IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

OPTIMIZED AI DEVICE TO MONITORING PREGNANCY WOMEN AND ELDER WOMEN THROUGH MOBILE APPLICATION

Mr.T.Jones Daniel , S.Gnana Latha , K.Hemeena , D.Grace Salomi, P.Guna Sundari

Assistant Professor, Student, Student, Student, Student
Information Technology,
Jayaraj Annapackiam CSI College Of Engineering , Nazareth Thoothukudi , India

Abstract: The Internet of Things (IOT) is an emerging technology revolutionizing healthcare by enabling innovative advancements in medical and health domains. IOT - powered wearable health devices are at the forefront of this transformation, leveraging cutting-edge technology to address new challenges. These devices facilitate the periodic and regular monitoring of both in-patient and out-patient health statuses. This paper presents an IOT - based E-Healthcare Monitoring System (EHMS) integrated with Machine Learning (ML) techniques to collect elder women and pregnancy women develop a sophisticated automated system. This system empowers the connection, monitoring, mobile application and decision-making processes essential for accurate diagnosis.

Keywords - Internet of Things, Machine Learning, Prediction, E-Healthcare.

I. Introduction

Unhealthy lifestyles, characterized by poor diet, sedentary habits, and stress, are prevalent globally. Traditional healthcare systems often struggle to provide continuous monitoring and timely intervention. To address these challenges, we propose an E-Healthcare Monitoring System (EHMS) that integrates IOT - enabled wearable devices and machine learning techniques. This innovative system collects real-time health data, analyzes it using advanced algorithms, and delivers timely insights to patients, doctors, and caregivers, facilitating proactive health management and accurate diagnosis.

II. RELATED WORK

Several researchers have explored various aspects of E-Healthcare monitoring systems. Here's a summary:

- Jones Daniel T et al.[1] relevant bedridden patient health monitoring application formed with data analysis, evaluation and algorithm. Data collection are stored on cloud for prediction. They were handled KM-Tree algorithm for prediction.
- **Data Quality:** Claudia C. et al. [2] emphasize the importance of accurate and secure data collection and processing for reliable decision-making in chronic disease management.
- **Patient Monitoring:** Bhoomika B.K. et al. [3] present a system using a PPG sensor to monitor heart rate and alert doctors in case of emergencies.
- **Wearable Sensors:** Wan, J. A.et al. [6] discuss the use of wearable devices with various sensors like ECG and EMG for continuous health monitoring.
- **Machine Learning:** Deepti Sisodia, D.S. et al. [7] highlight the integration of machine learning techniques like neural networks for disease prediction using data collected from sensors.
- **Overall System Design:** Gaurav Raj, N. R.et al. [4] describe a three-tier architecture for an IOT - based health monitoring system with wireless sensors, base stations, and user interfaces. These studies

showcase existing efforts in E-Healthcare, paving the way for more advanced systems like the one proposed in this paper.

III. PROPOSED EHMS IOT APPLICATIONS

The proposed E-Healthcare Monitoring System (EHMS) leverages IOT , Mobile application and machine learning to enable real-time patient health monitoring. Wearable devices, such as temperature, heart rate, blood pressure, and glucose sensors, collect vital data and transmit it to the EHMS server. Machine learning algorithms analyze this data to identify anomalies, predict potential health issues, and generate actionable insights. These insights are shared with patients, doctors, and caregivers through the EHMS application. A depiction of the proposed system architecture is provided in Figure 1.

