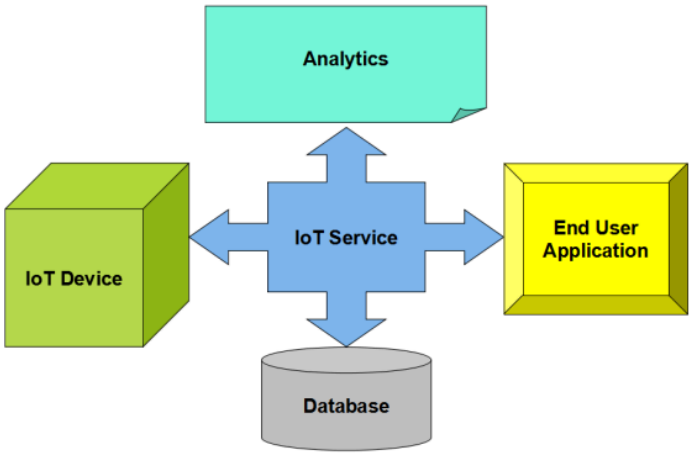
EXPERIMENT NO. 10 (Group C)

- **Aim:** Study of ThingSpeak – an API and Web Service for the Internet of Things.

- **Theory:**
  The internet of things is a System of "connected things" the things generally generally comprise of an embedded operating system and an ability to communicate with the internet or with neighbouring things. One of the key elements of a generic IoT system that bridges the various 'things' is an IoT service.

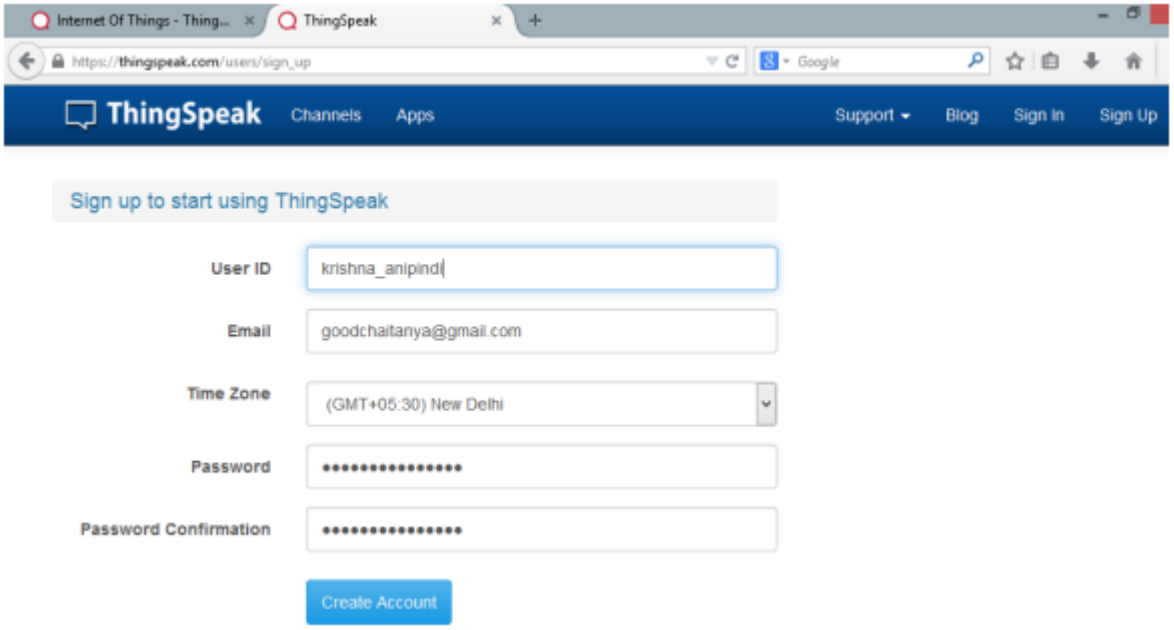


What is Thing Speak ??

ThingSpeak is a Web Service (REST API) that lets you collect and store sensor data in the cloud and develop Internet of Things applications.
It works with Arduino, Raspberry Pi and MATLAB (premade libraries and APIs exists).
But it should work with all kinds of Programming Languages, since it uses a REST API and HTTP.

