Panel ADVCOMP/SEMAPRO

Luc Vouligny, moderator

Computing Challenges with Semantics and Ontology Models

- Cristovâo D P Sousa
  - Universidade do Porto, Portugal
- Michel ClauB
  - Technische Universität, Chemnitz, Germany
- Jason Gu
  - Dalhousie University, Canada
- Artem Katasonov
  - VTT, Finland
- Luc Vouligny
  - Moderator
  - Hydro-Québec (IREQ)

Cristovâo D P Sousa
Universidade do Porto, Portugal

- Semantic artefacts dynamicity.
  How to reuse conceptual models and how to achieve the trade-off between informal and formal representation.

Michel ClauB

Technische Universität, Chemnitz, Germany

- Challenges for data integration in industrial settings (aspects: standards, dynamics, performance, robustness, privacy) as they are discussed along with the 4th industrial revolution.
- Semantic technologies and data quality: different ways to look at data quality, conditions for good data quality, sources of impairment, opportunities and limits of semantic technologies for better data quality

Jason Gu
Dalhousie University, Canada

- Handling and Modeling Data on Smart Transportation Management Systems.

Artem Katasonov
VTT, Finland

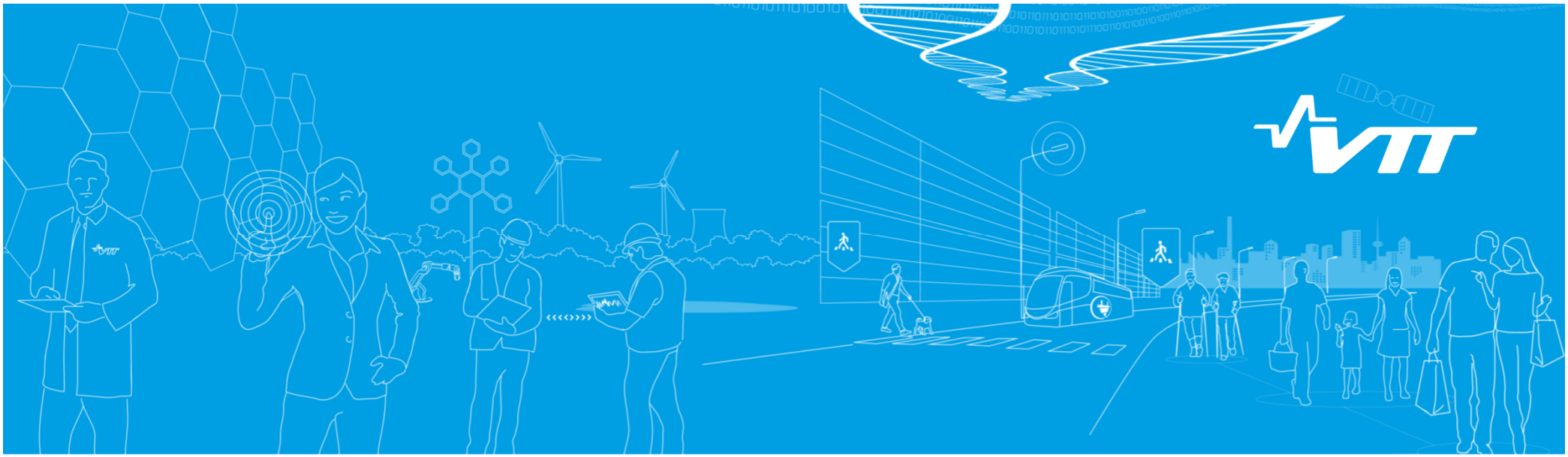
- How semantic technology can stay relevant in the Big Data age?
  Can performance ever match the needs?
- Semantic database vs semantic data virtualization (virtual semantic views on non-semantic data)?
  Our money is on the latter…

Panel on ADVCOMP/SEMAPRO

Topic: Computing Challenges with Semantics and Ontology Models

- **Subtopic 1:** Challenges for Data Integration in Industrial Settings
  - Aspects: Standards, Dynamics, Performance, Robustness, Privacy
  - Reference to the Discussion of the Fourth Industrial Revolution (Industry 4.0)

- **Subtopic 2:** Semantic Technologies and Data Quality
  - Different Ways to look at Data Quality
  - Conditions for good Data Quality and Sources of Impairment
  - Opportunities and Limits of Semantic Technologies for better Data Quality



How Semantic Technology Can Stay Relevant in the Big Data Age?

