Smart Waste Management System For Metropolitan Cities

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INTRODUCTION:

Ø The rate at which solid wastes are produced in most developing countries is becoming alarming. This increase may be due to recent population growth and rural-urban migration .

Ø Garbage is made up of non-renewable resources used daily to meet our needs then throw away. As increase in consumption of paper, clothing, bottles, and product packaging increases, the generation of garbage also increases significantly.

Ø The form and type of solid waste depends on a number of factors which include the living standard and life style of the inhabitants of the region and the natural resources

ØSmart city waste management technology **allows crews to empty bins before they become overflowing with trash or recycling, and before infestation becomes an issue**. Smart waste sensors can also alert crews

when bins develop unpleasant smells which can then be treated to eliminate odors.

ØReducing waste will not only protect the environment but will also **save on costs or reduce expenses for disposal**. In the same way, recycling and/or reusing the waste that is produced benefits the environment by lessening the need to extract resources and lowers the potential for contamination.

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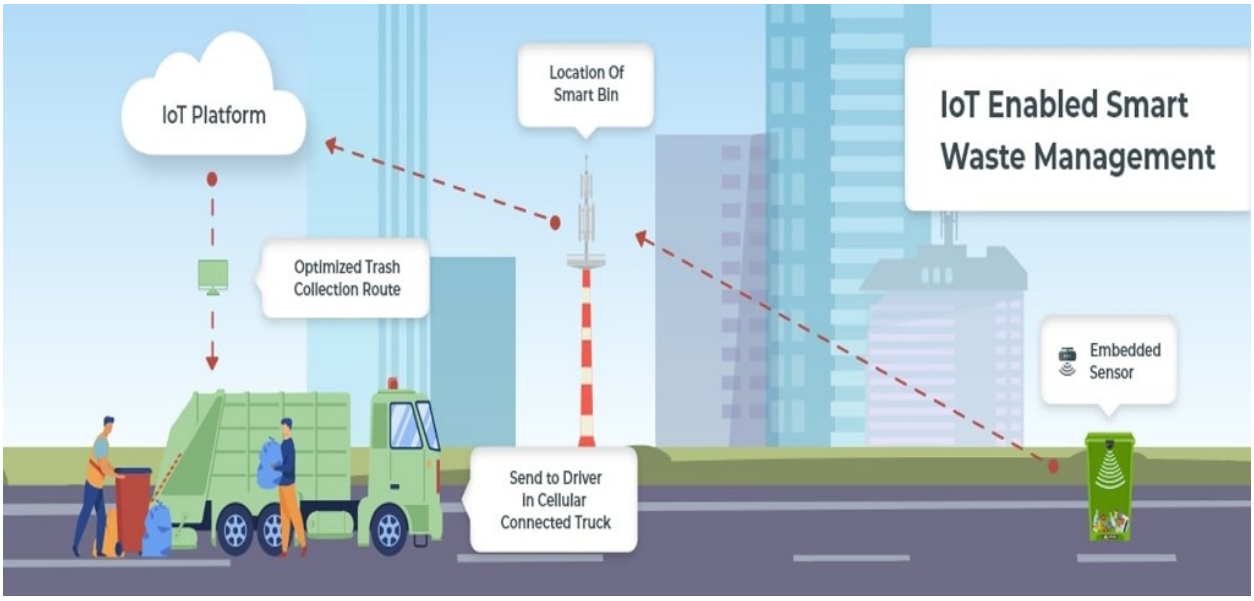
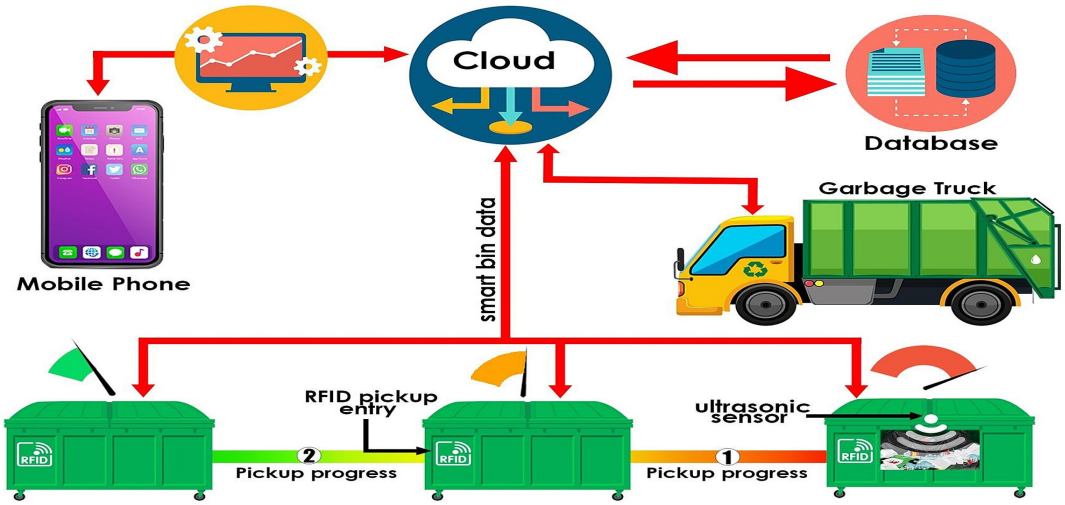
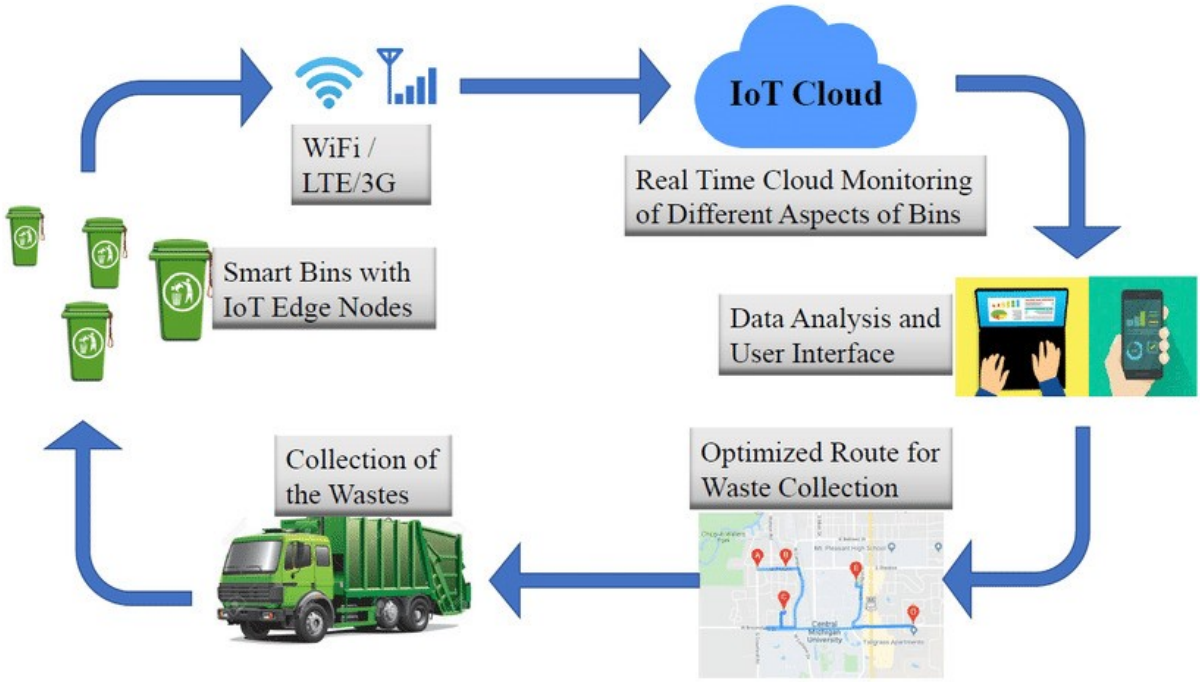
GENRAL SOLUTION:



SOLUTION ARCHUTECTURE:



TECHNICAL ARCHUTECTURE:



REQUIRED SOFTWARES:

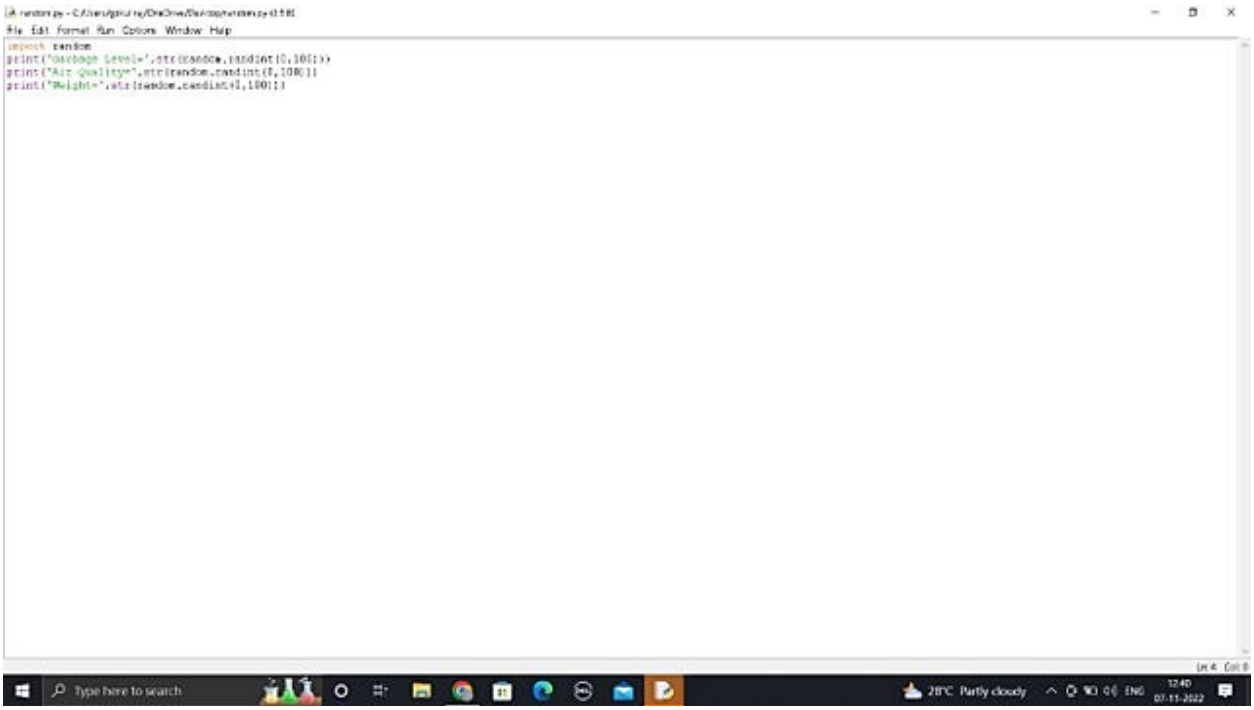
ØSo as to follow the above architecture to intimate filled garbage, we use few cloud (or) software applicants. They are,

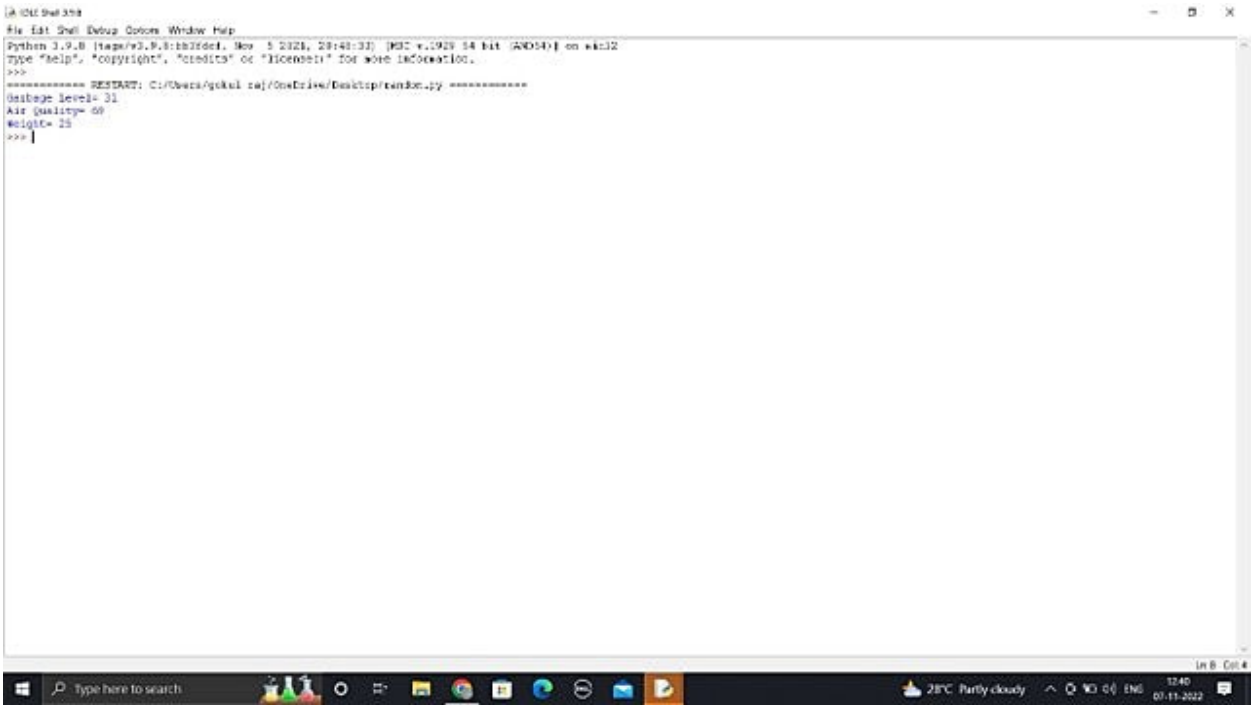
- Python IDLE (Version 3.7.0)
- IBM Watson IoT
- Node-Red

Node-Red UI

Python IDLE (Version 3.7.0)

ØIn this Project we are using Python IDLE (3.7.0) as the interacting medium via program from the user data to the IBM Cloud by using Device Credentials of IBM Cloud.

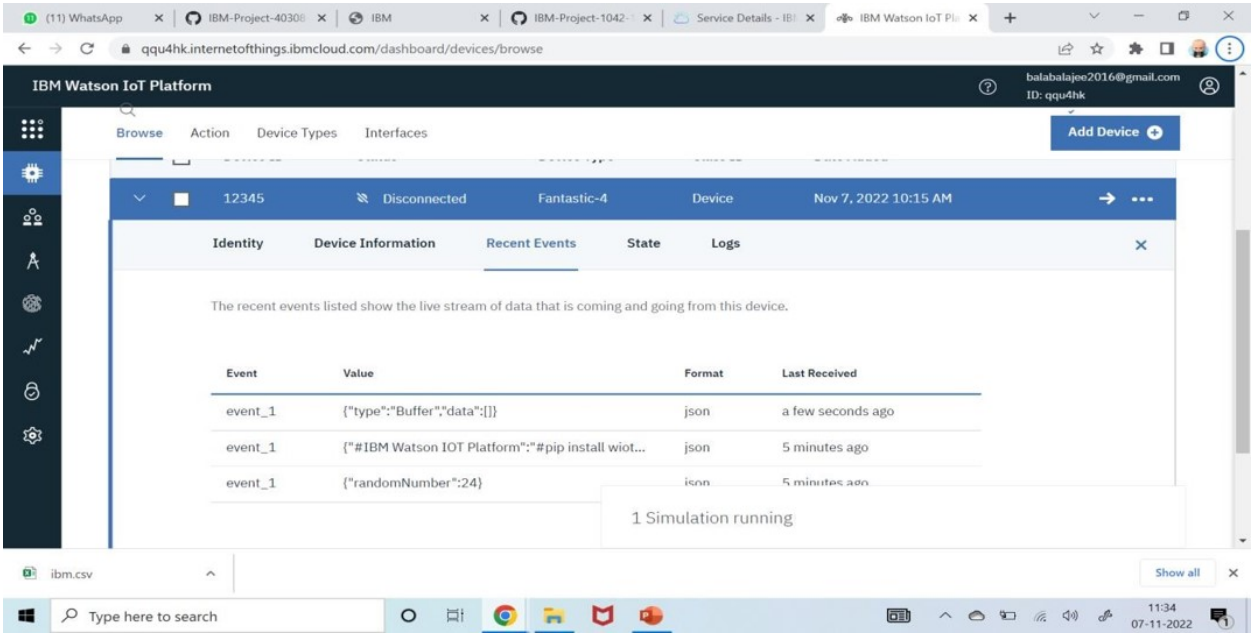




IBM Watson IoT:

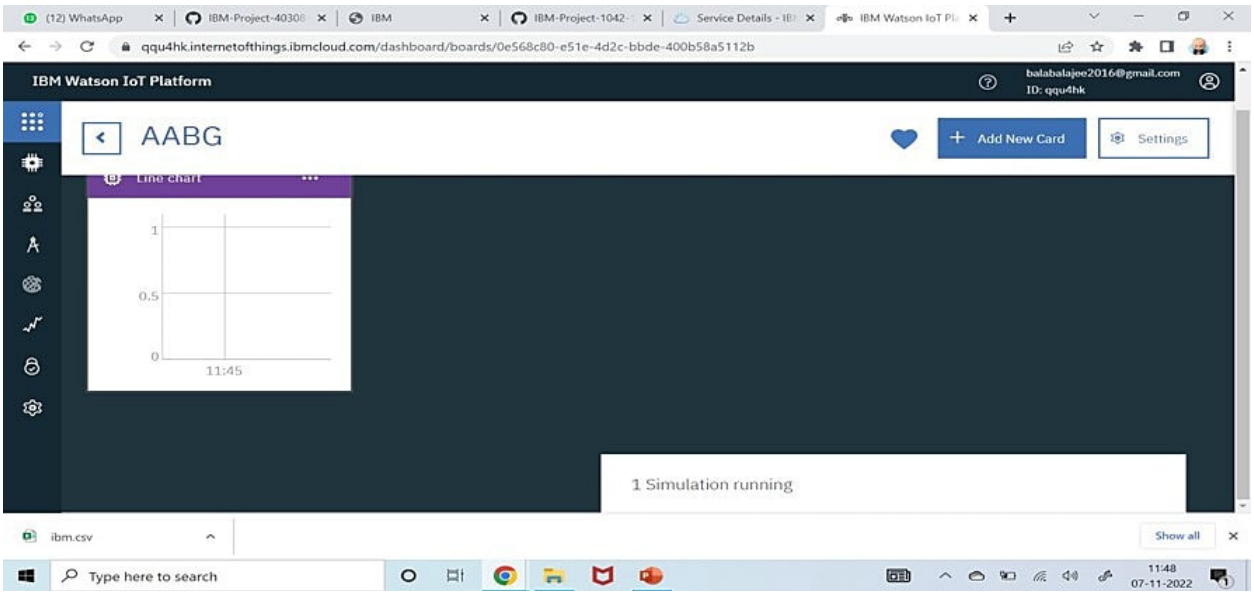
ØWhen the Device credentials are entered in the python IDLE, the Disconnected status in the IBM Watson IoT is changed as Connected.

ØAnd the Output values from the IDLE is also displayed on the Watson IoT platform too.



IBM Watson IoT [Card Display]

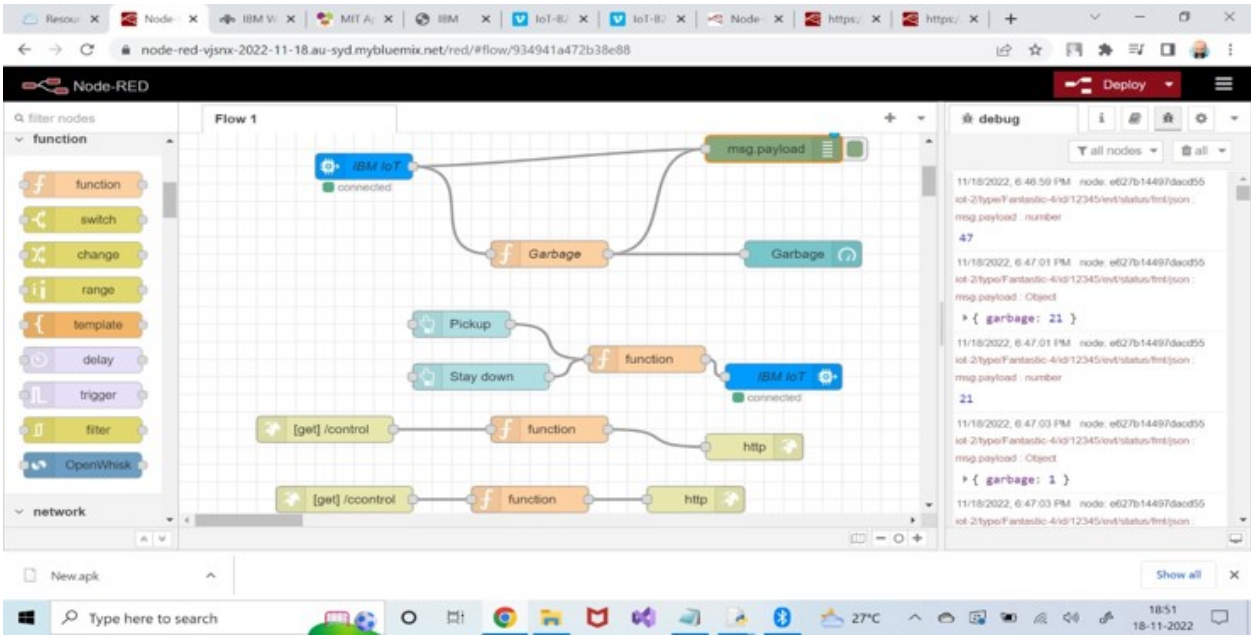
ØIBM Watson IoT itself as card display to show the output in the pictorial representation of Line chart.



Node-Red:

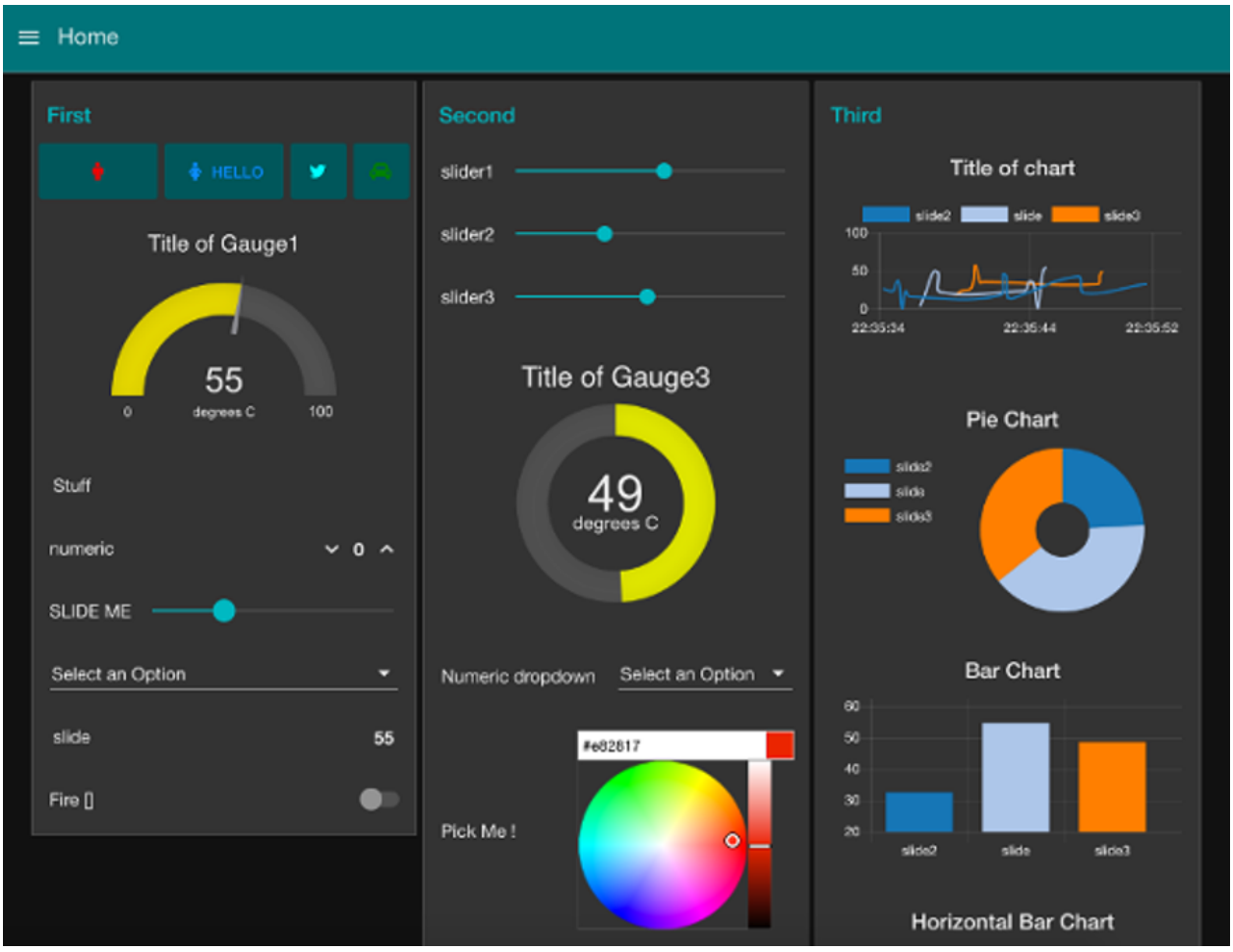
ØNode Red is the flow based block code which is used to connect the Output of the Watson IoT to the Node-Red, by giving the API Key references and API tokens along with the Device credentials of the Watson IoT.

