CAI1C02 -
Machine Learning Solutions Development

ASSIGNMENT PRESENTATION

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Agenda

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Introduction

- "AskFM" chatbot allows facility managers/ engineers/ technicians to manage the equipment in the building using a chat interface e.g. equipment monitoring/ control etc.

Functions

s/n	Function	Description
1	Equipment Status Monitoring	Check the on/off status of the facility equipment e.g. AHU (Air Handling Unit), FCU (Fan Coil unit), Lighting etc.
2	Equipment Control	Turn on/ off the facility equipment
3	Equipment Scheduling	Schedule when the facility equipment will operate e.g. Daily from 8a.m. to 9p.m.
4	Thermostat Adjustment	Adjust the area temperature in specific location of building
5	System Health Check	Check for unresolved faults in the facility equipment requiring attention

Scope - Intents

❑ Function – Intent Mapping

- Training phrases are framed in order to solicit either the equipment name or location from the user entry

Function	Intent	Parameters	
Equipment Status Monitoring	EquipmentStatusCheck	EqptName	Equipment Name
		EqptLocation	Location of equipment
		EqptParam	Equipment info requested e.g. run/stop status, temperature, humidity
Equipment Control	EquipmentControl	EqptName	Equipment Name
		EqptLocation	Location of equipment
		EqptCommand	Equipment start/stop command
Equipment Scheduling	EquipmentScheduling	EqptName	Equipment Name
		EqptLocation	Location of equipment
		SchStartTime	Start time of equipment
		SchStopTime	Stop time of equipment
		SchFrequency	Scheduling frequency e.g. daily, weekly etc.
Thermostat Adjustment	ThermostatAdjustment	EqptName	Equipment Name
		EqptLocation	Location of equipment
		SetTemp	Temperature Setting
System Health Check	SystemHealthCheck	EqptName	Equipment Name
		EqptLocation	Location of equipment

Scope -Entities

System Entities

- Used for direct parameter types e.g. temperature, time, name, location

Parameter	Entity Type	Typical values
EqptName	@sys.any	FCU_L1_01
EqptLocation	@sys.any	StarBucks, Let's Eat
SchStartTime	@sys.time	9a.m.
SchStopTime	@sys.time	10p.m.
SetTemp	@sys.temperature	24C

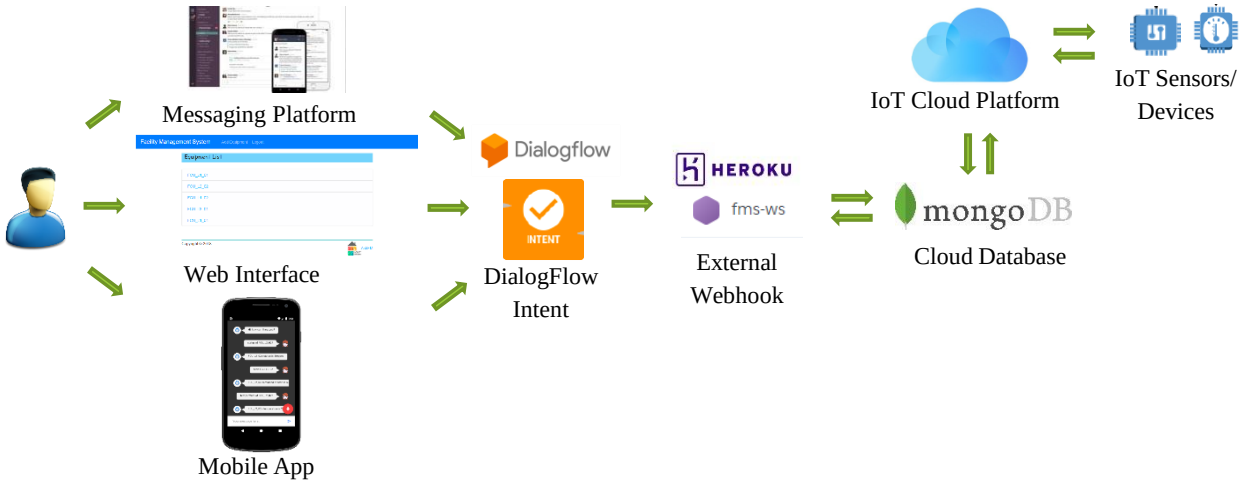
Developer Entities

- Used for complex value extraction and to accommodate the myriad number of synonyms that map to the specific parameter value requested

