SMART HEALTH AND ATTENDANCE MANAGEMENT SYSTEM FOR CHILD DEVELOPMENT PROGRAMS

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***ABSTRACT* – In today's standard, children's health monitoring is a vital part of a child's growth.It has been getting increased attention ,particularly early childhood development programs.Recording a child's height, weight are like the basic data required to monitor a child's health.Recording a child's daily attendance contributesto its education results. This paper proposes a reasonable, scalable solution to digitize growth measurement monitoring, to track attendance without overburdening server space. It also introduces opportunities to promote public engagement towards Anganwadi centres. It allows the workers in Anganwadi centres to keep the growth record of the child updated regularly using the easy to use UI. The system we designed can be used in multiple languages to help workers across diverse populations and rural communities.**

Keywords— Decentralized System

I INTRODUCTION

Child development programs such as ICDS are very crucial for monitoring a child's health while also increasing their educational focus and opportunities. It mainly faces challenges related to manual data entry either in physical means of digital which can lead to errors. At some level every project requires automation to reach the next level. The low level of community engagement produces a negative effect on the service delivery. Anganwadi centres are still relying on handwritten registers which is not only inefficient on workers but also prone to error and delay. It is difficult to monitor child growth consistently when services do not have connectivity at a consistent level leading to a need for a combination of offline and online systems. The availability and reliability of the internet greatly increases the odds of a digital system approach. This paper addresses the concerns of child growth and attendance measurement by introduction of BMI machines, decentralized local data storage, mobile apps to make it easier to track services and to improve public engagement for ICDS programs.

I. LITERATURE SURVEY

[1] In this paper, AMMoC is introduced, which stands for Attendance Management using Crowdsensing. AMMoC is a completely new student attendance management tool directed towards enhanced efficiency and deduction of the risk of fraudulent check-ins in a classroom environment. Classes of standard attendance, for example, include roll call and used to be sometimes basis on RFID; but few limitations like inefficiency, expensive nature, and susceptibility to cheating plagued them. The approach of AMMoC deals with these problems by mobile crowdsensing, where students upload their location data using mobile applications. The classroom is partitioned into tele regions, and the task assignment for student verification is optimized using Monte Carlo Tree Search (MCTS). Selected students shall dismantle and ascertain attendance in specific regions so that there should be a likelihood of mutual verification.

[2] This study aims to improve the accuracy of predictions of adult height movement by the use of several machine learning models constrained by the parental height distribution. Growth charts and other traditional methods have often proved less adaptable to different populations and have depended on lengthy longitudinal studies in their analyses. To fill this void, data were obtained on the heights of 2,687 Korean men and women. They replicated Galton's 19th-century dataset, asking how parental heights affected children's heights. Results from the Korean data indicate maternal ties exerted much more impact upon daughters' heights, while Galton's work suggested the influence of fathers on growth. Using software featuring several machine learning core types including linear regression, support vector regression, XGBoost

[3] The paper presents SCHOOLTHY-an automated menu planning system intended to create healthy and balanced meal choices for school canteens. Malnutrition resulting from nutrient deficiency or excessive consumption of processed foods is a growing concern, especially among children. Traditionally, school meal planning has been done manually by nutritionists-a painstaking, tortuous, and inefficient task.SCHOOLTHY transforms the labor-intensive manual method into an advanced automated menu generation process that is evolutionarily optimized to create a cost-efficient, nutritionally balanced, and varied menu. This system is capable of optimizing several objectives, including the minimization of costs, maximization of dietary diversity, and adherence to nutritional guidelines. SCHOOLTHY employs a multi-objective optimization strategy, ensuring that the meal plans meet energy and macronutrient requirements while reducing food repetition.

[4] This paper, she discusses the OCARIoT project, an initiative aimed at preventing childhood obesity through the establishment of healthy habits between ages 9 and 12. Childhood

[5] The paper presents a smart attendance system that employs Radio-Frequency Identification (RFID)

technology for attendance tracking in workplaces and minimizing fraudulent attendance.pare the two Hyperledger Fabric versions, v0.6 and v0.7.By adjusting each platform's workload up to 10,000 transactions, the two platforms' performance will be compared in terms of execution time, latency, and throughput. Second, by changing the number of nodes in each platform up to 20, we will examine the scalability of the two systems. Overall, the performance analysis results show that Hyperledger Fabric v1.0 regularly beats Hyperledger Fabric v0.6 in terms of scalability, throughput, execution time, and latency. However, under heavy workload circumstances, the performance of the Hyperledger Fabric v1.0 platform fell short of that of contemporary traditional database systems. Despite the obvious benefits of Blockchain, there are still a number of technical problems that need to be resolved before Blockchain platforms can be adopted.

[6] In this paper, we present the development of an attendance system based on face recognition that features real-time video processing for improved accuracy and efficiency. Traditional methods of taking attendance, such as fingerprint scanning or manual check-ins, suffer from inaccuracies, inefficient tendencies, and fraudulent acts such as proxy attendance. To alleviate this situation, artificial intelligence and computer vision are introduced in the attendance system in this system to automatically detect and authenticate the student identity for attendance taking. The study evaluated the system's recognition precision, stability status, and overall reduction in truancy based on the effectiveness of the interface among the users. The findings show an 82% recognition accuracy for the face recognition system, with marked improvement in attendance tracking when weighed against the manual method.

[7] This paper describes a smartphone-based system that detects signs of attendance problems early on. Attendance problems, related to sleep disorders and fewer indicators of academic engagement, can lead to course failures and dropouts. But students tend to delay help until problems develop, so it is imperative to intervene early. To this end, the researchers designed a mobile application that passively gathers data from commonly available sensors in smartphones and does not require additional wearable devices. The system uses machine learning models that analyze sleep and study engagement levels trained on data collected from 58 students over ten months. Their results show that the system could estimate how well a student is sleeping and how engaged the student is, providing reliable indicators of students who are at risk. The ability to monitor students on a larger scale, unobtrusively and without disruptions to normal routines, is contrary to the manner of traditional face-to-face counseling. The study emphasizes that the system is not meant to replace medical examination but helps to identify at-risk students for acquiring timely support. Future improvements will be focused on additional accuracy, wider applicability, and reinforcement of feedback mechanisms to maintain student feeling well and performing well.

[8] The paper discusses the development of an inexpensive attendance monitoring system based on facial recognition techniques meant specifically for Small Medium Enterprises (SMEs). With the introduction of remote and distributed working models for employees, attendance tracking has become a nightmare, especially for SMEs that do not afford to spend on exorbitant biometric systems. In light of this challenge, the authors suggest the development of a mobile application that employs artificial intelligence interface with facial recognition as well as location analysis for a cheap and effective attendance management system.

[9] The paper examines how interactive gesture-based game learning (GIGL) might positively impact working memory and basic mathematical skills in early childhood. This study investigates whether children (5-6 years old) can stimulate cognitive development through learning by motion rather than traditional methods of instruction. The experimental group was involved in a gesture-based game environment, while the control group engaged in teacher-directed activities. The working memory was measured through the Corsi task, while basic mathematical skills were evaluated through the TEDI-MATH measure. GIGL children demonstrated improvement to a point much higher than that of their control counterparts. This is seen as motivation, interest, and cognitive growth through movement in the learning activities. The possibilities offered by HCI will increase attention and key cognitive abilities in young learners, using gesture technology to integrate mobile learning into the school curriculum with fun. The inference here is that gesture-based educational games would vividly testify to the continued injection of interactive technologies into early education. Further studies look to advance the efficaciousness of such tactics and their enduring effects in child development.

