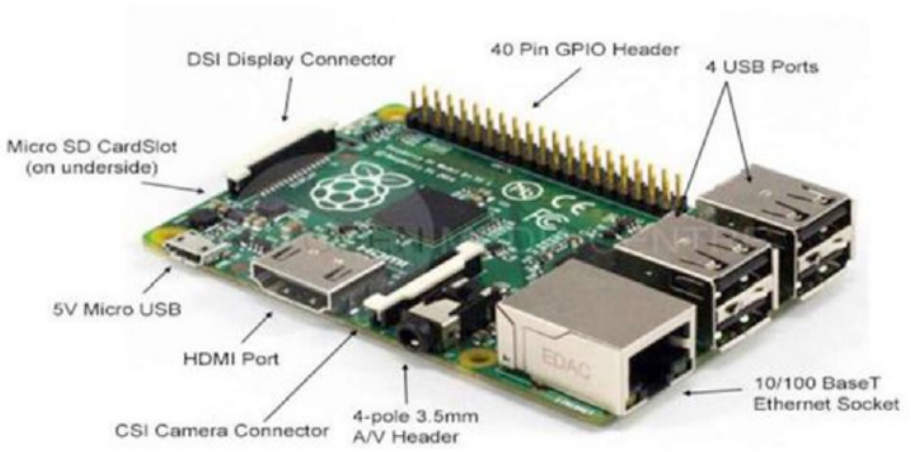

Figure 1. IoT Components and Connection Points

Phase of match: they were used in the adaptable match estimation to count the matched specifics matches by anticipating two subtleties with nearly identical positions and bearings after obtaining two plans with different details centers. In the event that the apparently immaterial subtleties to be matched are held inside a square-formed box and the course irregularity between them is negligible, then the two subtleties are viewed as matched subtleties matches. Each second in the design image either only has one look at specifics or there are no pairs of subtleties.[47,48,49,50,51]

Degree of Social Distance Arranging: the structure is getting the average particulars point set (nuances focuses present in both the base and the information picture). Finding the number of typical subtleties centers open in two or three finger impression pictures is the primary motivation behind this stage. This stage provides the average for two distinct finger impression images, where N1 and N2 are independently recognized specifics concentrates (where N1 and N2 need not be comparable).[52,53,54]

Finger impression module: the Raspberry-pi is connected to a novel finger impression module. A nuances assessment is utilized to manage the finger impression acquired from the module. Intriguing engraving managing coordinates two fragments: enlistment of finger impressions and coordination of finger impressions During signing up, client requirements to enter the finger twice. The system will handle the betray finger pictures, foster a finger shape in view of taking care of results, and store the design.[55,56]

https://doi.org/10.56294/sctconf2024624

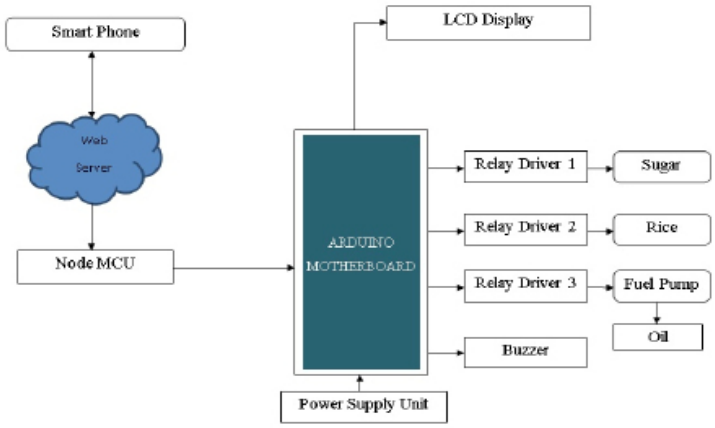

Figure 2. Processing System

Pi: Raspberry uses the informational index to investigate the particulars of each family member. Raspberry pi takes the consistent number from peruser and access taking a gander at record in the enlightening list as per the thumbprint perceiving proof.[57,58]