ØIt is the thing, which actually send the Alert message to the sender via SMS by giving the required link to the http node in the Node-Red.



Node-Red UI:

ØNode-Red itself as card display named as Node-Red UI to show the output in the pictorial representation of Gauge, Line chart, etc.,



ADVANTAGES & DISADVANTAGES

Advantages:

- **Reduces environmental pollution**
- Supervise waste levels in garbage.
- Real-time updates about waste filling.
- Cost-effective installation.
- **Keeps the environment clean and fresh**
- Measure the waste level accuracy.

Disadvantages:

- Poor stability leads to greater environmental impact.
- **Also rough action and usage of the user may cause damages to the sensors.**
- When heavy dust, insects or pests blocks the input of the sensor.

APPLICATIONS:

- **This can help in saving the resources.**
- **Reducing pollution.**
- **Taking care of the environment and so on.**

CONCLUSION

- Monitoring the fullness of bins through the use of sensors, it is possible to achieve a more efficient system than the current existing. Our idea of “Smart waste management system”, mainly concentrates on Monitoring the waste management, providing smart technology for waste system, avoiding human intervention, reducing human time and effort and which results in a healthy and waste ridden environment.
- The proposed idea can be implemented for smart cities where the residents would be busy enough with their hectic schedule and wouldn’t have enough time for managing waste. The bins can be implemented in a city if desired where there would be a large bin that can have the capacity to accumulate the waste of solid type for a single apartment. The cost could be distributed among the residents, leading to cheaper service provision.

FUTURE WORK

There are several future works and improvements for the proposed system,

1. Concept of green-points that would encourage the involvement of the residents or the end users making the idea successful and helping to achieve joined efforts for the waste management and hence fulfilling the idea of Swash Bharat.

2. Having a case study or data analytics on the type and times the waste is collected on the type of days or season making the bin filling predictable and removing the dependency on electronic components and fixing the coordinates.

3. Improving graphical interfaces for the Server and complete Android applications has the possibility of extending the system by adding other use cases and applications for smart cities.

4. Moreover, the proposed solution is flexible and decoupled with respect to the determination of the optimal number of bins and vehicles or to the algorithm that define the best route for vehicles. Therefore, future works can be made in the study

of models that offer the best results in terms of decision-making.

1.GIT HUB LINK : https://github.com/IBM-EPBL/IBM-Project-1042-1658335700.git

2.DEMO LINK :

https://drive.google.com/file/d/1uPuUVCSXshlBnDSgXuuMi9gcb6RS_R7n/view?usp=drivesdk