ThingSpeak is an IoT analytics platform service that lets you collect and store sensor data in the cloud and develop Internet of Things applications.
The ThingSpeak service also lets you perform online analysis and act on your data. Sensor data can be sent to ThingSpeak from any hardware that can communicate using a REST API
ThingSpeak is a Web Service (REST API) that lets you collect and store sensor data in the cloud and develop Internet of Things applications.

Getting Started-
Open https://thingspeak.com/ and click on the 'Get Started Now' button on the center of the page and you will be redirected to the sign-up page(you will reach the same page when you click the 'Sign Up' button on the extreme right). Fill out the required details and click on the 'Create Account' button.



First Steps

Firstly, although it is not required in actually setting up the API, for ThingSpeak to be of any meaning, it is imperative to have a micro-controller with an internet connection. The type of micro-controller is completely up to the user, as ThingSpeak is able to communicate with any type, as long as it is networked. In our example, we have used an Arduino board with an ethernet shield. Once the microcontroller has been chosen, the first steps to setting up ThingSpeak are always the same. After having signed up for a new user account you can log in and create new channels . When logged in, you can create a new channel by selecting Channels > My Channels and then Create New Channel. The channel has an unique identifier key which is used to identify the channel when reading or uploading data.

Uploading Data

Each channel has up to eight fields where data (both numeric and alphanumeric formats) can be stored, as well as four additional fields for location details. All entries are stored with an unique identifier and a date and time stamp. Existing data can be imported from a "Comma-Separated Values" (CSV) file, which is a popular format for storing tabular data.

Arduino IDE and ThingSpeak Integration

One of the example uses of the ThingSpeak API was the ThingTweet add-on, which enabled the creation of a doorbell that would tweet (from the account of the doorbell) whenever someone 'rang' it. For this example we used an Arduino with an ethernet shield. The Arduino continuously checks if there is a signal coming in, the signal would come when the doorbell was pressed. In other words, the moment the doorbell is pressed, an update is sent to ThingSpeak via a simple HTTP post using the API. This post to the server contained a message to be tweeted including the date and time the doorbell when rang.

```
if (buttonState == HIGH)
{
updateThingSpeak("field1=1&twitter=doorbelldaan&tw eet=Ring Ring);
void updateTwitterStatus(String tsData)
{
if (client.connect(thingSpeakAddress, 80))
 { // Create HTTP POST Data
tsData = "api_key=" + thingtweetAPIKey + "&status=" + tsData;
client.print("POST /apps/thingtweet/1/statuses/update HTTP/1.1\n");
client.print("Host: api.thingspeak.com\n"); client.print("Connection: close\n");
client.print("Content-Type: application/x-wwwform-urlencoded\n");
client.print("Content-Length: ");
client.print(tsData.length());
client.print("\n\n"); client.print(tsData);

}
}
```

The ThingSpeak API was connected to a Twitter account that we created for the doorbell [8]. The date and time had to be included to avoid having the message flagged as spam, as described earlier. Connecting the accounts took two clicks to accept and allowed the API to update Twitter. To get this connection, log in, click Apps, click the ThingTweet button, and finally click Link Twitter Account.

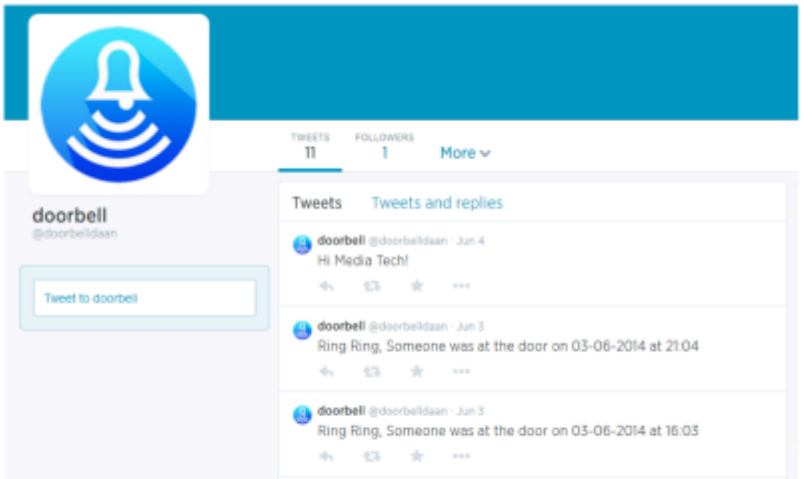


Figure 3. Screenshot showing the Twitter doorbell

Conclusion:

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