[continuous monitoring of subjects data on cloud through iot]

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Abstract

- **This project develops a system for continuous monitoring of subject data using an IoT framework integrated with a cloud platform. It utilizes three sensors—temperature, humidity, and motion detection—to collect real-time data for applications in healthcare, environmental monitoring, and industrial automation.**
- **Data is transmitted to the cloud via reliable communication protocols like MQTT or HTTP, where it is securely stored, processed, and visualized through an intuitive dashboard. Advanced machine learning models enhance the system by analyzing patterns, detecting anomalies, and predicting trends.**
- **The system is designed for scalability, security, and reliability, undergoing rigorous testing to ensure performance under varying conditions. This project showcases the potential of IoT and cloud technologies in delivering efficient, accurate, and secure monitoring solutions.**

Background

The integration of the Internet of Things (IoT) with cloud computing has revolutionized real-time data monitoring across various domains. Continuous monitoring of subject data using IoT systems allows for seamless data collection, transmission, and analysis, enabling efficient decision-making and automation. IoT-enabled sensors and smart devices collect real-time data from the environment or users and transmit it to cloud platforms for processing and storage. The cloud provides scalable computing resources, ensuring accessibility, security, and advanced data analytics. This technology is widely used in healthcare, smart agriculture, industrial automation, and environmental monitoring, where real-time insights are crucial for performance optimization and risk mitigation..

This project aims to design and implement a robust IoT-based continuous monitoring system that leverages cloud technology to enhance efficiency, reliability, and real-time decision-making.

Methods

he continuous monitoring of subject data on the cloud through IoT systems follows a structured approach involving multiple components:

1. **Data Acquisition**
   1. IoT sensors and devices collect real-time data related to the subject (e.g., temperature, heart rate, humidity, motion).
   2. Data is preprocessed at the edge to filter noise and reduce redundancy.
2. **Data Transmission**
   1. The collected data is transmitted to the cloud using communication protocols such as MQTT, HTTP, or CoAP.
   2. Wireless technologies like Wi-Fi, Bluetooth, LoRaWAN, and 5G ensure seamless connectivity.
3. **Cloud Integration & Storage**
   1. Cloud platforms (AWS, Azure, Google Cloud, etc.) store and process data securely.
   2. Databases like Firebase, MySQL, or NoSQL are used for efficient data management.
4. **Data Processing & Analytics**
   1. Cloud-based analytics and AI models process the data for real-time insights.
   2. Predictive analysis is used for anomaly detection and trend forecasting.
5. **User Interface & Alerts**
   1. A web or mobile dashboard displays real-time monitoring results.
   2. Alerts and notifications (via SMS, email, or push notifications) are sent for critical events.
6. **Security & Optimization**
   1. Data encryption and authentication ensure secure communication.
   2. Edge computing is used to reduce cloud dependency and improve response time.

Results

- **Real-Time Data Collection & Analysis**
- IoT sensors successfully captured real-time subject data with minimal latency.
- Cloud-based analytics provided instant insights, improving decision-making processes.
- **Improved Accuracy & Efficiency**
- Automated data transmission reduced human errors in data collection and processing.
- AI-powered analytics enhanced predictive capabilities, improving system reliability.

Conclusion

The implementation of IoT-based continuous monitoring systems with cloud integration has proven to be a transformative approach in real-time data collection, processing, and analysis. By leveraging IoT sensors, cloud computing, and AI-driven analytics, these systems enhance efficiency, accuracy, and decision-making across various domains, including healthcare, industrial automation, smart cities, and environmental monitoring.

Future Perspectives

Artificial Intelligence & Machine Learning Integration
- AI-driven analytics will enable more accurate predictive maintenance, anomaly detection, and automated decision-making.
- Machine learning models will enhance real-time data processing, reducing human intervention.

Impact on Society

Healthcare Advancements
- Remote patient monitoring improves early disease detection and timely medical intervention.
- Reduces hospital visits, making healthcare more accessible and cost-

To know more

GitHub link: https://github.com/manojgitam12/EECE_capstone_2

Video link: