

Department of Information Technology

NBA Accredited

A.P. Shah Institute of Technology

— G. B . Road, Kasarvadavli , Thane(W), Mumbai-400615

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A Project Report on
IOT Enabled Social Web Framework for Water Consumption Mointoring

Submitted in partial fulfillment of the degree of
Bachelor of Engineering(Sem-8)

in

INFORMATION TECHNOLOGY

By

Krutika Pawar (18204012)

Nakul Gagare (18204013)

Deeksha Kadam(18204007)

Under the Guidance of

Prof.Yaminee Patil

1. Project Conception and Initiation

1.1 Abstract

- Water is one of the essential part of life & in this era water quantity is one of big problem in the world.
- In order to ensure the safe supply of the drinking & useful water for different purpose, the water should be monitored.
- The system is designed to monitor the supply of water to a particular area which can detect the quantity of water supplied through that pump .
- This system design is a real time monitoring of the quantity of water by using some sensor and software .

1.2 Objectives

- To Develop the ecosystem for smart water supply
- To get the quantity of water supplied to area and analysis the water level present in tank.
- To observe the water supplied to area and analyze the water quality present in tank.
- To analyze & helpful the water department the problem of water scarcity in the town.
- To analyze this, the report can generate which can tell usage of water.
- By using Elastic stack designing the dashboard for department end user.

1.3 Literature Review

- **Paper Title :** An IOT-Based Water Supply Monitoring
- **Authors :** Maruthi H V,Lakshmi Priya, Lavanya A R,Meda Manideep
- **Publication details :** 2017 International Conference on Nextgen Electronic Technologies: Silicon to Software (ICNETS2)
- **Findings :** According to scientists and organizations as IPCC (Intergovernmental Panel on Climate Change), state has come, since a long time, where water management as such implies to maximizing use of water and minimizing the wastage of water and thus preventing the domino effect cycle arises as wastage of water. The sensors will sense the flow of water to each pipe which ultimately tells the usage of water at one block ideally. This water usage data would be sent to cloud using the IOT (Internet of things) space. This cloud data would be sent to the concern resident's person's mobile app (application) reporting the water used and alerting the user to limit the water use if it gets extended to the limit usage set by municipal government or corporation. If the limit gets extended the user have to pay accordingly. This will be real time operation. The objective of doing so is for limiting and minimizing the usage of water for an average of per person. To appraise the IOT based water management, it can be ramified as diligent, frugal for water management in a symbiotic parity way, which will constrict the water resource evenly according to the in situ factors

1.3 Literature Review

- **Paper Title :** Smart Water Monitoring System using IOT
- **Authors :** Gowthamy J, Chinta Rohith Reddy, Pijush Meher, Saransh Shrivastava, Guddu Kumar.
- **Publication details :** International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 10 — Oct 2018.
- **Findings :** According to Use of water in the industries for many purposes such as fabricating, washing, cooling, processing, diluting, or product transportation; take in water into a product etc . One of the major food industries in India is Dairy industry and India is at first rank in the list of maximum major milk producing nation . Most of the milk processing unit use “Clean In Place” (CIP) system which pumps clean ing solutions through all equipments. At modern dairy processing plants, the milk: water ratio is 1:2.5 liters. However, the expected ratio is 1:0.7 liters . Thus, to achieve such a low consumption not only advanced equipments are required, but also very good housekeeping and awareness among both employees and management is also required. Monitoring water use is the regular collection of information about the total amount of water drawn from all sources for any use during a given period. For the water consuming industries it is important to monitoring usage of water for planning for minimize and awareness of water use.

1.3 Literature Review

- **Paper Title :** Monitoring of Industrial Water Usage by using Internet of Things.
- **Authors :** 1.Sourabh Jadhav Center for P.G. Studies, Visvesvaraya Technological University, Belagavi 2.Sneha Vijay Patil Center for P.G. Studies, Visvesvaraya Technological University, Belagavi 3. T.C. Thanuja Center for P.G. Studies, Visvesvaraya Technological University, Belagavi 4. M.P. Shivu FluxGen Engineering Technology, Bangalore 5. Ganesh Shankar FluxGen Engineering Technology, Bangalore..
- **Publication details :** 2018 International Conference on Information , Communication, Engineering and Technology (ICICET)
- **Findings :** This paper focuses on monitoring the amount of usage of water in the milk processing unit and generates report of the daily water usage in each processing section. The system keeps track of the purchased water, water in reservoir and overall usage of water in the milk industry. The flow sensors will sense the flow of water in each pipe which ultimately tells the usage of water at one block ideally This water usage data would be sent to the cloud using the Internet of Things (IoT) space. The cloud data is computed and generates pattern of the data input and provides a detailed water consumption chart on the desktop as well as smart phones.Industrialization impacts directly on the development of country. Water is essential for industries. The industrial water usage keeps on rising and in the year 2025 to 2050 it will reach around 8.5 and 10.1 percent of the total freshwater.

1.4 Problem Definition

- We Observed that for the most part the Employment is manual and requires a sensible technology to give organized distribution.
- To Convert the manual water supply reading system to a automated sensor used dashboard
- No officer can change the reading which leads to corruption.

1.5 Technology stack

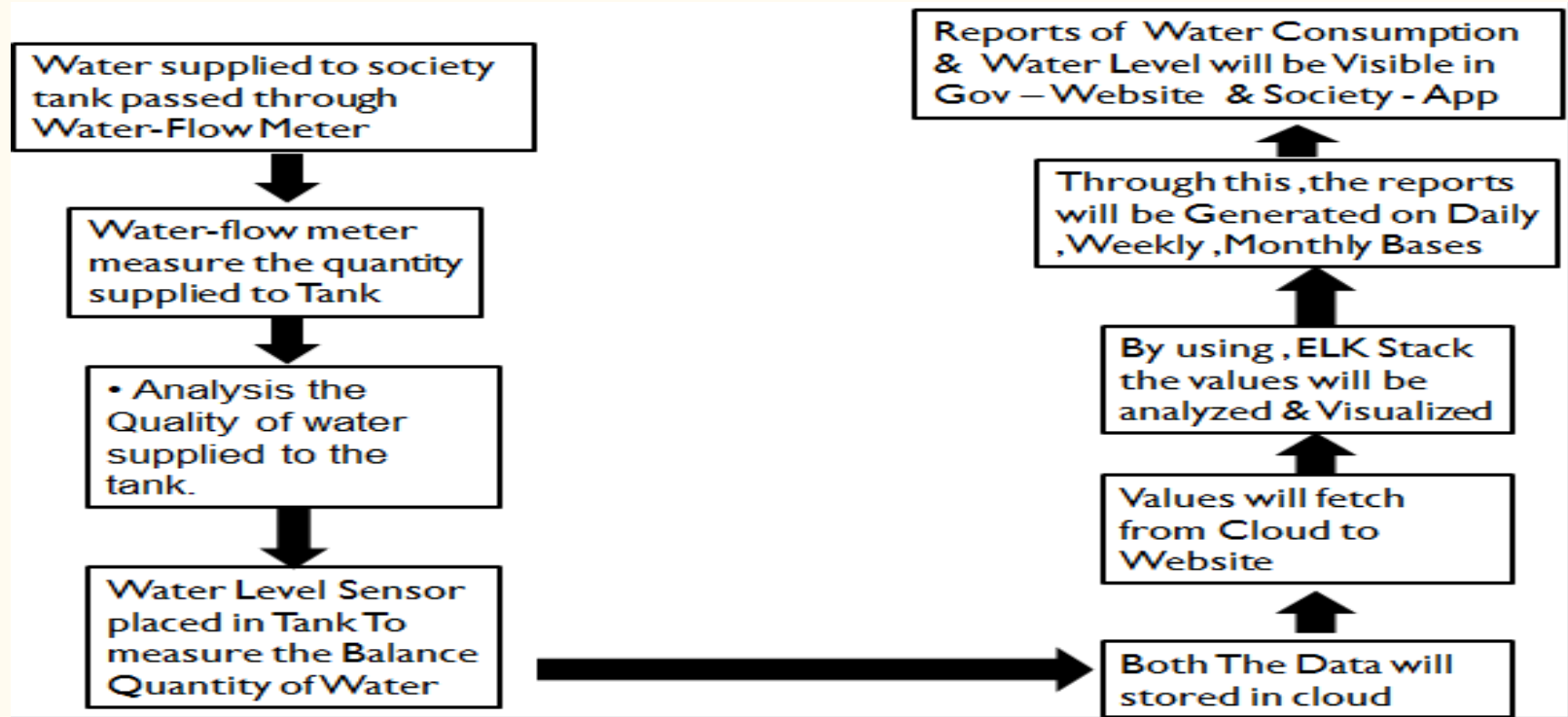
- **Hardware requirements:**
 - Water Level Sensor
 - Arduino Uno -ATmega328
 - Wifi Module
 - Water Quality Sensor
- **Software Requirements :**
 - Browser: Google chrome , Mozilla Firefox
 - Application : ELK Stack , HTML

1.6 Benefits for environment & Society

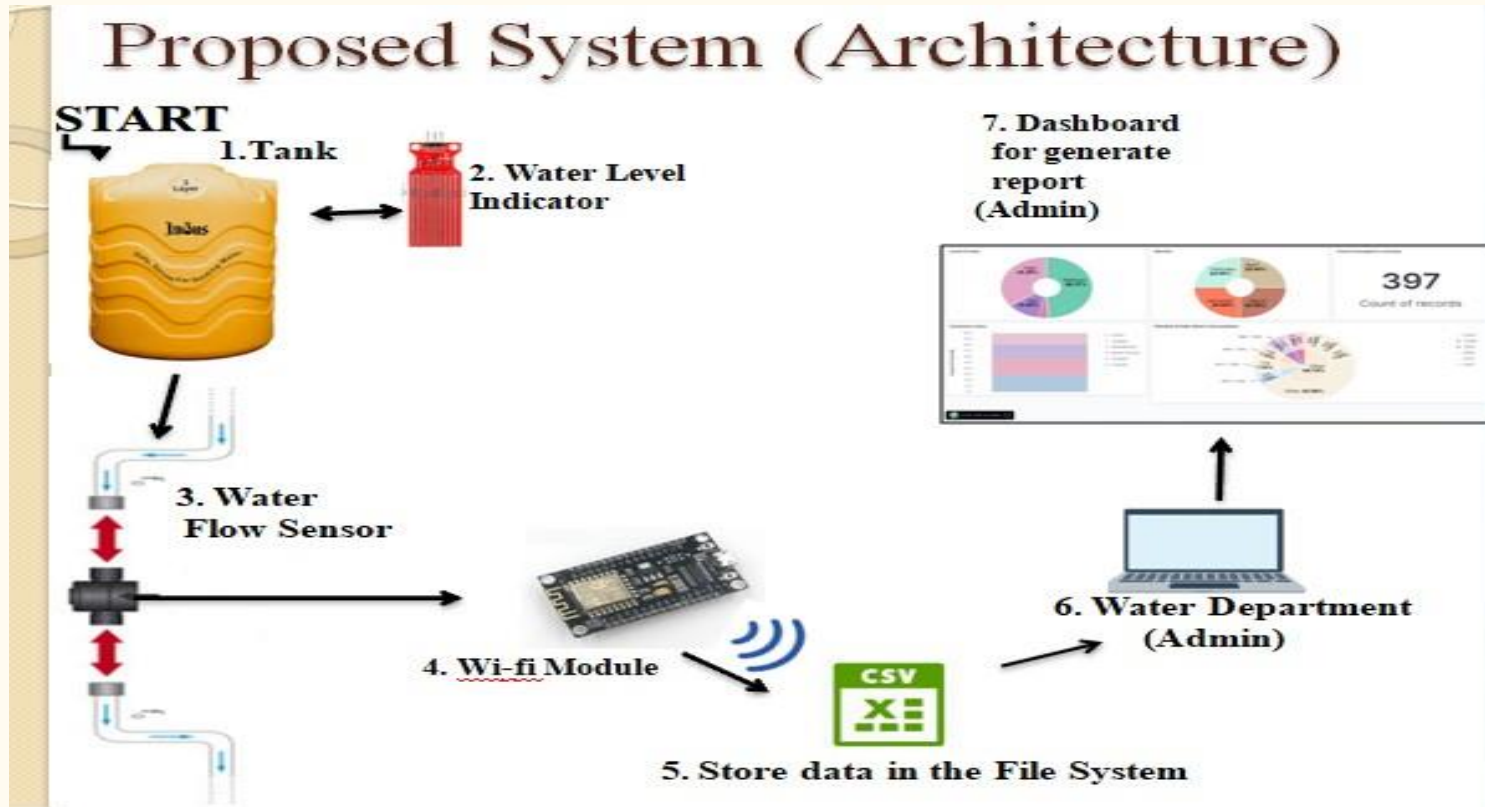
- Get accurate reading and mapping of supply water in the town , by this no one can change the reading/mapping.
- By using this we can analyze the wastage of water on yearly/monthly/daily basis that's how we can save the water in future.

2. Project Design

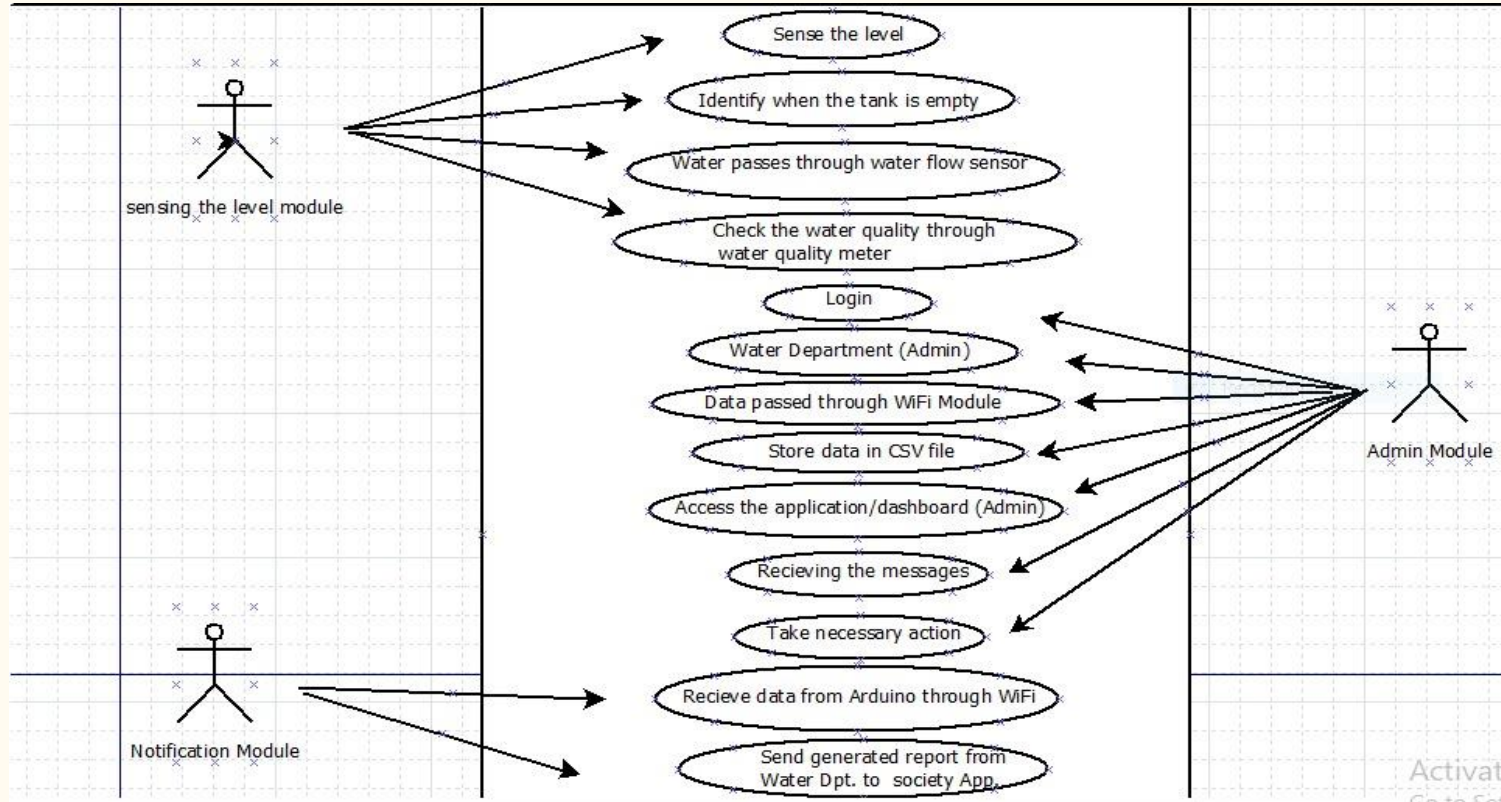
2.1 Proposed System



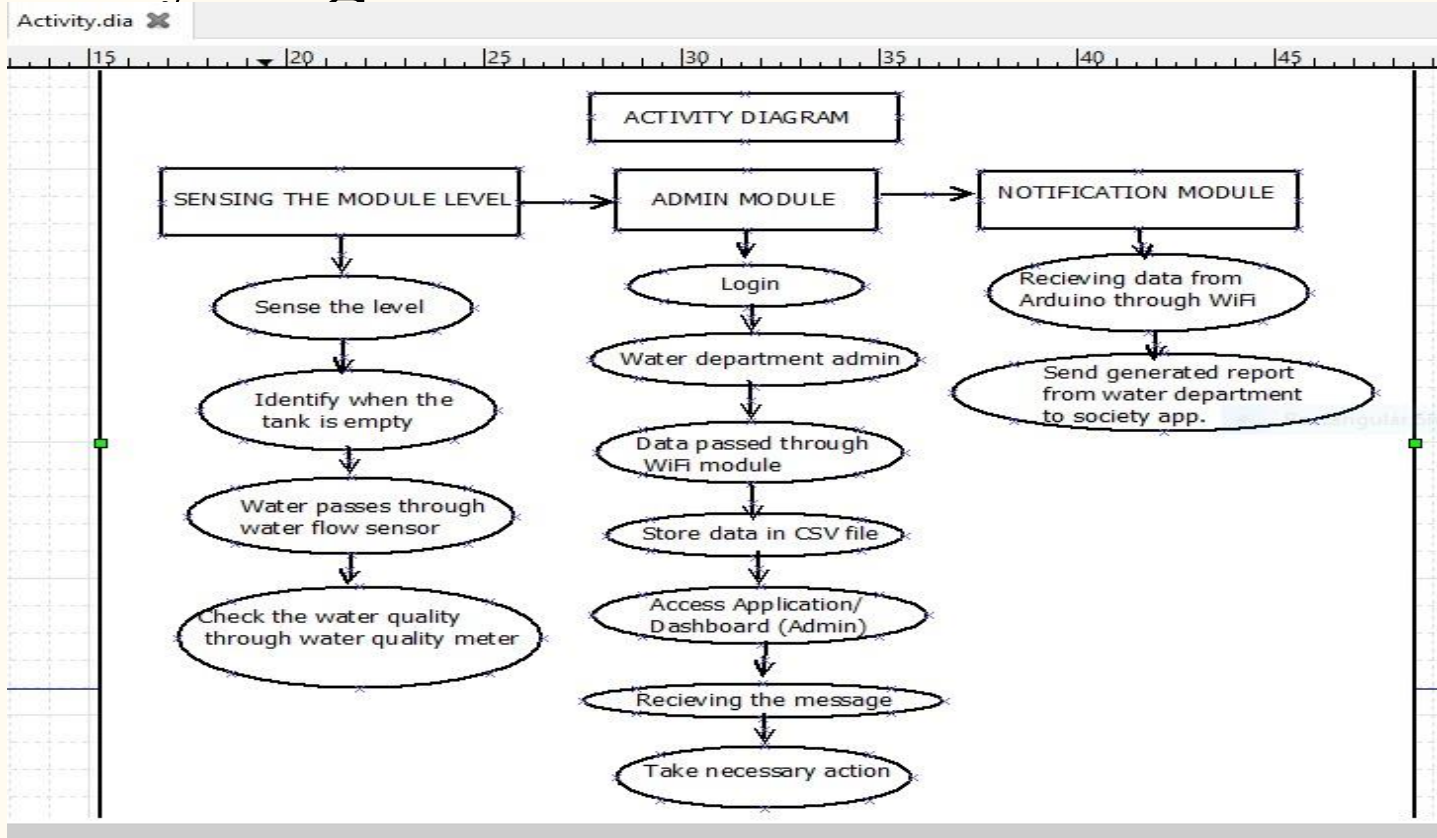
2.2 Design(Flow Of Modules)



