IoT Device Dashboard

Bhagyashree Dhake, Rahul Mane, Pratik Ghadge, Prof. Gaurav Deshmukh,Terna Engineering College,
Computer Engineering Department.

ABSTRACT

Internet of Things (IoT) technology has brought revolution to each and every field of common man's life by making everything smart and intelligent. Internet of Things is a technological revolution which provides the vision of connected world of Things. Devices, people and systems are connected with one another in such a way that they can communicate with each other over Internet. IoT refers to a network of things which make a self-configuring network. So, the form of communication from human-human is now turned into human-human, human-things and things- things. The development of IoT based devices is day by day enhancing It is also cost effective and helps in reducing waste. The purpose of this project is to create an efficient dashboard which will help the user in getting Live Data of his sensors for efficient environment monitoring. Accessing Data and control it is an efficient way to provide data security in the cloud. But in untrusted cloud servers, the data storage and retrieval control become a challenging in cloud storage systems. Since this new computing technology requires users to entrust their precious data to cloud providers, in that sense the security and privacy concerns on outsourced data is increasing. We have tried to create a dashboard for all IOT devices in which is efficient and flexible in dealing with access control for outsourced data in cloud.

Keywords- *IoT, Dashboard, monitoring, cloud, sensors, efficient, platform*

1. Introduction

IoT devices are being integrated into all kinds of industries: home goods, automotive, healthcare, and public transport. No matter where you use IoT technology, you'll need to control devices and gather valuable data. For this, you'll need a single control centre: A Dashboard

What is an IoT dashboard? An IoT dashboard is web-based software that allows you to control your ecosystem, get information from each device, and manage its operation. An IoT dashboard is basically an IoT control panel that can achieve many different goals for any business. The primary goal of most IoT devices is to collect data. A dashboard allows you to review collected data both retrospectively and in real time. To make the most of your collected data, you can combine datasets to find correlations and program rule-based actions. Different locations can be subject to different external factors: temperature, pressure, speed, etc. Combine your data and analyse it as a whole to get the most accurate results. Real-time IoT devices monitoring feature helps you know where your IoT devices are and what data they're gathering. For example, IoT in healthcare is often connected with remote patient monitoring. Doctors can use devices to monitor vitals in real time without having to visit a patient in person. A dashboard can help you achieve are connected with IoT device control and monitoring, data collection, management, and analysis. This requires a rather complex system.

1.1 Aim and Objectives of Project

The objective of this project to create an efficient dashboard which will help the user in getting Live Data of his sensors for efficient monitoring. Accessing Data and controlling it in efficient way to provide data security. We have tried to create a dashboard for all IOT devices in which is efficient and flexible in dealing with access control for outsourced data in cloud.

1.2 Scope

The scope of the project is to provide user safe and flexible platform to access data where he/she can also:

- System will support configurable max devices. This configuration will be user specific.
- Get information about the currently connected sensor
- Get alert notifications when the registered sensor will cross given limit.
- Also Shows historical data and real time data which can be used for analysis.

2. Existing Platforms:

Thingsboard – It is an open-source IoT platform for device management, data collection, processing and visualization for your IoT projects

Thingstream – Thingstream's intelligent Global Connectivity Platform provides low power, low cost, ubiquitous IoT connectivity via MQTT over GSM.
ThingWorx – It delivers tools and technologies that empower businesses to rapidly develop and deploy powerful industrial IoT applications and augmented reality (AR) experiences.
Thingspeak – It is the open IoT platform with MATLAB analytics.
Wolkabout – IoT Application Enablement Platform that integrates any device, transforms real-time readings into meaningful data, and combines different devices and services into a complete IoT solution.
Kaa - It is an open-source IoT platform for device management, data collection, analytics and visualization, remote control, software updates, and more.

3.Custom IoT Dashboard
A custom web IoT dashboard is web-based software that you build from scratch and power with the technologies that are best for your IoT service. The main downside of a custom dashboard is its cost. Building a dashboard requires a development process that is separate from what other development process, and the more features you want, the more complex the development will be. Building a dashboard from scratch will require strong skills from your web developer, as they'll need to select proper technologies, design the architecture, and pair your devices with the backend and the dashboard. However, with a custom IoT dashboard app you can always be sure that your IoT devices will be compatible with your whole system. You'll be able to implement features specific to your business and customize the dashboard according to your needs. This will make your operations more effective and save you money in the long run.
Pros: -
Custom features
Your own servers
Independence from another business's policies and pricing
Data safety
Can change functionality on demand
Cons: -
Significant investment, especially at the start
Need a software support team

