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# A Reliable Troubleshooting Model for IoT Devices with Sensors and Voice Based Chatbot Application

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**Abstract:** Due to rapidly adopting different IOT devices in a campus or building which emits the data into various gateway or channel or actuators. Processing & real-time transfer of data from edge to cloud is becoming a mammoth task. Many times, the devices may not send data or not respond to gateway or edge servers. It is essential to keep a command center and monitoring and it needs troubleshooting of any devices on the fly. The troubleshooting will be done with the help of sensor or gateway logs and build with self-learning model with voice based chatbot application.

**Keywords:** Chatbot, Edge Server, Gateway, IOT Sensor, Natural Language Processing, Text classification, Text Analytics, voice tags

## I. INTRODUCTION

Troubleshoot sensor or devices and provide necessary inputs for different support level or command center team's queries (e.g. which sensor failed and what is the corresponding gateway number and its last data collection date time)

Gateway or sensor logs are the sources for building chat bot application, this application will help to troubleshoot and monitor the sensors or devices with in the building or across different floors with in the building.

## II. BACKGROUND

The manual troubleshooting of large scale sensors or gateways with in the building or campus is cumbersome. Chatbot App will help the building admin or command center team to provide the answers on the fly and automatically allocates and generate a ticket (support ticket) in the system after notification of failure through SMS or Mobile App or Email (if needed)

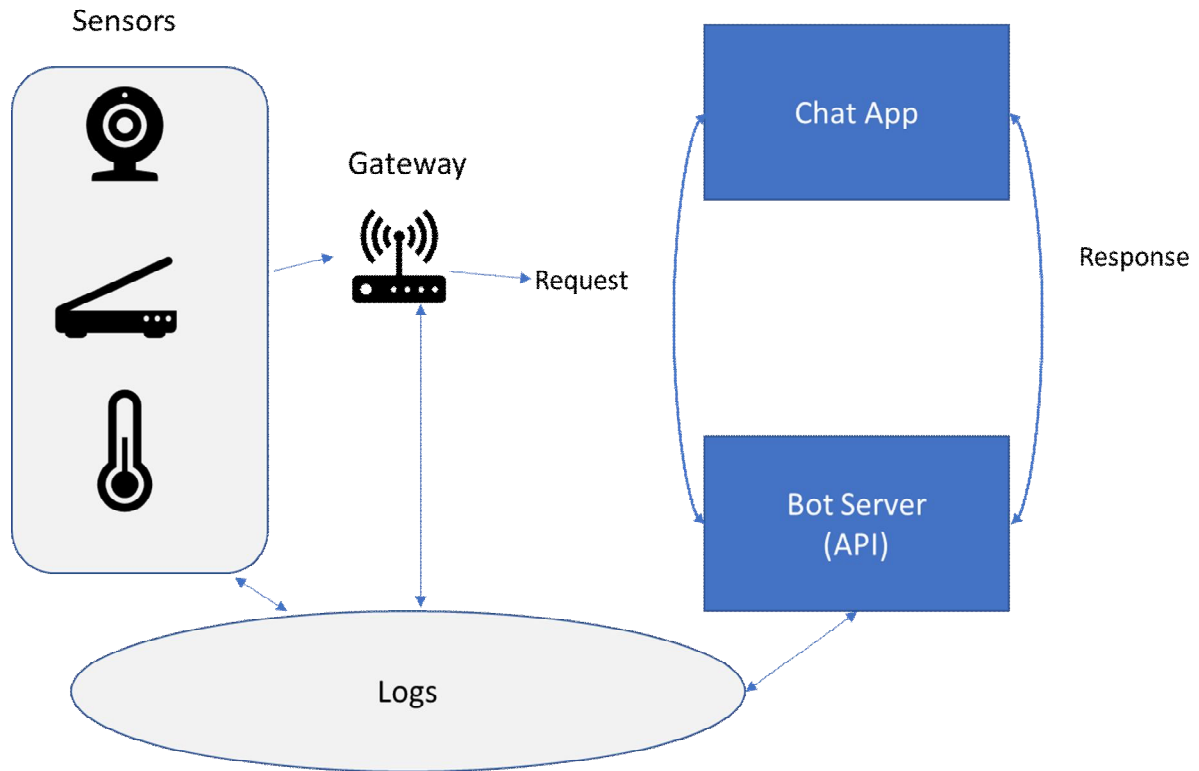
It not only helps to reduce the time to react the problem but also ease the troubleshooting techniques and tips based on the historical records available in edge server or log store.

## III. WHAT IS CHATBOT APP

A chatbot is a computer program which conducts a conversation via auditory or textual methods. Such programs are often designed to convincingly simulate how a human would behave as a conversational partner, thereby passing the Turing test. Chatbots are typically used in dialog systems for various practical purposes including customer service or information acquisition. Some chat bot uses sophisticated natural language processing systems, but many simpler systems scan for keywords within the input, then pull a reply with the most matching keywords, or the most similar wording pattern, from a database or log store

## IV. LITERATURE SURVEY

Troubleshooting of sensor devices is performed by a support engineer who uses run book or guide to refer the scenarios or previous fixes applied to that issue. Text analytics ease this kind of problems by collecting different sensor or gateway logs and removing all unneeded data. The selected data will be loaded into edge server which keeps stores the log files from different gateways or sensors. The analytics program which will check whether the issue arises out and keep a tag to link the previous resolution id or ticket number as link.