2.3 Description Of Use Case

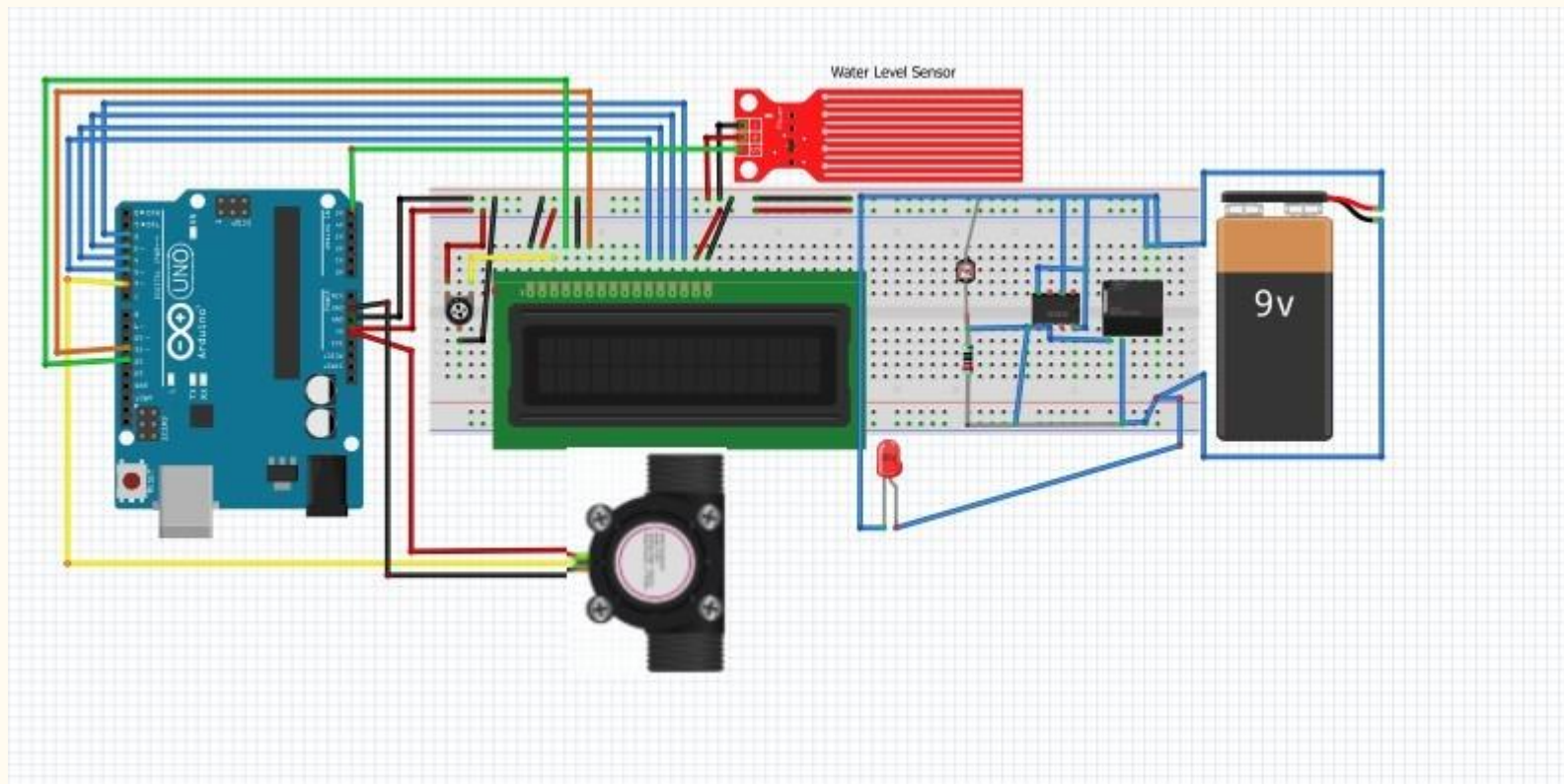


2.4 Activity diagram



3. Implementation


Circuit Diagram of measuring the level of water from a tank



Website

IoT Enabled Social Web Framework for Water Consumption Monitoring

Welcome To System


ACCOUNT

Dashboard

Login


Monitor

Report

About Us

Dashboard

Login Form



Username

Enter Username

Password

Enter Password

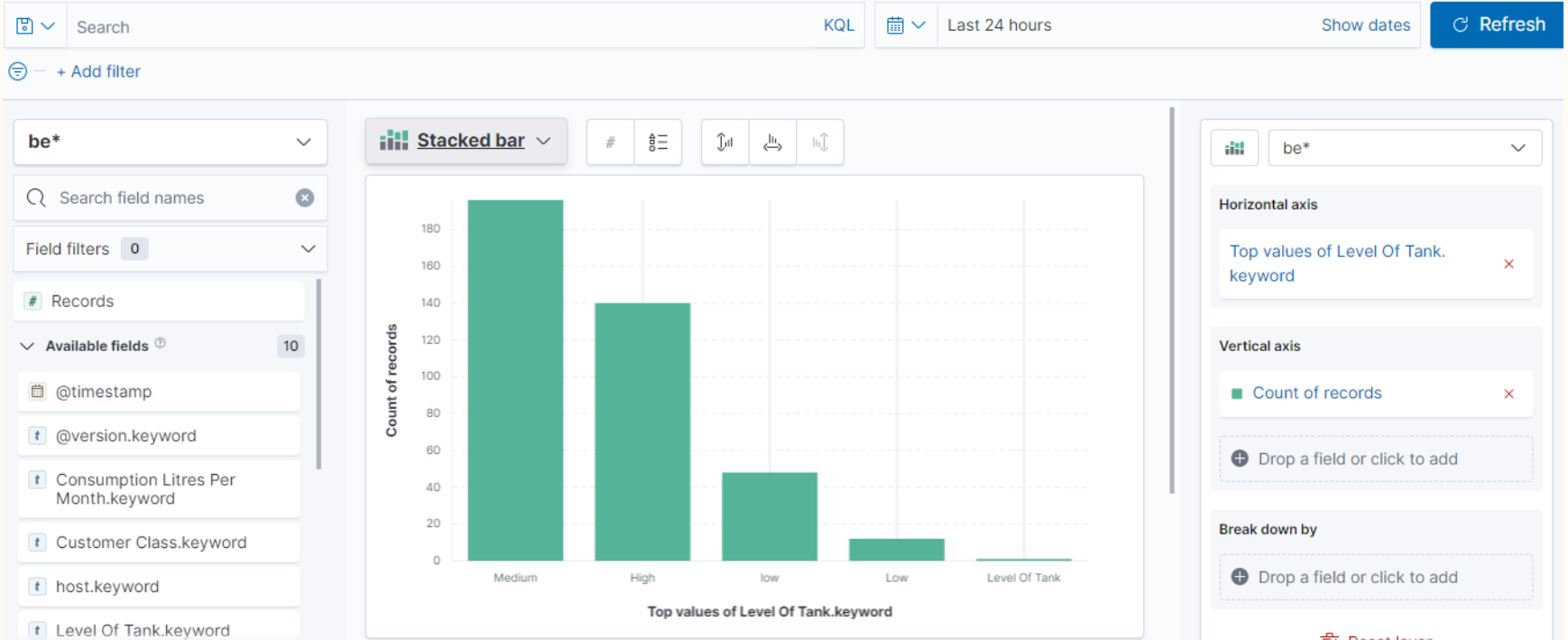
Login

☒ Remember me

Cancel

Forgot password?

Visualization filter in kibana

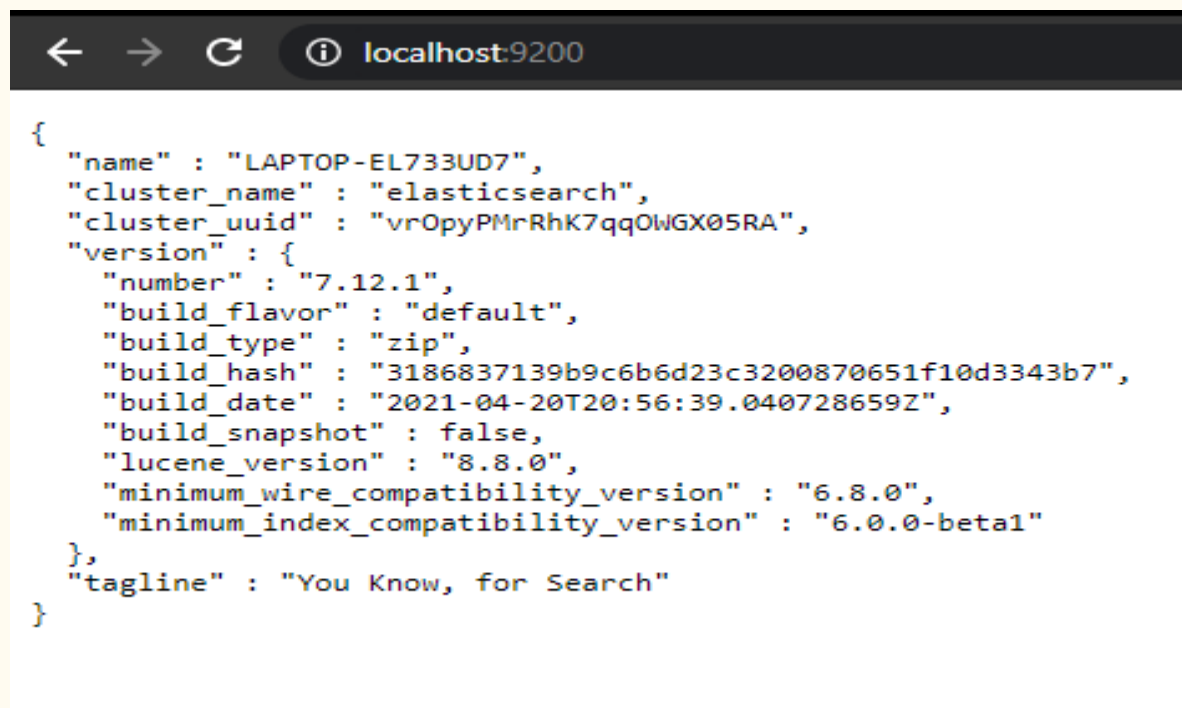


4. Testing

Running Elastic search on command prompt

```
C:\ELK Stack\elasticsearch-7.12.1-windows-x86_64\elasticsearch-7.12.1\bin>elasticsearch.bat
[2021-05-09T02:18:56,874][INFO ][o.e.n.Node               ] [LAPTOP-EL733UD7] version[7.12.1], pid[25988], build[default
/zip/3186837139b9c6b6d23c3200870651f10d3343b7/2021-04-20T20:56:39.040728659Z], OS[Windows 10/10.0/amd64], JVM[AdoptOpen
DK/OpenJDK 64-Bit Server VM/16/16+36]
[2021-05-09T02:18:56,890][INFO ][o.e.n.Node               ] [LAPTOP-EL733UD7] JVM home [C:\ELK Stack\elasticsearch-7.12
1-windows-x86_64\elasticsearch-7.12.1\jdk], using bundled JDK [true]
[2021-05-09T02:18:56,890][INFO ][o.e.n.Node               ] [LAPTOP-EL733UD7] JVM arguments [-Des.networkaddress.cache.t
tl=60, -Des.networkaddress.cache.negative.ttl=10, -XX:+AlwaysPreTouch, -Xss1m, -Djava.awt.headless=true, -Dfile.encoding
=UTF-8, -Djna.nosys=true, -XX:-OmitStackTraceInFastThrow, -XX:+ShowCodeDetailsInExceptionMessages, -Dio.netty.noUnsafe=t
rue, -Dio.netty.noKeySetOptimization=true, -Dio.netty.recycler.maxCapacityPerThread=0, -Dio.netty allocator.numDirectAre
nas=0, -Dlog4j.shutdownHookEnabled=false, -Dlog4j2.disable.jmx=true, -Djava.locale.providers=SPI,COMPAT, --add-opens=jav
a.base/java.io=ALL-UNNAMED, -XX:+UseG1GC, -Djava.io.tmpdir=C:\Users\SANJAY~1\AppData\Local\Temp\elasticsearch, -XX:+Heap
DumpOnOutOfMemoryError, -XX:HeapDumpPath=data, -XX:ErrorFile=logs/hs_err_pid%p.log, -Xlog:gc*,gc+age=trace,safepoint:fil
e=logs/gc.log:utctime,pid,tags:filecount=32,filesize=64m, -Xms2005m, -Xmx2005m, -XX:MaxDirectMemorySize=1051721728, -XX:
G1HeapRegionSize=4m, -XX:InitiatingHeapOccupancyPercent=30, -XX:G1ReservePercent=15, -Delasticsearch, -Des.path.home=C:\
ELK Stack\elasticsearch-7.12.1-windows-x86_64\elasticsearch-7.12.1, -Des.path.conf=C:\ELK Stack\elasticsearch-7.12.1-win
dows-x86_64\elasticsearch-7.12.1\config, -Des.distribution.flavor=default, -Des.distribution.type=zip, -Des.bundled_jdk=
true]
[2021-05-09T02:20:24,248][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [aggs-matrix-stats]
[2021-05-09T02:20:24,248][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [analysis-common]
[2021-05-09T02:20:24,248][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [constant-keyword]
[2021-05-09T02:20:24,248][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [flattened]
[2021-05-09T02:20:24,248][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [frozen-indices]
[2021-05-09T02:20:24,248][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [ingest-common]
[2021-05-09T02:20:24,373][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [ingest-geoip]
[2021-05-09T02:20:24,373][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [ingest-user-agent]
[2021-05-09T02:20:24,388][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [kibana]
[2021-05-09T02:20:24,388][INFO ][o.e.p.PluginsService     ] [LAPTOP-EL733UD7] loaded module [lang-expression]
```

Elastic search running on browser

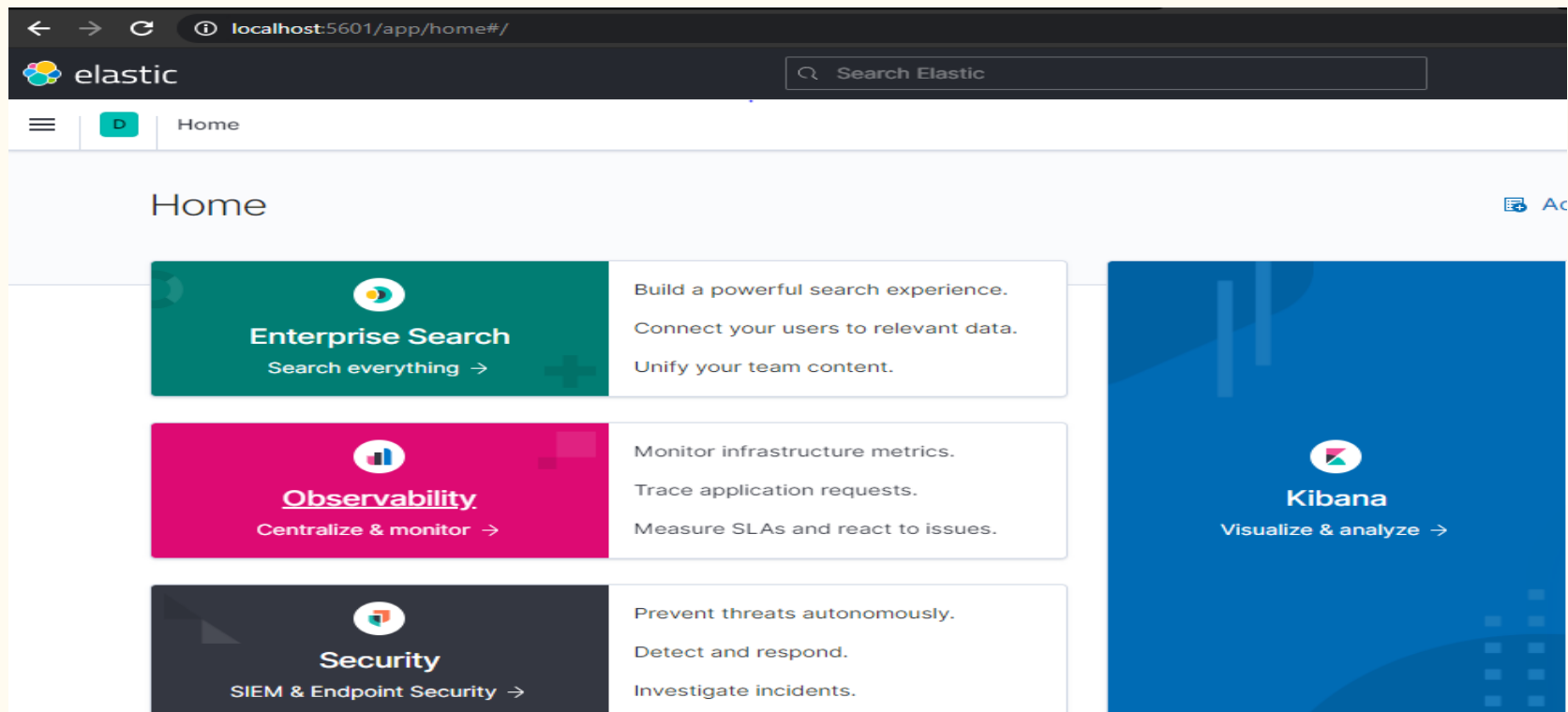
A screenshot of a web browser window. The address bar shows 'localhost:9200'. The page content is a JSON object representing the Elastic Search status. The JSON includes fields for name, cluster_name, cluster_uuid, version (with sub-fields for number, build_flavor, build_type, build_hash, build_date, build_snapshot, lucene_version, minimum_wire_compatibility_version, and minimum_index_compatibility_version), and a tagline.

```
{
  "name" : "LAPTOP-EL733UD7",
  "cluster_name" : "elasticsearch",
  "cluster_uuid" : "vrOpyPMrRhK7qqOWGX05RA",
  "version" : {
    "number" : "7.12.1",
    "build_flavor" : "default",
    "build_type" : "zip",
    "build_hash" : "3186837139b9c6b6d23c3200870651f10d3343b7",
    "build_date" : "2021-04-20T20:56:39.040728659Z",
    "build_snapshot" : false,
    "lucene_version" : "8.8.0",
    "minimum_wire_compatibility_version" : "6.8.0",
    "minimum_index_compatibility_version" : "6.0.0-beta1"
  },
  "tagline" : "You Know, for Search"
}
```

Running Kibana on command prompt

```
C:\ELK Stack\kibana-7.12.1-windows-x86_64\kibana-7.12.1-windows-x86_64\bin>kibana.bat
log [02:31:39.794] [info][plugins-service] Plugin "osquery" is disabled.
log [02:31:40.346] [warning][config][deprecation] Config key [monitoring.cluster_alerts.email_notifications.email_address] will be required for email notifications to work in 8.0."
log [02:31:43.135] [info][plugins-system] Setting up [100] plugins: [taskManager,licensing,globalSearch,globalSearchProviders,banners,code,usageCollection,xpackLegacy,telemetryCollectionManager,telemetry,telemetryCollectionXpack,kibanaUsageCollection,securityOss,share,newsfeed,mapsLegacy,kibanaLegacy,translations,legacyExport,embeddable,uiActionsEnhanced,expressions,charts,esUiShared,bfetch,data,home,observability,console,consoleExtensions,apmOss,searchProfiler,painlessLab,grokDebugger,management,indexPatternManagement,advancedSettings,fileUpload,savedObjects,visualizations,visTypeVislib,visTypeTimelion,features,licenseManagement,watcher,canvas,visTypeTagcloud,visTypeVega,visTypeMarkdown,visTypeMetric,visTypeTable,tileMap,regionMap,visTypeXy,graph,timelion,dashboard,dashboardEnhanced,visualize,visTypeTimeseries,inputControlVis,discover,discoverEnhanced,savedObjectsManagement,spaces,security,savedObjectsTagging,maps,lens,reporting,lists,dataEnhanced,encryptedSavedObjects,dashboardMode,cloud,upgradeAssistant,snapshotRestore,fleet,indexManagement,rollup,remoteClusters,crossClusterReplication,indexLifecycleManagement,enterpriseSearch,beatsManagement,transform,ingestPipelines,eventLog,actions,alerts,triggersActionsUi,stackAlerts,ml,securitySolution,case,infra,monitoring,logstash,apm,uptime]
log [02:31:43.138] [info][plugins][taskManager] TaskManager is identified by the Kibana UUID: f5358923-4585-4e52-a3bf-fb8827b8ba61
log [02:31:50.523] [warning][config][plugins][security] Generating a random key for xpack.security.encryptionKey. To prevent sessions from being invalidated on restart, please set xpack.security.encryptionKey in the kibana.yml or use the bin/kibana-encryption-keys command.
log [02:31:50.526] [warning][config][plugins][security] Session cookies will be transmitted over insecure connections. This is not recommended.
log [02:31:50.662] [warning][config][plugins][reporting] Generating a random key for xpack.reporting.encryptionKey. To prevent sessions from being invalidated on restart, please set xpack.reporting.encryptionKey in the kibana.yml or use the bin/kibana-encryption-keys command.
log [02:31:50.672] [info][config][plugins][reporting] Chromium sandbox provides an additional layer of protection, and is supported for Win32 OS. Automatically enabling Chromium sandbox.
log [02:31:50.682] [warning][encryptedSavedObjects][plugins] Saved objects encryption key is not set. This will cause
```