@ArtemKatasonov
VTT Technical Research Center of Finland Ltd

Panel on ADVCOMP/SEMAPRO 2015,
Nice, July 22

Old Question : How to make computers act in a way we perceive as intelligent?

Three known approaches :

- ***Tradition AI***: complex algorithms on raw data, attempt to imitate *human logic*
- ***Semantic Technology***: simpler algorithms on carefully prepared data (standardized, context-free, unambiguous), still imitating *human logic*
- ***Big Data (aka Google-way)***: even simpler algorithms (mostly, nearest-neighbor search) on huge amounts of example data, attempt to imitate *human memory*

Big Data is clearly winning, and currently appears to be *the only meaningful overall framework for AI*.

The other approaches have to be satisfied with a supporting role, at best. Some of Traditional AI algorithms (feature extraction, optimizations, etc.) are routinely used to further improve Big Data –based systems.

What is the role of Semantic Technology in the Big Data age?

Actually, in principle, opportunities are clear:

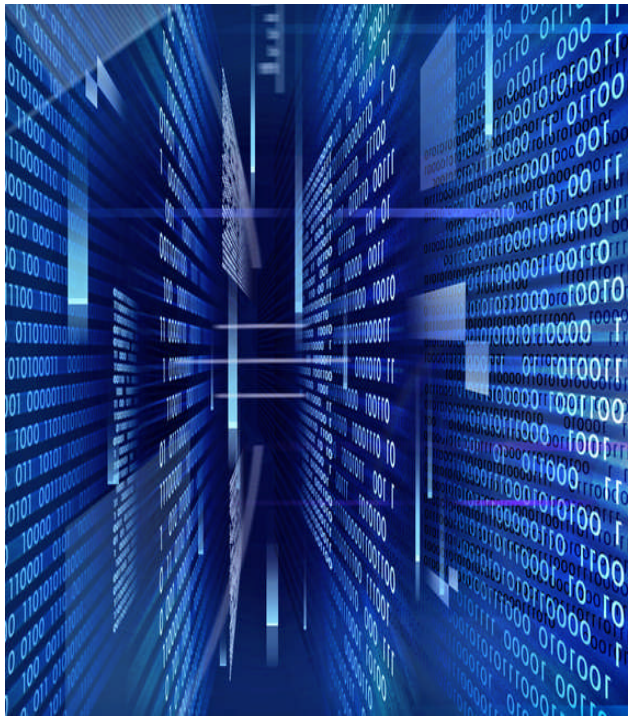
- Mapping of data models of questions and of example data.
- Connecting various heterogeneous example data sets.
- Allowing questions at various levels of abstraction.

Now, the main problem:

Can the performance of the Semantic Technology be ever enough for Big Data?

The current Semantic Technology is often too slow even for a single-database-size datasets, and now we need to handle Big Data!

Should we just give up?



We believe:

The Semantic Technology can be relevant in the Big Data age.

It may be a time, however, to give up on the idea of a triple-store (RDF database) ?