### V. HOW THIS RELEVANT TO THIS PROBLEM?

In the recent era of connected building or campuses, it is difficult to monitor or troubleshoot manually and fix the problem (e.g. if a Fire Alarm malfunction, the resiliency or other fire alarm needs to be checked on the fly through few commands, it is not possible without a interactive application like chatbot where we can enter our commands in natural language). Also, buildings need to communicate to other building through their current health and status flags to keep other buildings safe and plan for evacuation.

### VI. HIGH LEVEL APPROACH

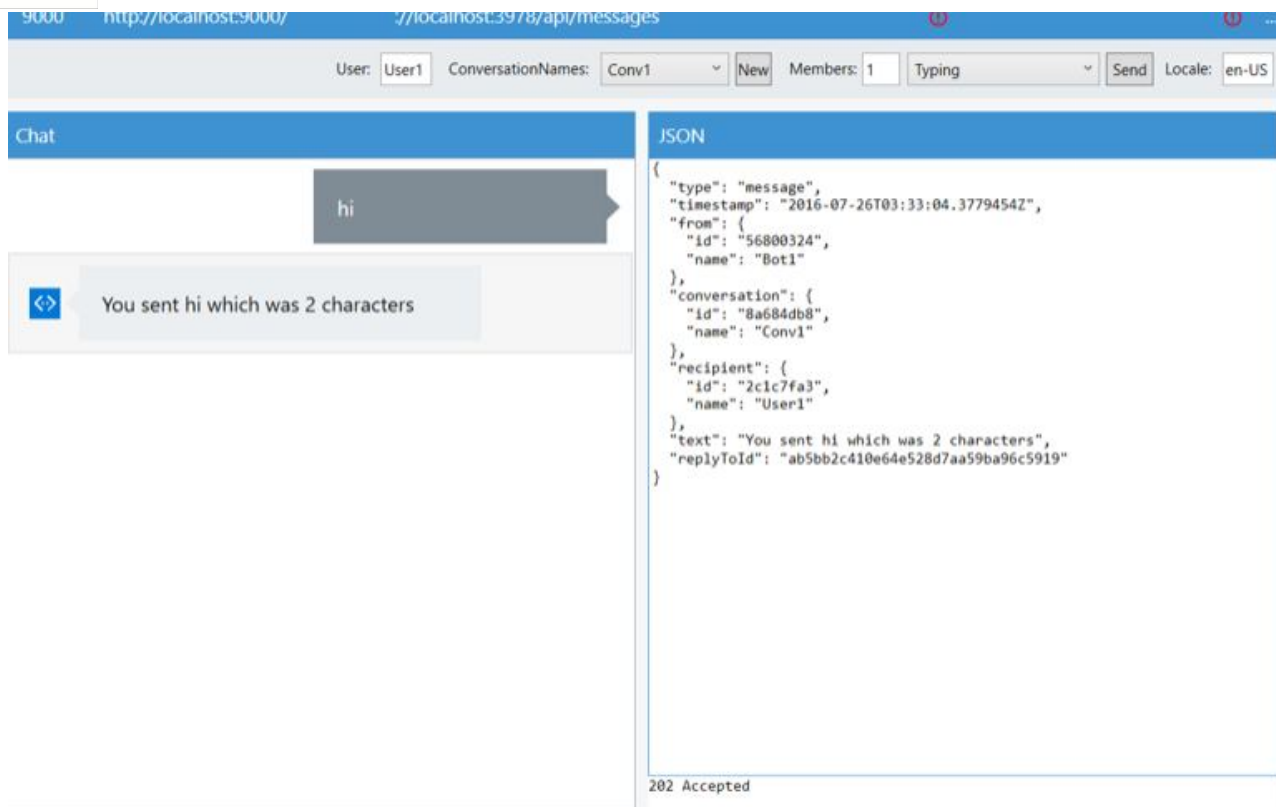
- A. Collect sensor logs from IOT gateway or direct devices and keep train the data based on predefined FAQs. Over a period of time different inputs from other users will be tagged as FAQ and map the right answers or links.
- B. Log store like Solr or Elastic search will be used to do text analytics (like lemmatization, stemming, classification, etc.) through R or Python.
- C. Andriod or iOS app can built which will help the users to interact through audio or textual inputs which will connect the log database or store and leverage the recommender model mentioned in step b.

### VII. KEY BENEFITS OF THIS SOLUTION

- A. It will provide real-time status of each sensor and helps the troubleshooter to recommend the right solutions or fixes based on previous issues or logs stored
- B. Operators can customize their queries based on their user's profile or building type
- C. Seamless and it will be replicated for different building with similar characteristics and user model

### VIII. BOT FRAMEWORK

Bot Service provides what we need to build, connect, deploy, monitor, and manage bots. Bot Service provides the core components for creating bots, including the Bot Builder SDK for developing bots and the Bot Framework for connecting bots to channels Bot Service provides an integrated environment purpose-built for bot development. we can write a bot, connect, test, deploy, and manage it from your web browser with no separate editor or source control required. For simple bots, you may not need to write code at all. It is powered by the Bot Framework and it provides two hosting plans:



## IX. CONCLUSION

The above problem statement is not generic to building automation providers and it needs to be customized based on their devices or data collection agents. Their existing voice assistant can also compliment to solve this problem in larger scale.

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