Engine and Move circuit: the valve's course of action—opening and closing—is controlled by the motors. The transfer (clock) circuit limits these motors. The move circuit is used to measure the grain's weight because the grain falls through the channel and the valve closes in accordance with the normal aggregate.[59,60,61]

Water driven Valve: in a structure driven by water, stream control is necessary to control speed. This valve controls the speed of an actuator by regulating the stream rate. The valve is limited by the electric flow that flows through a DC engine. The strain-driven valve is operated by the motor to distribute the oil to the cardholders.[62,63,64]

RESULTS

The depictions of the outcome are displayed under. The unique mark module communicates with the Raspberry Pi. The client enters exceptional ID and secret word into the android application is then avowed utilizing put away enlightening file. It is accompanied by distinctive, recognizable finger impression evidence to confirm the client's personality. Coming about to supporting ID and secret word client is moved nearer to take a gander at the finger which goes presumably insistence to stop any fake action in the event that in case the ID and secret express are hacked. The regulating holders for rice, sugar, and any fluid are depicted in figure 3. They are connected via H-length to DC motors (for rice and sugar) and a strain-driven valve strategy (for fluid).

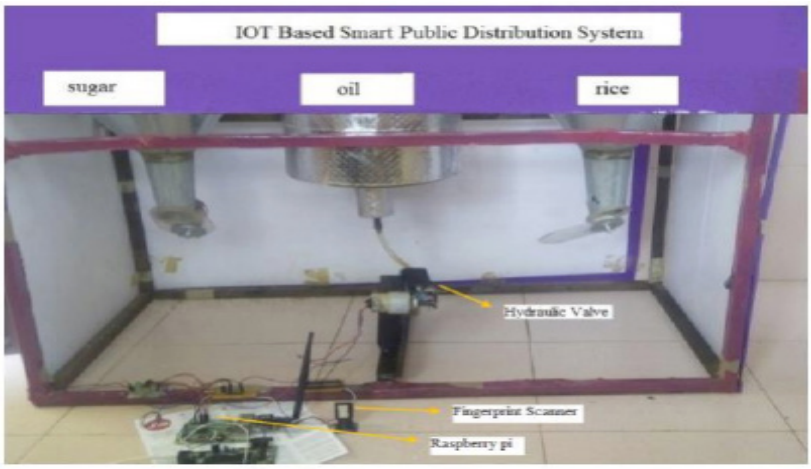

Figure 3. Real time implementation setup

https://doi.org/10.56294/sctconf2024624

They can buy, select there novel engraving, erase annoying finger impression or view the profile. The client can now choose fail horrendously rent merchandise like rice, sugar, and oil in light of their necessities by pressing the select button, as displayed in figure 3. Figure 4 gives a see of the Android application that shows the different products.

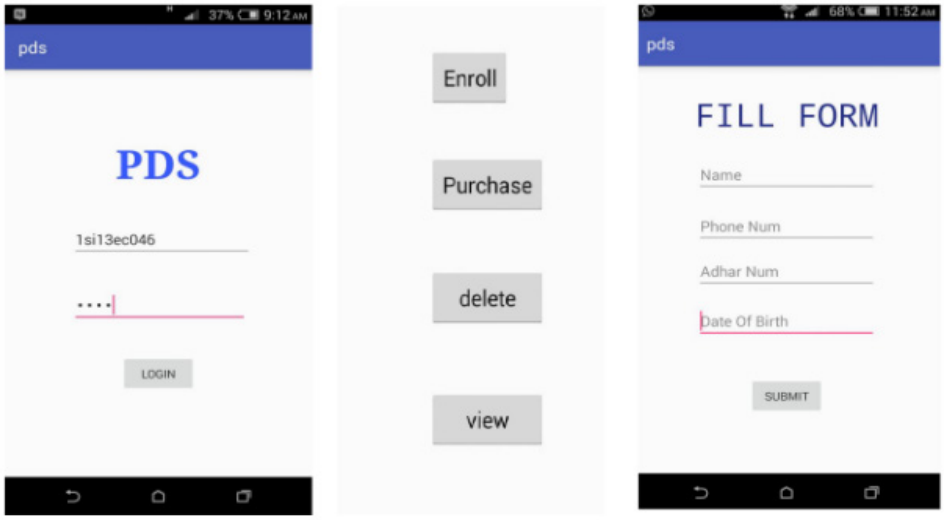

Figure 4. Login Page and Forms

Finger impressions that are in sync are shown in the illustration. The representation depicts various items and controls one kilogram of rice; if a customer requires an additional kilogram of rice, they must unquestionably press the rice button. The order in which the amounts of the various items were looked at is shown in table 1.

Table 1. Selected Commodities and Quantity

Product	Value	Measure	Error Index	Existing Error
Rice	50	2	0,0	25gms
	100	2,50	0,15	35gms
Sugar	50	3	0,20	25gms
	100	4,50	0,20	50gms
Oil	50	1	0	20ml
	100	2	0,1	35ml
Wheat	50	1	0,0	25gms
	100	2	0,1	25gms
Dal	50	2	0,12	25gms
	100	3	0,15	25gms

Figure 5. Each stage product dispenses details

The difference in weight between rice and sugar ranges from 0 to 20 grams. In the event that of oil the evaluation screw up is around 0-50 ml The ideal proportion of degree which is allocated by the design is surveyed by changing the postponement of opening and shutting of the valve. The trail and slip-up method is used to get rid of the deferral.

https://doi.org/10.56294/sctconf2024624

Table 2. Various person selected details and measurements

Level	Reference	Mixed Reference	Similarity (%)
A1	50	35	81
A2	48	37	88
A3	46	38	81
A4	47	32	82
A5	48	33	83
UA	40	31	82

This system, which is different from the previous structure in that the precision in concede assessment is higher, provides better execution. In table 2, the degree of similarity between tests of the same unique mark with different arrangements is compared to one another and organized by particulars. As the individual finger impression's arrangement changes, the similarities between the reference and the information grow.

CONCLUSION

IoT based Wonderful public vehicle structure is a robotization framework and it is an award over the continuous fair cost shops. The structure of finger impression confirmation is more secure and precise because it makes use of Subtleties extraction-based estimation. It protects the interests of ordinary people and ensures the nation's food security by removing holders of fake extent cards. The level of degradation can be reduced through its implementation. If the Android application is used to select the quantity and the product, the framework will become smarter and more powerful. It will assist the country's economy with appearing at new levels. The mechanized PDS is not difficult to finish and requires astonishingly less irksome work when stood apart from the other framework. Because there are no manual steps involved and all information is stored in an informational index, this system prevents disregard displays. As a result, this structure will be extremely beneficial to individuals. Another way to promote the project is to make it possible to pay for goods purchased online. As such it will make structure more changed. With the assistance of the web, correspondence distances among client and server can be expanded.

REFERENCE

1. Suhas K, Suhas N, Sumukh B, Sunil S, An undertaking report on Open conveyance framework directed by Mrs. S Mala, Division of Gadgets and Correspondence, 2022.

2. Sana A, Qader P, Dube R , Brilliant Card based e-Public Circulation Framework , Between public Diary of Cutting edge Exploration in PC and Correspondence Designing, 2021

3. Bhalekar D, Kulkarni R, Lawande K, Patil V, Online Apportion Card Framework by utilizing RFID and Biometrics , Global Diary of Cutting edge Exploration Software engineering and Programming 5(10), pp. 849-851, 2023

4. Manikandan S and Chinnadurai, M, Powerful Energy Versatile and Utilization in Remote Sensor Organization Utilizing Conveyed Source Coding and Testing Procedures, Remote Individual Correspondence, 118, 1393-1404, 2021

