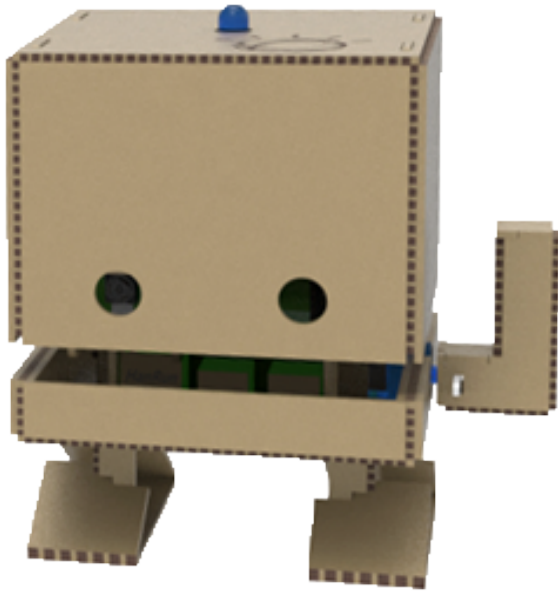


TJBot Sees Objects and Speaks

TJBot Nodes in Node-RED

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Train TJBot to take a picture using the Raspberry Pi camera, classify the image using the Watson Visual Recognition service, and then speak a list of the objects seen using the Watson Text to Speech service.

Use the function node to construct a list for TJBot to speak.




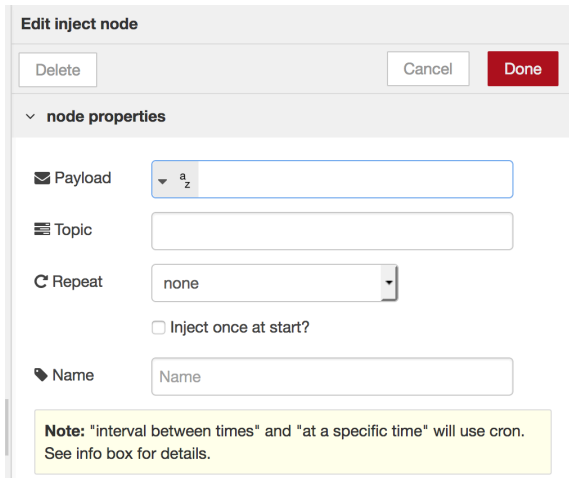
A digital copy of this lab and completed flow can be found at:
<http://ibm.biz/node-red-tjbot-say-what-i-see>

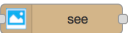


Train TJBOT to See Objects and Speak

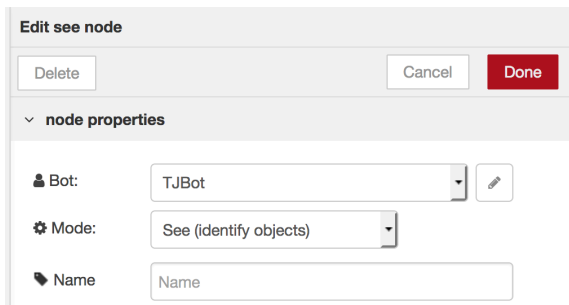
In this lab, we'll use the see and speak nodes to train TJBOT to recognize objects and speak what is seen. You will need a Raspberry Pi camera and speaker connected to the TJBOT for this lab.

1. In the Node-RED editor running on the Raspberry Pi, drag an  node onto the canvas. Double click on the node and configure as shown below.

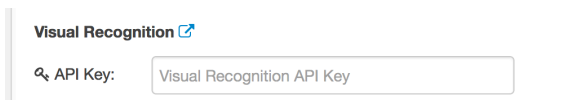


2. Add a  node as shown below. The listen node has several modes: recognize text, recognize objects, and take a photo. Select **See (identify objects)** from the **Mode** dropdown menu.

The see node uses the Watson Visual Recognition service, which requires service credentials from IBM Bluemix. Click on the pencil icon to the right of the **Bot** dropdown menu.



3. Click on the link icon next to the **Visual Recognition** heading to launch into the IBM Bluemix console and create a Watson Visual Recognition service instance.



- If you don't have an IBM account, sign up at bluemix.net. Sign into your account if prompted. Leave the service name as is and click **Create**.

The screenshot shows the IBM Bluemix Catalog page for the Visual Recognition service. The page includes a description of the service, a list of features (General Classification, Face Detection), and a form to create a new service instance. The form fields are: Service name (Visual Recognition-8f), Credential name (Credentials-1), Select region to deploy in (US South), Choose an organization (tutorials), Choose a space (tjbot), and Connect to (Leave unbound). A 'Create' button is at the bottom right.

- Click on **Service Credentials** in the menu on the left. Click on **View Credentials** to display the service credentials.

The screenshot shows the IBM Bluemix Watson Service Credentials page. The left sidebar has a 'Service credentials' menu item. The main content area shows a table with one credential named 'Credentials-1' created on Jul 22, 2017. The 'ACTIONS' column for this credential has a 'View credentials' link.