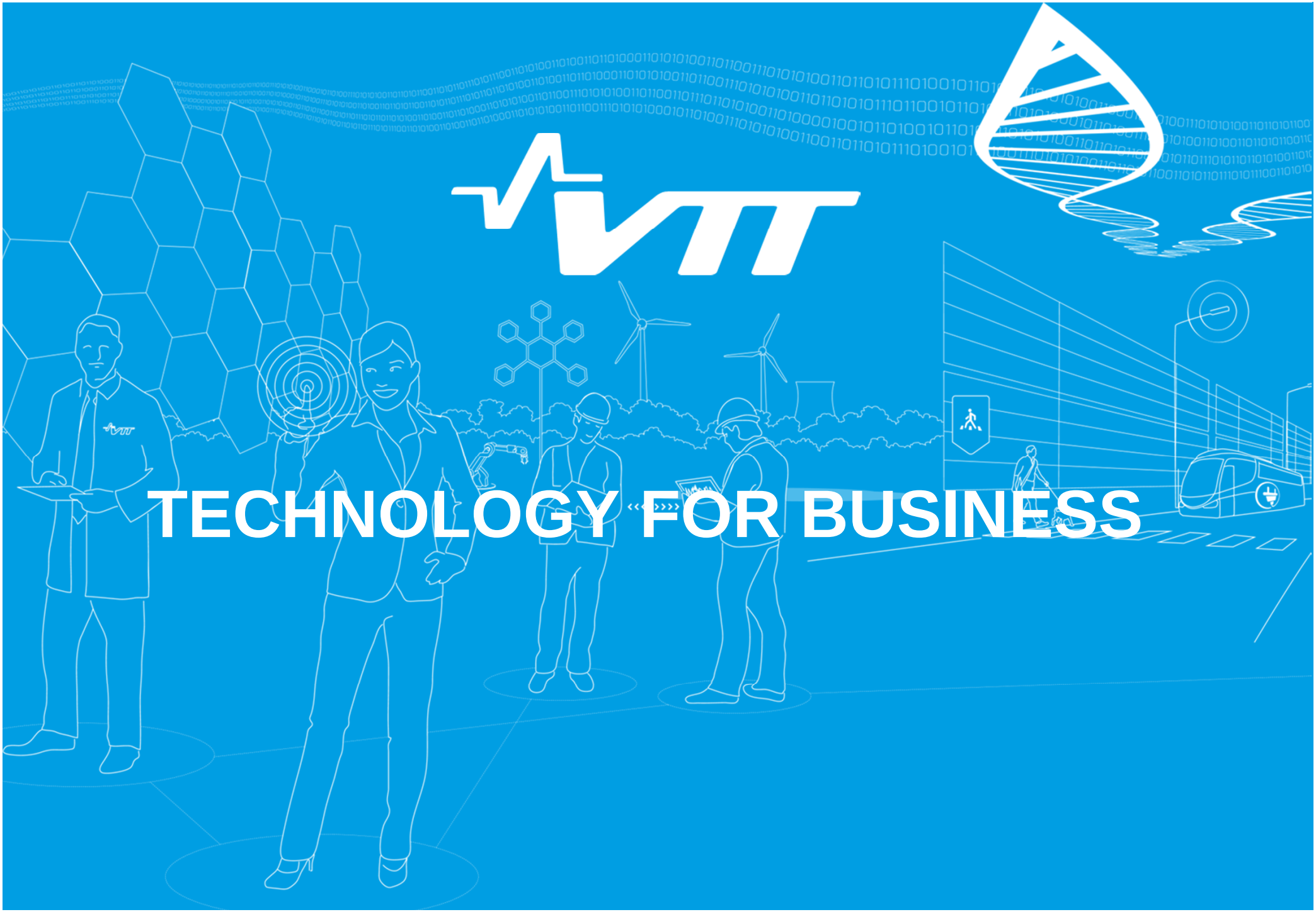
Semantic Data Virtualization is the way

- Allowing data to be stored in a non-semantic form.
- Providing a semantic view on these data.

This means ***query transformation*** instead of *data transformation*.

VTT's ***DataBearings*** system follows this approach, shows its feasibility (https://sites.google.com/site/databearings/)

Main open issues: *How to enable other semantic functions, such as OWL reasoning, on virtualized data?*