[10] The paper gives a systematic review of digital game-based learning technologies for teaching English as a foreign language in preschools and primary schools. In this regard, the authors analyze 110 studies published between 2010 and 22, focusing it on how DGBL enhances motivation, creativity, and problem-solving skills among young learners. They propose a classification model for DGBL that takes into consideration game design principles, pedagogical aspects, language content, and feedback mechanisms so as to provide better educational outcomes. The study catalogs 50 key studies that focus specifically on children between ages 2-10 and hence emphasize interactive and engaging learning instances. While DGBL is in fact very effective, the review also spins a spandex web of some nontrivial difficulties that swaddle DGBL into its own potential, like health, technology accessibility, and preparation of the teachers. The authors state that perhaps the enumeration of some emerging technologies, for instance, artificial intelligence and blockchain, augmented reality will address some of these hindrances to optimization and scalability of DGBL. The work highlights the vital importance and need of developing structured models for games tailored to the young learners while suggesting further research that should extend into automated assessments and progression tracking of students.

[11] The paper proposes an IoT-based way of teaching variety of geometric shapes to young children, so as to make this learning more interesting and effective. Geometry, an important subject in the development of spatial awareness and problem- based learning, has often been neglected in early childhood education.The findings indeed showed that children were able to recognize shapes and retain more information as compared to traditional approaches. The fact that many children reported fun and enjoyment while engaged in interactive learning indicates the motivation potential of technology within early childhood education. Additionally, a significant number of children reported enjoyment and satisfaction with the interactive learning experience, implying that technology has the potential to boost motivation in early childhood education.Although the research has primarily targeted boys, further studies can validate the claim further for mixed-gender sampling and larger sample size.

[12]A paper discussing the techniques and approaches for managing and analyzing large-scale data that is distributed across several geographically separated data centers. Due to high volumes of big data, storing and processing all data from a single location become impractical: bandwidth constraints, security concerns, and high operation costs are just but a few of the reasons. The authors propose two distributed data strategies that allow for efficient analysis without the need to move entire datasets over long distances. The first one is designed for data stored without replication; by selecting data blocks based on a Random Sample Partition technique, a sample will be chosen from each data center and sent to a central server for approximate analysis. The second strategy relies on the replication of certain key data blocks across the different data centers, hence allowing the analysis to be carried out at any one of these sites without the need for large-scale data movement.

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[13]The paper presents a novel methodology for data storage based on deep learning techniques, aiming to minimize latency in data center networks. As cloud computing and data-centric applications burgeon, traditional static data-accommodation models are losing their grip to effectively adapt to changing networks and dynamic user requests whose outcomes often slow down data retrieval. The authors developed an analytical-based k-means clustering approach, which dynamically optimizes data placement into closer regions through the group-allocation of hot data blocks. Taking advantage of the previous work of access to avoid unnecessary data transfers, this system cuts read and write latency. The simulation work on a Fat-Tree DCN topology demonstrates the 33% average reduction in write latency and 45% average reduction in read latency over static storage schemes.

[14]The paper presented an automatic literacy assessment system, which had been dedicated to investigation of children's reading abilities using machine learning and speech processing. Manual assessments commonly used until now needed to be executed on admissions by three or more evaluators; minutes were spent to recast, and there was no definite rule as how to differentiate between reading types.

[15]The present paper discusses the effect telemedicine has on healthcare access in the rural areas by focusing on ways through which telecommunications can overcome spatial boundaries, making travel burden for patients light, and providing medical outcomes. The problem that these rural populations face is that health services are often underdeveloped and, as a result, patients are unable to seek medical attention at the right time due to lack of access.

[16] This paper discusses community-engaged research (CER) in the context of improved public health outcomes in India. In CER, community members actively participate in all different stages of research so that interventions shall be culturally appropriate and efficacious. The study screened for 15 research articles based on community engagement published in India. Most studies indicated health promotion initiatives targeting HIV/AIDS prevention, menstrual hygiene, and infant healthcare. CER offers the first-level exposure of community needs, behavior, and challenges; however, it was noted in the study that there was no report where community members defined by themselves issues to be handled. It was observed that the involvement of the community leads to increased participation in health programs, awareness, and improvement of health-seeking behavior.