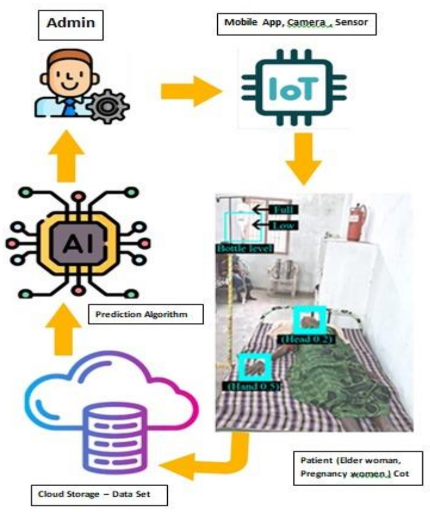
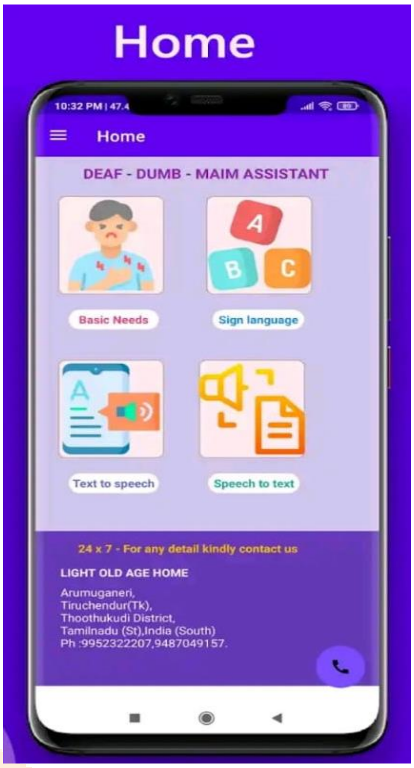


Fig 1 : Proposed System architecture for EHMS IOT

The system's key features include:

- **Real-time monitoring:** Continuous tracking of patient health parameters.
- **Remote access:** Access to patient data from anywhere.
- **Early detection:** Proactive identification of health risks.
- **Personalized care:** Tailored recommendations based on individual needs.
- **Secure data storage:** Protection of sensitive patient information.
- **Mobile Application:** Handling patient data and prediction has been done through mobile application.



By integrating IOT , Mobile application and machine learning, EHMS empowers individuals to take control of their health and healthcare providers to deliver more effective care. IOT analysis, data modeling,and high-level automation analysis are facilitated through the application of machine learning tools. Collected data undergoes processing and storage using machine learning techniques on the EHMS server, and is subsequently stored in cloud storage to ensure high availability for all stakeholders. The EHMS application delivers training and prediction analysis based on supervised learning, employing efficient machine learning approaches to support informed decision-making. A layered approach to supervised learning is outlined in Table I.

Table I: Layered Supervised Learning Approach

Layer	Data set Supervised Learning
Layer 1	Getting raw data from the device.
Layer 2	Supervising the categorization, loading, and labeling of training data sets.
Layer 3	Process of identifying and evaluating the labeling of raw data.
Layer 4	Training the machine learning model using classification algorithms.
Layer 5	The final output consists of data analysis and predictions.

EHMS utilizes machine learning for predictive analysis. Common algorithms like Support Vector Machines (SVM), Decision Trees, and K-Nearest Neighbors (KNN) are suitable options .This research focuses on SVM due to its effectiveness in handling large datasets and performing well in both classification and regression tasks.

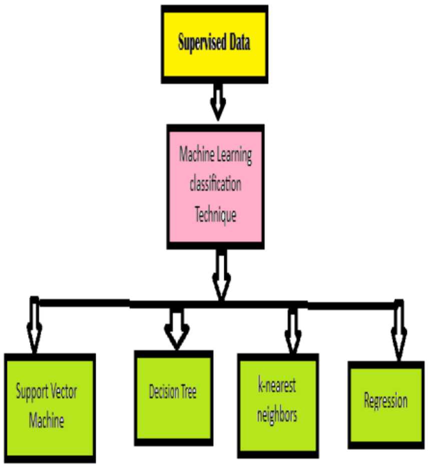


Fig 2 : Suggested ML Classifiers

Machine learning (ML), a mathematical and statistical approach that employs data mining techniques and supervised/unsupervised learning methods, is a promising technology for EHMS. Figure 2 illustrates the suitability of key ML classification algorithms, such as Support Vector Machines (SVM), Decision Trees, K-Nearest Neighbors (K-NN), and Regression algorithms, for EHMS applications.

SVMs work by creating a hyper plane in N-dimensional space that maximizes the separation between different classes. This hyper plane helps classify new data points accurately. The choice of SVM is motivated by its strengths in:

- **High-dimensional data handling:** SVM excels at working with data containing many features.
- **Clear class séparation:** It effectively identifies boundaries between différent catégories.
- **Robustness to outliers:** SVMs margin-based approach helps minimize the impact of outliers.

