For this homework assignment, you will build a chatbot that can interact with users in natural language. You will use the Watson Conversation service and its graphical web-based tooling to teach a chatbot how to answer questions about an Internet of Things (IoT) sensor connected to a Raspberry Pi. You should be able to ask questions about the temperature, humidity, or barometric pressure that is currently measured by the sensor. The Sense HAT sensor can also detect if the sensor has been moved (i.e., if someone has opened a door it is attached to). If the sensor detects movement, the students will design their solution to send an SMS message using IBM’s Cloud Functions service (IBM’s open-source version of AWS’s Lambda service).   
  
To do this, you will have to connect your group’s Raspberry Pi + Sense HAT to the IBM Watson IoT Platform in Bluemix. This includes installing a custom OS onto the Raspberry Pi's and attaching the Sense HAT sensor.

You will then link your Raspberry Pi to the Watson IoT Platform and perform operations using IBM's open-source drag-and-drop Node-Red development environment tool to create the integration needed for the chatbot to interact with the sensor.

This is your first group assignment. Each group will be given the following items to complete this assignment:

1. 16 GB sd card
2. Micro USB charger
3. Raspberry Pi Sense Hat module
4. Raspberry Pi 3 Model b

**You must return these items when the assignment is complete. Your team leader is responsible for the care and return of these items.**

**The assignment will be graded in person on the Friday after the assignment is due (it will be due on Thursday night, by midnight). At least 1 person from each group must come to my office to demo the assignment (using the equipment) on Friday between 1 – 3:30.**

Rubric

Part 1: Watson Conversation Service (50 points)

1. (2 points) Create Chatbot Project in IBM  
   Be sure to note your credentials when you create it, as you’ll need these later
2. (3 points) Create Workspace to save entities, intents and Dialogues
3. (10 points) Defined appropriate entities (or combinations of self-defined + system entities)
4. (10 points) Defined appropriate dialogues
5. (10 points) Defined appropriate intents
6. (15 points) Chatbot is able to respond appropriately to questions asked related to the assignment
   1. Temperature
   2. Humidity
   3. Barometric pressure

Part 2: Node Red & Raspberry Pi (25 points)

1. (5 points) Successfully installed Raspberry PI OS image
2. (10 points) Successfully installed and tested Sense HAT module
3. (10 points) Successfully create an IBM “Internet of Things Platform Starter” application in Bluemix that integrates Node-Red and the Raspberry pi

Part 3: Putting it all together (25 points)

1. (15 points) Your chatbot is able to correctly respond to a question with the appropriate information from the raspberry pi sensor.
   1. Temperature
   2. Humidity
   3. Barometric Pressure
2. (10 points: 5 for IBM Lambda function, 5 for raspberry pi calling it upon movement detection) When your sensor detects movement, it calls your IBM Lambda function and sends a SMS text message to someone in your group (via the Twillio service in Bluemix). Note: You should send no more than one SMS text message within a 5-minute period.