[17]Most rural healthcare systems, characterized by a lack of software applications, focus on paper-based records management. The ongoing transition to digital in healthcare continues to pose security risks in the management of medical information in rural areas. To tätäva into considerations, they introduce a private cloud infrastructure whereby data service delivery is ensured for the protected, fast, reliable, accessible, and scalable data service. Operating using a dual-database system, with one database handling medical records and another dealing with encryption keys for added security, it preempts decryption unauthorized access. The data transmitted is subjected to hashing and encryption processes for fulfilling two prerequisites: confidentiality and integrity compliance. The end result is that healthcare providers can access patient records conveniently; medical decision-making improves while data breach risks are reduced in rural clinics deploying the cloud solution.

[18] This paper analyses the use of mobile applications in monitoring child growth outcomes, particularly focusing on children with poor nutritional status, including undernutrition and obesity. The scenario around the digital health solutions suggests that mobile applications represent a great potential method for tracking growth metrics, helping educate parents and caregivers, and supporting early intervention. The 12 studies subject to systematic review are those that evaluate the effectiveness of mobile applications in improving child nutrition and development.

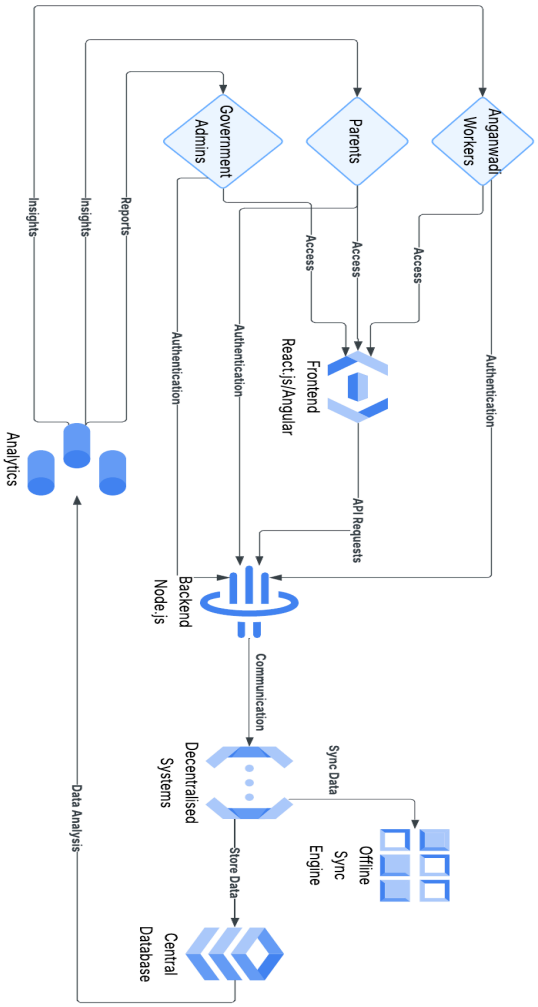
[19] This paper analyses the transition from conventional record-keeping to rational data management systems in Anganwadi centers of India's Integrated Child Development Services (ICDS) programme. Initially, the ICDS-CAS software was introduced in 2018 into the programme for near-real-time monitoring of nutrition and maternal health services for children. However, it was discontinued in the year 2020 and subsequently replaced with Poshan Tracker in 2021. The study evaluates the extent and challenges and benefits of this transition with the help of discussions with Anganwadi workers (AWWs), supervisors (AWS), and Child Development Project Officers (CDPOs) in urban Gujarat. The findings reveal young AAWs adapt very well, older worked better with registers.

[20] This paper presents a method for detecting fake media using natural language processing (NLP) and blockchain technologies. It integrates NLP for content analysis and blockchain for verifying media authenticity, enhancing trustworthiness in digital media.

II. PROPOSED SYSTEM

The proposed system focuses on addressing the challenges faced by Anganwadi centres in monitoring child growth and attendance in a more efficient way. Instead of using manual physical entries ,complex IoT devices, the solution uses a BMI machine to record children's height and weight, with a data transfer to the software platform. Attendance is managed through the software along with the BMI of each child on a daily basis. The new data is updated in bulk to minimize the server load. A mobile application for parents, guardians to provide child engagement by providing access to growth reports, attendance history, reminders and educational content. Additionally it promotes regular check-ups and participation through a system.The system also supports multiple languages, offline functionality and security. Even in remote areas the data can be collected reliably and synchronized in connectivity. Through modular, scalable decentralized systems and user-friendly interface, the system aims to improve child health and attendance monitoring and increase community involvement in Anganwadi centres.

Fig. 1. Architecture Diagram



III.CONCLUSION

The problems faced in traditional methods of monitoring child growth and attendance have been discussed. Several papers and journals related to child development monitoring and programs were studied and objectives were proposed. The system architecture and flow for the proposed solution were provided. The security issues, limitations with the existing physical, manual methods and the lack of public engagement have been highlighted in Phase I. Various articles and journals were examined, and goals were given. The suggested work's system architecture and flow were designed and completed.

IV.METHODOLOGY

4.1. ANGANWADI WORKER LOGIN MODULE

The Anganwadi worker module allows users to enter their credentials. Once logged in, workers can manage the children's growth data obtained from the BMI machine and the daily attendance records. The entered information will be validated by the workers and stored securely for further processing.

4.2. GROWTH MONITORING MODULE

With the height and weight data the BMI machine will calculate the BMI, and the children will be categorized into underweight, normal, overweight or obese based on the standard BMI thresholds used across the world. Growth trends will be visualized using interactive growth charts and alerts will be generated for the children with abnormal growth patterns.

4.3. PARENT ACCESS MODULE

A mobile application and web portal will allow parents to log in using their registered mobile number or Aadhaar number. Parents can view their child's growth charts, download growth reports in PDF format and receive health recommendations. Parents will also get notification a bout the upcoming checkups and vaccination dates and receive alerts if any abnormal growth trends are detected.

4.4. ATTENDANCE TRACKING MODULE

Daily attendance marked by the Anganwadi workers in the portal will be processed and stored securely. Monthly a summarized report will be generated to minimize storage space. Parents will receive SMS alerts if the child is consecutively absent.

References

[1] Zhigang Gao, et al. "A Student Attendance Management Method Based on Crowdsensing in Classroom Environment" IEEE Access Volume: 9 (2021):31481 - 31492.

[2] Ji-Sung Park, et al. "Improving the Accuracy of Adult Height Prediction With Exploiting Multiple Machine Learning Models According to the Distribution of Parental Height" IEEE Access (Volume: 11) 2023:91454 - 91471.

[3] Eduardo Segredo, et al. "SCHOOLTHY: Automatic Menu Planner for Healthy and Balanced School Meals" IEEE Access (Volume: 8)2020:113200 - 113218 .

[4] Leire Bastida, et al. "Promoting Obesity Prevention and Healthy Habits in Childhood: The OCARIoT Experience" IEEE Journal of Translational Engineering in Health and Medicine (Volume: 11) 2023:261 - 270.

[5] Qianwen Miao, Fu Xiao, Haiping Huang, Lijuan Sun, Ruchuan Wang "Smart attendance system based on frequency distribution algorithm with passive RFID tags" Tsinghua Science and Technology (Volume: 25, Issue: 2, April 2020): 217 - 226.

[6] Hao Yang, Xiaofeng Han. "Face Recognition Attendance System Based on Real-Time Video Processing"IEEE Access (Volume: 8),2020: 159143 - 159150.