Table 2: Detailed Description of the Diabetes Data set

Category	Low	OK	Abnormal	Emergency
Blood Pressure	80mm Hg < = 90	< 80mm Hg	90mm Hg < =100	= >100mm Hg
Cholestrol	Below 200 mg / dL	Under 200 mg / dL	150 - 199 mg / dL	
Pregnancy	1< = 3	3< = 5	6 < = 9	= >10 above
Glucose	110mg/dL< 130	70mg/dL	130mg/dL< =160	= >160 above
Insulin	30 min, 30-230 ml U/L	Fasting < 25 ml U/L	1hr18-276 ml U/L, 2hr 16-166 ml U/L	> 3hr, < 25ml U/L
Diabetes Pedigree Function	Float 0.324-0.999	Float 0.001- 0.324	Float 1.0-1.99	Float = >2.00
Body Mass Index (BMI)	25 < = 30	18.50< = 25	30 < =35	= >35

However, SVMs might struggle with highly nonlinear data or situations with a large number of irrelevant features. The chosen dataset for this research includes features like blood pressure, glucose levels, and family history to predict diabetes risk.

IV. EXPERIMENTAL ANALYSIS

The EHMS was evaluated using a diabetes data set from Kaggle [11]. The data set includes various features like age, glucose level, insulin level, and a binary class label indicating whether a person has diabetes or not.

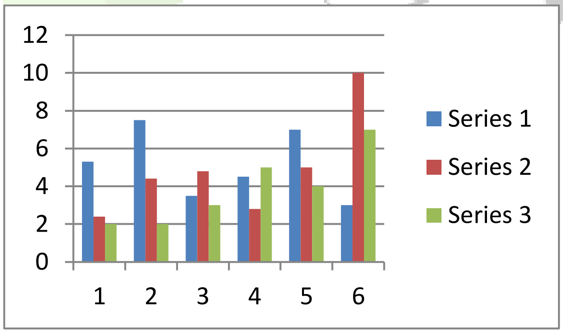
Table 3 : Results of Descriptive Statics of Study Variables

	Patient 0	Patient 1	Patient 2	Patient 3	Patient 4
Pregnancies	0	1	2	1	0
Glucose	6	85	183	89	137
Blood Pressure	72	66	64	66	40
Skin Thickness	35	29	0	23	35
Insulin	0	0	0	94	168
BMI	33.6	26.6	23.3	28.1	43.1
Diabetes Pedigree Function	0.627	0.351	0.672	0.167	2.288
Age	50	31	32	21	33
Outcome	1	0	1	0	1

4.1 Model Predictions on Sample Data

Support Vector Machine (SVM) was selected as the primary algorithm for prediction. The model was trained on the data set to predict diabetes risk based on age and glucose/insulin levels. The results were visualized using graph to illustrate the relationship between these factors and diabetes risk.

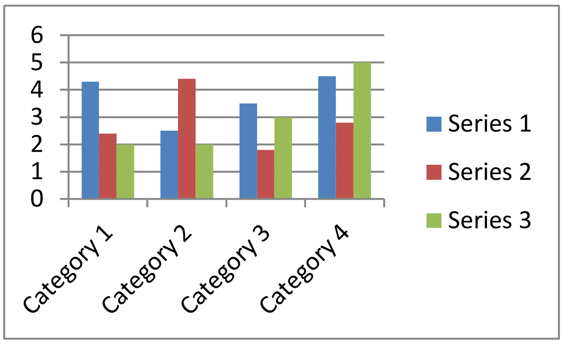
Figure 3: Illustration of Model Predictions on Sample Data



4.2 Age-Based Glucose Level Prediction Model

The SVM model achieved an accuracy of 80.51%, outperforming other algorithms like GNB, KNN, Decision Tree, Random Forest, and Gradient Boosting. The performance metrics, including precision, recall, F1-score, and support, further confirm the effectiveness of the SVM model in this application.

Fig 4. Age-Based Glucose Level Prediction Model



V. CONCLUSION

The proposed E-Healthcare Monitoring System (EHMS) offers a promising solution for remote patient monitoring and early disease detection. By integrating IOT - enabled wearable devices through mobile application and machine learning techniques, EHMS enables continuous tracking of vital health parameters, timely alerts, and personalized healthcare recommendations.