Kibana running on browser

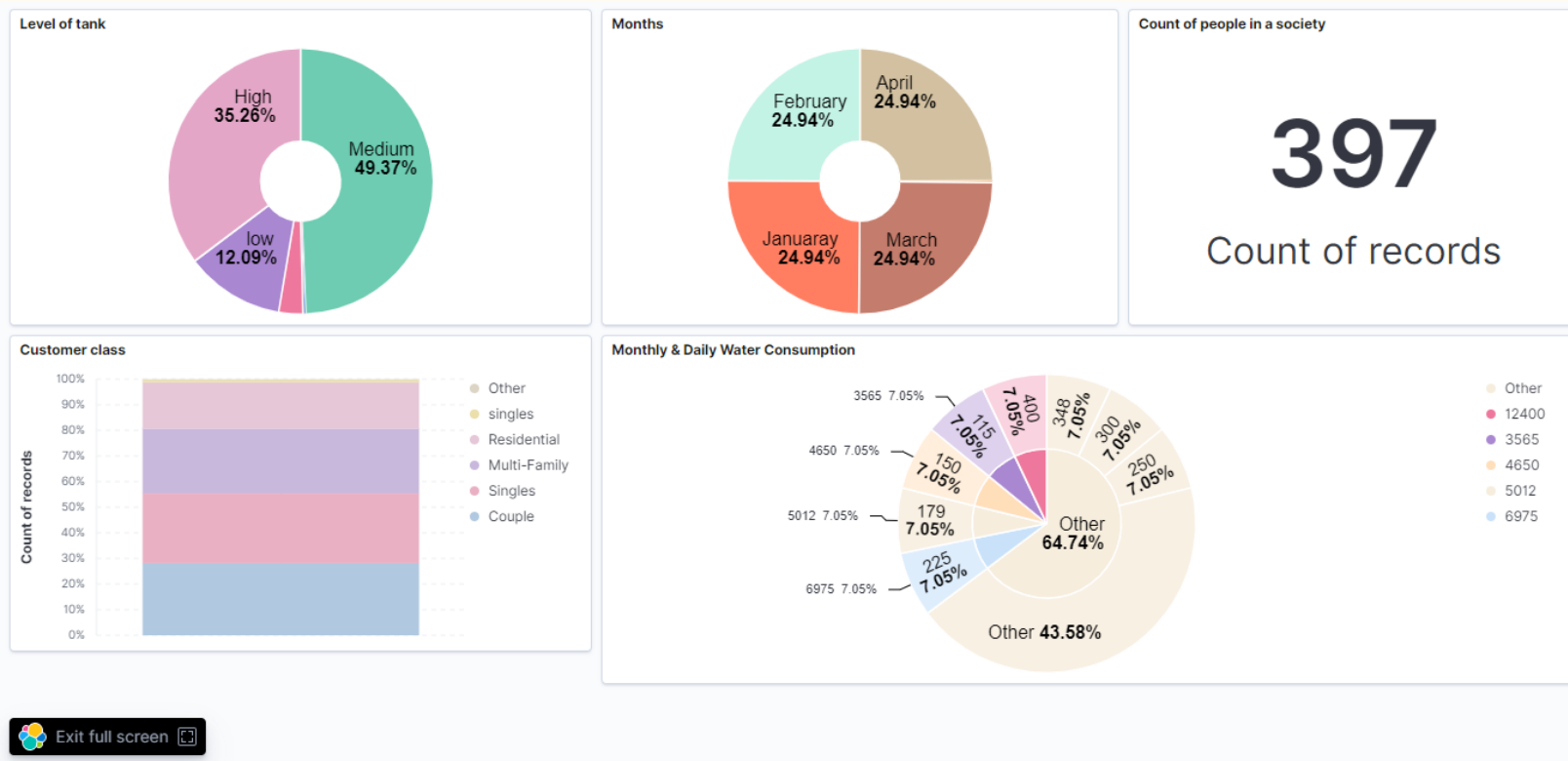


Running Logstash on command prompt

```
C:\ELK Stack\logstash-7.12.1-windows-x86_64\logstash-7.12.1\bin>logstash -f logstash.conf
Using bundled JDK: ""
OpenJDK 64-Bit Server VM warning: Option UseConcMarkSweepGC was deprecated in version 9.0 and will likely be removed in a future release.
Sending Logstash logs to C:/ELK Stack/logstash-7.12.1-windows-x86_64/logstash-7.12.1/logs which is now configured via log4j2.properties
[2021-05-09T02:55:09,719][INFO ][logstash.runner           ] Log4j configuration path used is: C:\ELK Stack\logstash-7.12.1-windows-x86_64\logstash-7.12.1\config\log4j2.properties
[2021-05-09T02:55:09,937][INFO ][logstash.runner           ] Starting Logstash {"logstash.version"=>"7.12.1", "jruby.version"=>"jruby 9.2.13.0 (2.5.7) 2020-08-03 9a89c94bcc OpenJDK 64-Bit Server VM 11.0.10+9 on 11.0.10+9 +indy +jit [mswin32-x86_64]"}
[2021-05-09T02:55:10,408][WARN ][logstash.config.source.multilocal] Ignoring the 'pipelines.yml' file because modules or command line options are specified
[2021-05-09T02:55:38,292][INFO ][org.reflections.Reflections] Reflections took 6433 ms to scan 1 urls, producing 23 keys and 47 values
[2021-05-09T02:55:48,152][INFO ][logstash.agent           ] Successfully started Logstash API endpoint {:port=>9600}
[2021-05-09T02:56:12,850][INFO ][logstash.outputs.elasticsearch][main] Elasticsearch pool URLs updated {:changes=>{:removed=>[], :added=>[http://localhost:9200/]}}
[2021-05-09T02:56:23,006][WARN ][logstash.outputs.elasticsearch][main] Restored connection to ES instance {:url=>"http://localhost:9200/" }
[2021-05-09T02:56:29,453][INFO ][logstash.outputs.elasticsearch][main] ES Output version determined {:es_version=>7}
[2021-05-09T02:56:29,460][WARN ][logstash.outputs.elasticsearch][main] Detected a 6.x and above cluster: the `type` event field won't be used to determine the document _type {:es_version=>7}
[2021-05-09T02:56:33,209][INFO ][logstash.outputs.elasticsearch][main] New Elasticsearch output {:class=>"LogStash::Outputs::ElasticSearch", :hosts=>["http://localhost:9200"]}
[2021-05-09T02:56:34,148][INFO ][logstash.javapipeline     ][main] Starting pipeline {:pipeline_id=>"main", "pipeline.workers"=>4, "pipeline.batch.size"=>125, "pipeline.batch.delay"=>50, "pipeline.max.inflight"=>500, "pipeline.sources"=>["C:
```

5. Result

Dashboard created in kibana



6. Conclusion and Future Scope

Conclusion

- The Internet has changed the size of life involving virtual interaction. IOT has the potential to feature new dimensions enabling smarter objects communications. The proposed system is a water level monitoring system with different levels indicated. System design and architecture which has been implemented in our project is very cost effective, a simple strategy to monitor the water level system . Saving water is also essential now-a-days looking over it we have created this idea.

Future Scope

- Future Work can involve the analysis of water level during a particular area in order that the wastage of water is prevented. In future we are also planning to add PH scale to find out the quality of water, the quality of water, etc. It also symbolizes when the water level is as per requirement below or low.

References

- Chef Soh, Z. H., Shafie, M. S., Shafie, M. A., Noraini Sulaiman, S., Ibrahim, M. N., & Afzal Che Abdullah, S. (2018). IoT Water Consumption Monitoring & Alert System. 2018 International Conference on Electrical Engineering and Informatics (ICELTICs)(44501). doi:10.1109/iceltics.2018.8548930
- Siddula, S. S., Babu, P., & Jain, P. C. (2018). Water Level Monitoring and Management of Dams using IoT. 2018 3rd International Conference On Internet of Things: Smart Innovation and Usages (IoT-SIU). doi:10.1109/iot-siu.2018.8519843

Paper Publication

Paper entitled “IOT Enabled Social Web Framework for Water Consumption Monitoring” is presented at “My Easy Chair“, “Springer” by “Krutika Pawar , Nakul Gagare , Deeksha Kadam Prof . Yaminee Patil".

Thank You