5. S. Manikandan, N. Poongavanam, V. Vivekanandhan and T. A. Mohanaprakash, "Execution Correlation of Different Remote Sensor Organization Dataset utilizing Profound Learning Orders," 2022 IEEE second Global Meeting on Portable Organizations and Remote Correspondences (ICMNWC), Tumkur, Karnataka, India, 2022, pp. 1-4

6. Ashok Kumar D, Ummal Sariba B, A Relative Report on Unique mark Matching Calculations for EVM, Diary of PC Sciences and Applications, Vol. 1, No. 4, 2019

7. Sharath P, Prabhakar S, Jain A, On the uniqueness of fingerprints, IEEE Exchanges on Example Examination and Machine Insight, 8(12), pp.1010-1025, 2012

8. Xuejun T, Bir B, Unique mark matching by hereditary, calculations, Example Acknowledgment Society, Distributed by Elsevier Ltd, 39 pp: 465-477, 2016.

https://doi.org/10.56294/sctconf2024624

9. Frank M, Ricci E. Education for sustainability: Transforming school curricula. Southern Perspective / Perspectiva Austral 2023;1:3–3. https://doi.org/10.56294/pa20233.

10. Malaver YYV, Claudio BAM, Ruiz JAZ. Quality of service and user satisfaction of a police station in a district of northern Lima. Southern Perspective / Perspectiva Austral 2024;2:20–20. https://doi.org/10.56294/pa202420.

11. Deepika S, Rashmi S, Details Based Unique finger impression Matching for Distinguishing proof and Confirmation, Worldwide Diary of Science and Exploration (IJSR), 17, 2021

12. A project report on Fingerprint Recognition was written by Rohit S, Utkarsh S, and Vinay G for the Department of Computer Science at the Indian Institute of Technology in 2018

13. Application of GIS in COVID -19 Monitoring and Surveillance, International Journal for Research in Applied Science & Engineering Technology, 8(5), 2021), by Raju K, Lavanya R, Manikandan S, and Srilekha K.

14. Amado DPA, Diaz FAC, Pantoja R del PC, Sanchez LMB. Benefits of Artificial Intelligence and its Innovation in Organizations. AG Multidisciplinar 2023;1:15-15. https://doi.org/10.62486/agmu202315.

15. Asencios-Trujillo L, Asencios-Trujillo L, Rosa-Longobardi CL, Gallegos-Espinoza D, Piñas-Rivera L. Stress level in nursing professionals in a hospital center during the COVID-19 pandemic. Health Leadership and Quality of Life 2024;3:45-45. https://doi.org/10.56294/hl202445.

16. Asencios-Trujillo L, Asencios-Trujillo L, Rosa-Longobardi CL, Gallegos-Espinoza D, Piñas-Rivera L. Level of empathy in nursing professionals working in a hospital institution in Callao. Health Leadership and Quality of Life 2024;3:44-44. https://doi.org/10.56294/hl202444.

17. Asencios-Trujillo L, Asencios-Trujillo L, Rosa-Longobardi CL, Gallegos-Espinoza D, Piñas-Rivera L. E-health literacy level of university teachers attending first level health centers in South Lima. Health Leadership and Quality of Life 2024;3:49-49. https://doi.org/10.56294/hl202449.

18. Auza-Santivañez JC, Lopez-Quispe AG, Carías A, Huanca BA, Remón AS, Condo-Gutierrez AR, et al. Improvements in functionality and quality of life after aquatic therapy in stroke survivors. AG Salud 2023;1:15-15. https://doi.org/10.62486/agsalud202315.

19. Aveiro-Róbalo TR, Pérez-Del-Vallín V. Gamification for well-being: applications for health and fitness. Gamification and Augmented Reality 2023;1:16-16. https://doi.org/10.56294/gr202316.

20. Barrios CJC, Hereñú MP, Francisco SM. Augmented reality for surgical skills training, update on the topic. Gamification and Augmented Reality 2023;1:8-8. https://doi.org/10.56294/gr20238.