Future research directions include:

- Expanding the range of health conditions monitored.
- Enhancing data privacy and security measures.
- Integrating advanced machine learning algorithms for more accurate predictions.
- Developing user-friendly interfaces for patients and healthcare providers.

By addressing these areas, EHMS can further revolutionize healthcare delivery and improve patient outcomes.

REFERENCES

[1] Jones Daniel, T., Sundar Rajan, R. (2025). Optimized AI Bed for Maim and Bedridden Elder Person Based on Mobile Application. In: Jaiswal, A., Anand, S., Hassanien, A.E., Azar, A.T. (eds) Proceedings of International Conference on Computing and Communication Systems for Industrial Applications. ComSIA 2024. Studies in Autonomic, Data-driven and Industrial Computing. Springer,Singapore. https://doi.org/10.1007/978-981-97-5862-3_5

[2] Claudia C. Gutiérrez, R. M. (May 17, 2011). e-Health monitoring applications: What about Data Quality. *HamIS 2011 Health Ambient Information Systems Workshop 2011*. Gramado, Brazil.

[3] Bhoomika.B.K, B. D. (2015, July). Secured Smart Health Care Monitoring System Based on IoT. *International Journal on Recent and Innovation Trends (IJRIT), 3*(7), 4958-4961.

[4] Gaurav Raj, N. R. (2017, July). IoT Based EMG Monitoring System. *International Research Journal of Engineering and Technology (IRJET), 4*(7).

[5] H. N. Saha, D. P. (2017). Internet of Thing based healthcare monitoring system. *IEEE Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)*, (pp. 531-535). Vancouver, BC. doi:10.1109/IEMCON.2017.8117245

[6] Wan, J. A.-a. (2018:298). Wearable IoT enabled real-time health monitoring system. *J Wireless Com Network*, (pp. 1-11). doi:10.1186/s13638-018-1308-x

[7] Deepti Sisodia, D. S. (2018). Prediction of Diabetes using Classification Algorithms. *Procedia Computer Science, 132*, pp. 1578-1585. doi:org/10.1016/j.procs.2018.05.122

[8] Khari, M. K. (2016). Internet of Things: Proposed security aspects for digitizing the world. *3rd International Conference on Computing for Sustainable Global Development (INDIACom)* (pp. 2165-2170). IEEE.

[9] IoT",In 2017 International Conference on Big Data,IoT and Data Science (BID),IEEE April 2018.

[10] Z. Zhiao, Chnaowei, z. Nakdahira, "Healthcare application based on Internet of Things", Proc. IEET Int. ConfE. on. Technolgy. Application, pp. 661-662, Nov. 2013.

[11] S. Pradeep Kumar, Vemuri Richard Ranjan Samson,U. Bharath Sai, P L S D. Malleswara Rao, K. Kedar Eswar, "From Smart Health Monitoring System of Patient Through IoT", International conference on ISMAC, pp. 551-556, 2017.

[12] S. Ananth, P. Sathya, P. Madhan Mohan," Smart Health Monitoring System through IOT", In 2019 International Conference on Communication and Signal Processing (ICCSP),IEEE April 2019.

[13] M.S. Uddin, J.B. Alam, S. Banu, "Real time patient monitoring system based on Internet of Things", 4th International Conference on Advances in Electrical Engineering, pp. 516-521, 2017.

[14] R.T. Hameed, O.A. Mohamad, O.T. Hamid, N. Ţăpuş, "Patient monitoring system based on e-health sensors and web services", 8th International Conference on Electronics Computers and Artificial Intelligence, pp.1-6, 2016.

[15] B. Priya, S. Rajendran, R. Bala, R. Gobbi, "Remote wireless health monitoring systems", Innovative Technologies in Intelligent Systems and Industrial Applications Monash, pp. 383-388, 2009.

[16] Alvee Rahman, Tahsinur Rahman, Nawab Haider Ghani , Sazzad Hossain , Jia Uddin," IoT Based Patient Monitoring System Using ECG Sensor", 2019 International Conference on Robotics,Electrical and Signal Processing Techniques (ICREST), february 2009.