KEY NAME	DATE CREATED	ACTIONS
Credentials-1	Jul 22, 2017 - 06:22:02	View credentials

- Copy the API key into the field back in the Node-RED editor under the **Visual Recognition** section.

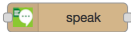
The screenshot shows the Node-RED editor. On the left, a JSON object is displayed:

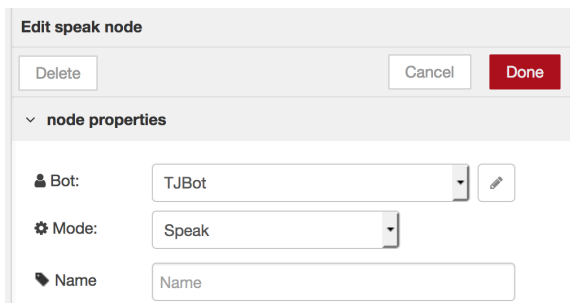
```
{  "url": "https://gateway-a.watsonplatform.net/visual-recognition",  "note": "This is your previous free key. If you want a different key, unbinding the key and try again.",  "api_key": "g0h123kjf5h3m620n5h1175mrk54h32vc54ji543"}
```

 On the right, the 'Visual Recognition' service configuration is shown, with the 'API Key' field containing the same API key.

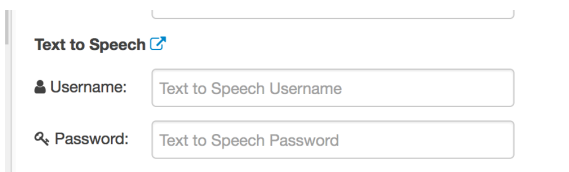
7. The see node produces a message with names of objects and colors in the photo captured, with the response being passed in the **msg.payload** property. Add a  **function** node to loop through the results and concatenate them into a new message.



8. Add a  **speak** node as shown below. The speak node uses the Watson Text to Speech service, which requires service credentials from IBM Bluemix. Click on the pencil icon to the right of the **Bot** dropdown menu.



9. Click on the link icon next to the **Text to Speech** heading to launch into the IBM Bluemix console and create a Watson Text to Speech service instance.



10. Leave the service name as is and click **Create**.

The screenshot shows the 'Text to Speech' service configuration page in the IBM Bluemix Catalog. The page includes a description of the service, a 'View Docs' link, and a table with metadata: AUTHOR (IBM), PUBLISHED (08/01/2017), TYPE (Service), and LOCATION (US South, Germany, Sydney, United Kingdom). The configuration section contains fields for 'Service name' (Text to Speech-20), 'Credential name' (Credentials-1), 'Select region to deploy in' (US South), 'Choose an organization' (tutorials), 'Choose a space' (tjbot), and 'Connect to' (Leave unbound). A 'Features' section lists 'English (US)' and 'English (UK)' with voice options. At the bottom, there are links for 'Need Help? Contact Bluemix Sales', 'Estimate Monthly Cost Cost Calculator', and a 'Create' button.

11. Click on **Service Credentials** in the menu on the left. Click on **View Credentials** to display the service credentials.

The screenshot shows the 'Service Credentials' page for the Watson Text to Speech service. The left sidebar has a 'Manage' section with 'Service credentials' selected. The main area displays a table with one credential: 'Credentials-1', created on 'Aug 2, 2017 - 12:34:49'. The 'ACTIONS' column for this credential has a 'View credentials' link.

12. Copy the username and password into the fields back in the Node-RED editor under the **Text to Speech** section.

The screenshot shows the Node-RED editor configuration for the 'Text to Speech' service. On the left, a JSON object contains the configuration:

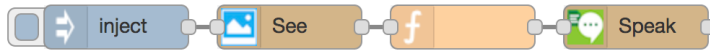
```
{  "url": "https://stream.watsonplatform.net/text-to-speech/api",  "username": "f8b532e1-4151-4993-92ee-89bc5a23890c",  "password": "f4G1M3B5onrP"}
```


. On the right, the 'Text to Speech' configuration window shows the 'Username' field populated with 'f8b532e1-4151-4993-92ee-89bc5a23890c' and the 'Password' field with masked characters '.....'.

13. At the top of the configuration window, select **English (US dialect)** from the **Speak** dropdown menu.

The screenshot shows the 'speak > Edit tjbot-config node' configuration window. It includes a 'Delete' button, a 'Cancel' button, and an 'Update' button. The configuration fields are: 'Gender' (Male), 'Speak' (English (US dialect)), 'Listen' (empty), 'Has' (radio buttons for Servo and LED), and 'Name' (TJBot). At the bottom, there is a 'Tone Analyzer' link.

14. Connect the nodes together as shown below.



15. Click on the  Deploy button in the top-right corner of the Node-RED editor to save and deploy the changes.

16. Click on the tab to the left of the inject node to take a picture with TJBOT's camera. When the photo is analyzed with the Watson Visual Recognition service, a message is constructed with the objects and colors recognized, and is spoken out via the speaker.

An example is:

TJBOT sees earphone, person, face, people, maroon color