21. Batista-Mariño Y, Gutiérrez-Cristo HG, Díaz-Vidal M, Peña-Marrero Y, Mulet-Labrada S, Díaz LE-R. Behavior of stomatological emergencies of dental origin. Mario Pozo Ochoa Stomatology Clinic. 2022-2023. AG Odontologia 2023;1:6-6. https://doi.org/10.62486/agodonto20236.

22. Caero L, Libertelli J. Relationship between Vigorexia, steroid use, and recreational bodybuilding practice and the effects of the closure of training centers due to the Covid-19 pandemic in young people in Argentina. AG Salud 2023;1:18-18. https://doi.org/10.62486/agsalud202318.

23. Castillo JIR. Aumented reality im surgery: improving precision and reducing ridk. Gamification and Augmented Reality 2023;1:15-15. https://doi.org/10.56294/gr202315.

24. Castillo-Gonzalez W, Lepez CO, Bonardi MC. Augmented reality and environmental education: strategy for greater awareness. Gamification and Augmented Reality 2023;1:10-10. https://doi.org/10.56294/gr202310.

25. Castillo-González W. Kinesthetic treatment on stiffness, quality of life and functional independence in patients with rheumatoid arthritis. AG Salud 2023;1:20-20. https://doi.org/10.62486/agsalud202320.

26. Deebak BD, Al-Turjman F, Aloqaily M, Alfandi O. IoT-BSFCAN: A smart context-aware system in IoT-Cloud

using mobile-fogging. Future Generation Computer Systems 2020;109:368-81. https://doi.org/10.1016/j.future.2020.03.050.

27. Diaz AMS, Sanchez MNN, Hinojosa BLA, Claudio BAM, Mendoza OAV. Digital marketing and brand positioning in a dental company in North Lima. SCT Proceedings in Interdisciplinary Insights and Innovations 2023;1:8-8. https://doi.org/10.56294/piii20238.

28. Diaz DPM. Staff turnover in companies. AG Managment 2023;1:16-16. https://doi.org/10.62486/agma202316.

29. Espinosa JCG, Sánchez LML, Pereira MAF. Benefits of Artificial Intelligence in human talent management. AG Multidisciplinar 2023;1:14-14. https://doi.org/10.62486/agmu202314.

30. Fernandez LEM, Hinojosa BLA, Claudio BAM, Mendoza OAV. Customer experience and customer loyalty in a gastronomic company. SCT Proceedings in Interdisciplinary Insights and Innovations 2023;1:10-10. https://doi.org/10.56294/piii202310.

31. Figueredo-Rigores A, Blanco-Romero L, Llevat-Romero D. Systemic view of periodontal diseases. AG Odontologia 2023;1:14-14. https://doi.org/10.62486/agodonto202314.

32. Frank M, Ricci E. Education for sustainability: Transforming school curricula. Southern Perspective / Perspectiva Austral 2023;1:3-3. https://doi.org/10.56294/pa20233.

33. Gai K, Qiu M, Xiong Z, Liu M. Privacy-preserving multi-channel communication in Edge-of-Things. Future Generation Computer Systems 2018;85:190-200. https://doi.org/10.1016/j.future.2018.03.043.

34. Gai K, Qiu M. Optimal resource allocation using reinforcement learning for IoT content-centric services. Applied Soft Computing Journal 2018;70:12-21. https://doi.org/10.1016/j.asoc.2018.03.056.

35. Ghani A, Mansoor K, Mehmood S, Chaudhry SA, Rahman AU, Najmus Saqib M. Security and key management in IoT-based wireless sensor networks: An authentication protocol using symmetric key. International Journal of Communication Systems 2019;32. https://doi.org/10.1002/dac.4139.

36. Gonzalez-Argote J, Castillo-González W. Productivity and Impact of the Scientific Production on Human-Computer Interaction in Scopus from 2018 to 2022. AG Multidisciplinar 2023;1:10-10. https://doi.org/10.62486/agmu202310.

37. Gupta M, Abdelsalam M, Khorsandroo S, Mittal S. Security and Privacy in Smart Farming: Challenges and Opportunities. IEEE Access 2020;8:34564-84. https://doi.org/10.1109/ACCESS.2020.2975142.

38. Hernández-Flórez N. Breaking stereotypes: “a philosophical reflection on women criminals from a gender perspective". AG Salud 2023;1:17-17. https://doi.org/10.62486/agsalud202317.

39. Jeronimo CJC, Basilio AYP, Claudio BAM, Ruiz JAZ. Human talent management and the work performance of employees in a textile company in Comas. Southern Perspective / Perspectiva Austral 2023;1:5-5. https://doi.org/10.56294/pa20235.

40. Kristiani E, Yang C-T, Huang C-Y, Ko P-C, Fathoni H. On construction of sensors, edge, and cloud (isec) framework for smart system integration and applications. IEEE Internet of Things Journal 2021;8:309-19. https://doi.org/10.1109/JIOT.2020.3004244.

41. Lamorú-Pardo AM, Álvarez-Romero Y, Rubio-Díaz D, González-Alvarez A, Pérez-Roque L, Vargas-Labrada LS. Dental caries, nutritional status and oral hygiene in schoolchildren, La Demajagua, 2022. AG Odontologia 2023;1:8-8. https://doi.org/10.62486/agodonto20238.

42. Ledesma-Céspedes N, Leyva-Samue L, Barrios-Ledesma L. Use of radiographs in endodontic treatments in pregnant women. AG Odontologia 2023;1:3-3. https://doi.org/10.62486/agodonto20233.

43. Lopez ACA. Contributions of John Calvin to education. A systematic review. AG Multidisciplinar 2023;1:11-

11. https://doi.org/10.62486/agmu202311.

44. Malaver YYV, Claudio BAM, Ruiz JAZ. Quality of service and user satisfaction of a police station in a district of northern Lima. Southern Perspective / Perspectiva Austral 2024;2:20-20. https://doi.org/10.56294/pa202420.

45. Marcillí MI, Fernández AP, Marsillí YI, Drullet DI, Isalgué RF. Older adult victims of violence. Satisfaction with health services in primary care. SCT Proceedings in Interdisciplinary Insights and Innovations 2023;1:12-12. https://doi.org/10.56294/piii202312.

46. Marcillí MI, Fernández AP, Marsillí YI, Drullet DI, Isalgué VMF. Characterization of legal drug use in older adult caregivers who are victims of violence. SCT Proceedings in Interdisciplinary Insights and Innovations 2023;1:13-13. https://doi.org/10.56294/piii202313.

47. Martínez MCH, Medina MAG. Impact of Toxic Substance Use on Quality of Life in Adolescents. Health Leadership and Quality of Life 2024;3:42-42. https://doi.org/10.56294/hl202442.

48. Moraes IB. Critical Analysis of Health Indicators in Primary Health Care: A Brazilian Perspective. AG Salud 2023;1:28-28. https://doi.org/10.62486/agsalud202328.

49. Peñaloza JEG, Bermúdez L marcela A, Calderón YMA. Perception of representativeness of the Assembly of Huila 2020-2023. AG Multidisciplinar 2023;1:13-13. https://doi.org/10.62486/agmu202313.

50. Pérez DQ, Palomo IQ, Santana YL, Rodríguez AC, Piñera YP. Predictive value of the neutrophil-lymphocyte index as a predictor of severity and death in patients treated for COVID-19. SCT Proceedings in Interdisciplinary Insights and Innovations 2023;1:14-14. https://doi.org/10.56294/piii202314.

51. Pupo-Martínez Y, Dalmau-Ramírez E, Meriño-Collazo L, Céspedes-Proenza I, Cruz-Sánchez A, Blanco-Romero L. Occlusal changes in primary dentition after treatment of dental interferences. AG Odontologia 2023;1:10-10. https://doi.org/10.62486/agodonto202310.

52. Roa BAV, Ortiz MAC, Cano CAG. Analysis of the simple tax regime in Colombia, case of night traders in the city of Florencia, Caquetá. AG Managment 2023;1:14-14. https://doi.org/10.62486/agma202314.

53. Rodríguez LPM, Sánchez PAS. Social appropriation of knowledge applying the knowledge management methodology. Case study: San Miguel de Sema, Boyacá. AG Managment 2023;1:13-13. https://doi.org/10.62486/agma202313.

54. Rodríguez-Pérez JA. Augmented reality as an accessory technology in surgery. Gamification and Augmented Reality 2023;1:27-27. https://doi.org/10.56294/gr202327.

55. Rueda AJQ, Ortiz FMR, Blandón KDO, Rincon LFP, Cano CAG. Alternatives to agricultural production different from the traditional way. AG Managment 2023;1:10-10. https://doi.org/10.62486/agma202310.

56. Saavedra MO, Ruíz GCR, Aguilar AE, Rojas JSV, Mora EHP, Miño CJP. Satisfacción estudiantil y calidad institucional en la Educación Superior en Salud. Health Leadership and Quality of Life 2024;3:43-43. https://doi.org/10.56294/hl202443.

57. Sarker IH. Data Science and Analytics: An Overview from Data-Driven Smart Computing, Decision-Making and Applications Perspective. SN Computer Science 2021;2. https://doi.org/10.1007/s42979-021-00765-8.

58. Solano AVC, Arboleda LDC, García CCC, Dominguez CDC. Benefits of artificial intelligence in companies. AG Managment 2023;1:17-17. https://doi.org/10.62486/agma202317.

59. Sudeendra Kumar K, Sahoo S, Mahapatra A, Swain AK, Mahapatra KK. Security enhancements to system on chip devices for IoT perception layer. vol. 2018- February, 2017, p. 151-6. https://doi.org/10.1109/iNIS.2017.39.

60. Talwana JC, Hua HJ. Smart World of Internet of Things (IoT) and Its Security Concerns, 2017, p. 240-5.

https://doi.org/10.1109/iThings-GreenCom-CPSCom-SmartData.2016.64.

61. Velásquez AA, Gómez JAY, Claudio BAM, Ruiz JAZ. Soft skills and the labor market insertion of students in the last cycles of administration at a university in northern Lima. Southern Perspective / Perspectiva Austral 2024;2:21-21. https://doi.org/10.56294/pa202421.

62. Viera EJH, Meléndez NMN, Claudio MCM, Ruiz JAZ. Selection process in the Operations area of a company in the ecological sector. Southern Perspective / Perspectiva Austral 2023;1:13-13. https://doi.org/10.56294/pa202313.

63. Xu H, Yu W, Griffith D, Golmie N. A Survey on Industrial Internet of Things: A Cyber-Physical Systems Perspective. IEEE Access 2018;6:78238-59. https://doi.org/10.1109/ACCESS.2018.2884906.

64. Raspberry Pi: http://www.Raspberrypi.org/

FINANCING

The authors did not receive funding for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: N. Murali, S. Palani Murugan, K. Sivakumar, Manojkumar Vivekanandan, Mishmala Sushith, S.Manikandan.

Research: N. Murali, S. Palani Murugan, K. Sivakumar, Manojkumar Vivekanandan, Mishmala Sushith, S.Manikandan.

Methodology: N. Murali, S. Palani Murugan, K. Sivakumar, Manojkumar Vivekanandan, Mishmala Sushith, S.Manikandan.

Writing - original draft: N. Murali, S. Palani Murugan, K. Sivakumar, Manojkumar Vivekanandan, Mishmala Sushith, S.Manikandan.

Writing - proofreading and editing: N. Murali, S. Palani Murugan, K. Sivakumar, Manojkumar Vivekanandan, Mishmala Sushith, S.Manikandan.