Parameter	Entity Name		Synonyms
EqptParam	EqptParam	Status	status, running, stopped, start
		Humidity	humid, stuffy
		Temperature	temp, hot, cold
		Schedule	sched, scheduling
EqptCommand	EqptCommand	Start	run, on
		Stop	off
SchFrequency	ScheduleFrequency	Daily	everyday, every day
		Weekly	every week
		Monthly	Every month, month
		Fortnightly	every 2 weeks, every other week
		Weekday	Week day, Mon to Fri
		Weekend	Non-working day, nonworking day, Sat and Sun

Scope –Process Flow

- **Process Flow**
  - User interact with chatbot via web/ mobile app/ social messaging platform e.g. Slack/ Telegram/ Facebook messenger
  - Corresponding intent triggered based on query sent with request fulfilled by external webhook hosted on Heroku platform
  - Webhook retrieves/sends equipment information/commands from/to a cloud database hosted on Mongo DB Atlas platform
  - Cloud database interacts with equipment using intermediary IoT cloud platform (AWS/ Microsoft Azure) via restful API calls



- All intents provide direct answers to the user questions and do not require follow-up clarification with the user

Status

- **Assumption**
  - Facility management system scope limited to ACMV devices e.g. FCU (fan cool unit), but able to accommodate other facility equipment not yet included

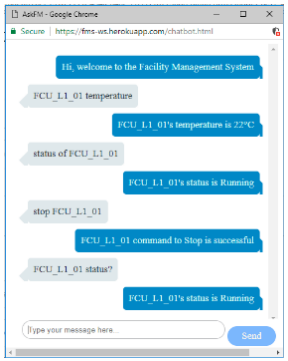
- **Functions**
  - All functions implemented with intents and entities configured in DialogFlow and fulfilment implemented via a NodeJS webhook hosted on Heroku platform

- **Improvements / Additional features**
  a) Integration with Telegram social platform (in addition to Slack)
  b) Mobile App Integration using Ionic/ Cordova
  c) Implementation of webhook function using NodeJS and web front-end using jade templating engine and hosting on Heroku platform
  d) Implementation of backend cloud database using Mongo DB Atlas

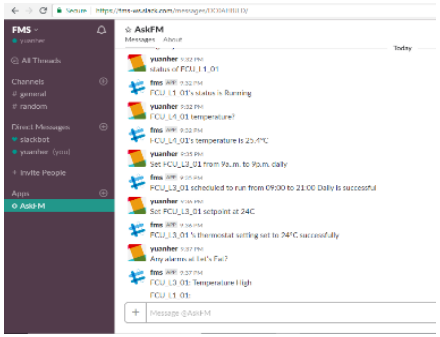
- **Problems Encountered/ Challenges**
  - Individual training phrases including each of name and location need to be configured separately e.g. “FCU_L1_01 status” / “StarBucks status”
  - Phrases with more than 1 parameter require separate training phrases to be configured to cater for different appearance order of parameter e.g. “status of FCU_L1_01” / “FCU_L1_01 status

Chatbot Client Screenshots

❑ Web

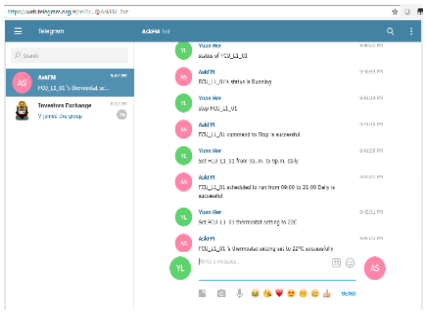


❑ Messaging Platforms



Slack

❑ Mobile



Telegram

References

- Rohan Kar, Rishin Haldar (2016). Applying Chatbots to the Internet of Things: Opportunities and Architectural Elements.
  - International Journal of Advanced Computer Science and Applications(ijacsa), Volume 7 Issue 11, 2016.

- Creating a NodeJS based Webhook for Intelligent Bots.
  - https://chatbotslife.com/creating-a-nodejs-based-webhook-for-intelligent-bots-a91ecbe33402

Q&A