Must-have IoT dashboard components
Telemetry data collection
Data collection is one of the primary goals of any IoT device. Your backend is what helps you store and view information in the form of reports. Telemetry data includes:
- Temperature
- Humidity
- Motion
- GPS coordinates
- Proximity
- Pressure
- Air and water quality
- Chemical composition
- Acceleration
- Voltage/current/energy

After your sensors get all this data and transfer it to your database, you need to visualize it. There are some IoT monitoring open-source solutions that can allow you to do that easily.
Note, that an industrial IoT dashboard might need more customization, and it may be hard to find a ready solution.
Data visualization
Humans typically have visual perception, so a dashboard should visualize information from IoT devices. There are lots of ways to do that:
- Line graphs
- Gauges
- Geographical maps
- Bar charts
- Pie charts
- Histograms
- Heat maps

There are lots of ways to visualize data, so choose several types and test them

Use these visualization methods to represent your data in the best way possible. To make your service outstanding, share some of this information with your users in an equally clear way after you create IoT dashboard for your own needs.

Real-time data processing

For most IoT-based products (for example, in healthcare and smart car applications), it's vital to get data in real time. For this, data should be sent and received dynamically. This requires several things:

- Dynamic database
- Stable connection
- Advanced development skills and lots of resources

Data storage

IoT devices are usually lightweight, so they don't have much storage capacity. All the data they gather they almost immediately send to the server. And though these data points may appear to be collected slowly, over time there will be so many of them that you'll need sufficient storage to keep them all. Moreover, your database should be able to quickly retrieve all data so you can see changes according to timestamps. A timestamp shows when a piece of data was created. This parameter is attributed to data either by a device or by backend software. Later, when you need information from a certain timeframe, your software can retrieve it according to the timestamps.

Application:

Healthcare

IoT is applied in Healthcare to collect and analyse real-time medical data aiming to create actionable medical insight and minimize traditional medical treatment limitations [33]. Medical data, acquired through smart devices, is stored and analysed in cloud platforms for different stakeholders. A such, a patient's health status may be remotely monitored by ubiquitous healthcare applications.

Smart Buildings

Large sets of IoT devices in smart buildings collect sensitive timely data providing detailed interactions between humans and machines [51]. A large number of building IoT sensors collect high resolution meter recordings from heating, ventilation, air conditioning, lighting, digital video, access control, intrusion detection, fire detection, alarms, weather conditions, and demographics. The integration of these heterogeneous IoT devices enables smart services, called building analytics, which are utilized to monitor and forecast citizens' activities [54,55]. The offered smart services in smart buildings are further optimized through the employment of general, personal, and critical gathered data.

Smart Agriculture

Agriculture is a highly complex system that depends on the climate, weather, soil conditions, plant types, and so on. Nowadays, smart agriculture applications employ IoT technologies, to collect and process various sensor

data, to enhance crop management, assure improved productivity and product quality, with minimum energy consumption and maximum customer satisfaction. The establishment of sustainable agriculture due to the effects of global warming and frequent extreme weather conditions is increasingly important.

Conclusion:

An IoT dashboard is a necessary part of your IoT software. It allows you to gather, analyse, and visualize information that's vital for your customers and your business. An IoT dashboard can be very basic, only displaying and visualizing your data. This option is great for simple services or MVPs. . A more complex dashboard will allow you to manage your devices, deliver updates to them, get valuable insights from your data, and more. Accessing Data and controlling it in efficient way to provide data security. We have tried to create a dashboard for all IOT devices in which is efficient and flexible in dealing with access control for outsourced data in cloud.

References:

[1] Nakhuva, Bhumi & Champaneria, Tushar. (2015). Study of Various Internet of Things Platforms. International Journal of Computer Science & Engineering Survey. 6. 61-74. 10.5121/ijcses.2015.6605.
 [2] https://www.mobindustry.net/how-to-create-web-dashboards-for-iot-devices/#
[3] Hassan, Zozo & Ali, Hesham & Badawy, Mahmoud. (2015). Internet of Things (IoT): Definitions, Challenges, and Recent Research Directions. International Journal of Computer Applications. 128. 975-8887.
[4] Abdul-Qawy, Antar & Magesh, E & Tadisetty, Srinivasulu. (2015). The Internet of Things (IoT): An Overview. 5. 71-82.
[5] In Lee, Kyoochun Lee,The Internet of Things (IoT): Applications, investments, and challenges for enterprises,
Business Horizons,Volume 58, Issue 4,2015