[7] Viktor Erdélyi, Teruhiro Mizumoto, Yuichiro Kitai, Daiki Ishimaru, Hiroyoshi Adachi, Teruo Higashino. "Detecting Subtle Signs of School Attendance Issues Using Smartphone-Based Sensing." IEEE Access (Volume: 13):4652 - 4669,2024.

[8] Hong-Danh Thai, Yeong-Seok Seo, Jun-Ho Huh. "Enhanced Efficiency in SMEs Attendance Monitoring: Low Cost Artificial Intelligence Facial Recognition Mobile Application" IEEE Access (Volume: 12):184257 - 184274,2024.

[9] Tareq Alzubi, Raquel Fernández, JuliáN Flores, Montserrat Duran, José M. Cotos. "Improving the Working Memory During Early Childhood Education Through the Use of an Interactive Gesture Game-Based Learning Approach." IEEE Access (Volume: 6):53998 - 54009, 2018.

[10] Catherine Akoth Ongoro, Yong-Yi Fanjiang. "Digital Game-Based Technology for English Language Learning in Preschools and Primary Schools: A Systematic Analysis."IEEE Transactions on Learning Technologies (Volume: 17):202-228,2023.

[11] Jalal Safari Bazargani, Abolghasem Sadeghi-Niaraki, Fatema Rahimi, Tamer Abuhmed, Soo-Mi Choi. "An IoT-Based Approach for Learning Geometric Shapes in Early Childhood."IEEE Access (Volume: 10):130632 - 130641,2022.

[12] Tamer Z. Emara, Joshua Zhexue Huang. "Distributed Data Strategies to Support Large-Scale Data Analysis Across Geo-Distributed Data Centers."IEEE Access (Volume: 8):178526 - 178538,2020.

[13] Zhuofan Liao, et al. "Deep Learning-Based Data Storage for Low Latency in Data Center Networks." IEEE Access (Volume: 7): 26411 - 26417,2019.

[14] Matthew P. Black, et al. "Automatic Prediction of Children's Reading Ability for High-Level Literacy Assessment."IEEE Transactions on Audio, Speech, and Language Processing (Volume: 19, Issue: 4, May 2011):1015-1028.

[15] Dr Ashwini L, Dr Vinaykumar L, Dr Hanumanaik (2024). TELEMEDICINE AND RURAL HEALTHCARE ACCESS: A COMPARATIVE ANALYSIS OF EMERGING TECHNOLOGIES.Vol.31 No.11 JPTCP:169-179.

[16] Kristen J. Wells, Charles Preuss, Yashwant Pathak, J. K. Kosambiya and Ambuj Kumar(2012). ENGAGING THE COMMUNITY IN HEALTH RESEARCH IN INDIA. Technol Innov. 2012 April 1; 13(4).

[17] Raghavendra Ganiga, Radhika M Pai, Manohara Pai M M,Rajesh Kumar Sinha (2018). Private cloud solution for Securing and Managing Patient Data in Rural Healthcare System. Procedia Computer Science Volume 135, 2018, Pages 688-699.

[18] Theresia Chrisanthy Kustiawan , Siti Rahayu Nadhiroh , Roziana Ramli and Chaniphun Butryee(2022). Use of mobile app to monitoring growth outcome of children: A systematic literature review. Digital Health Volume 8: 1–10.

[19] Sneha Kurian, Bansari L. Chawada(2023). Response and adaptations made by the integrated child development services stakeholders towards the digitalisation of its record keeping systems of the Anganwadi centres in urban Gujarat, India. International Journal of Community Medicine and Public Health | October 2023 | Vol 10 | Issue 10 Page 3848-3852.

[20] Mayuri Raul (2024). Attendance in Anganwadi centres through Anganwadi workers' lens: A Force Field Analysis in Urban slum. Indian Journal of Community Medicine ¦ Volume 49 ¦ Issue 7 ¦ Supplement 2024.