TECHNOLOGY FOR BUSINESS

Handling and Modeling Data on Smart Transportation Management Systems

Jason Gu and Umar Farooq

Electrical and Computer Engineering

Dalhousie University Halifax, N.S., Canada

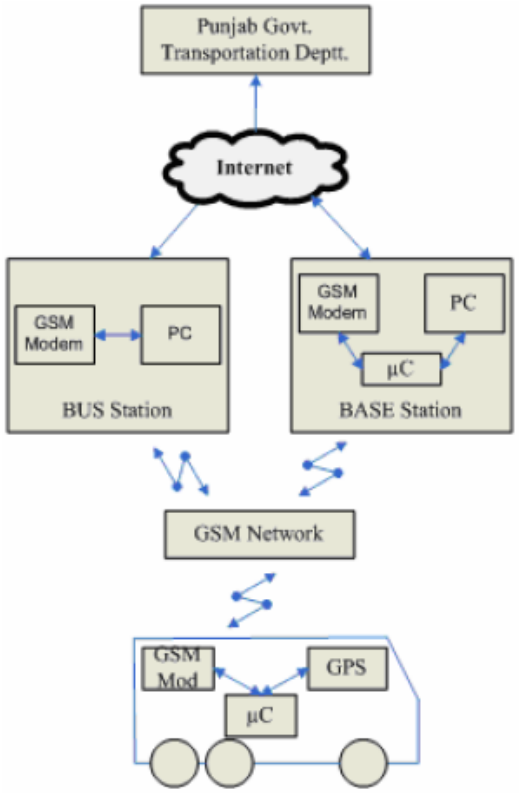
System Components and Data Management

System Components

- Bus Station Module
- In-Bus Module
- Base Station Module
- Bus Stop Module

Data Management

- Artificial Intelligence
- Semantics Technology
- Big Data



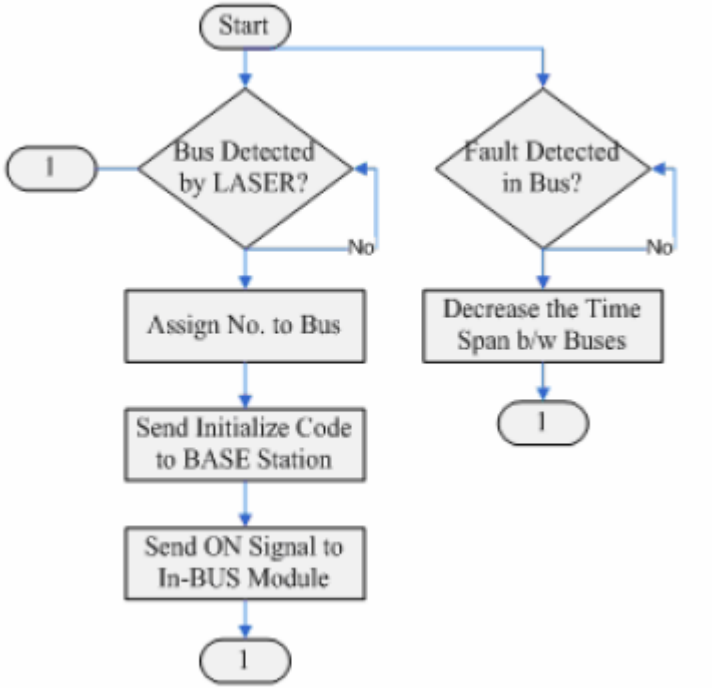
Bus Station Module and Data Management

Hardware Modules

- Laser Sensor
- GSM Modem

Data Management

- Less Amount of Data
- Handled Locally



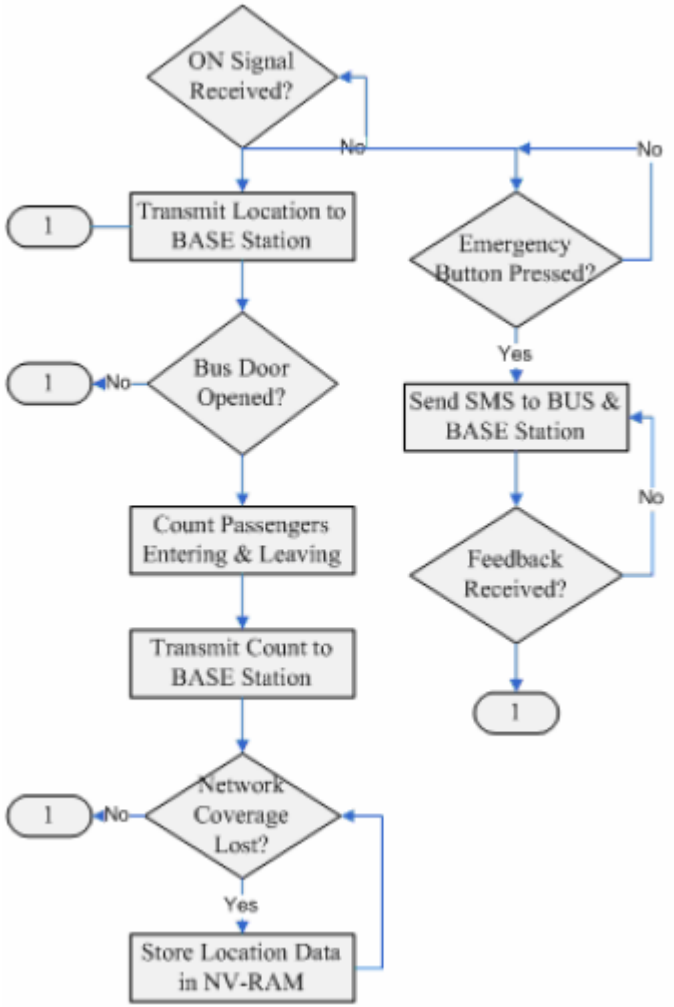
In-Bus Module and Data Management

Hardware Modules

- GPS Receiver
- GSM Engine
- Microcontrollers
- NV RAM

Data Management

- Less Amount of Data
- Handled Locally



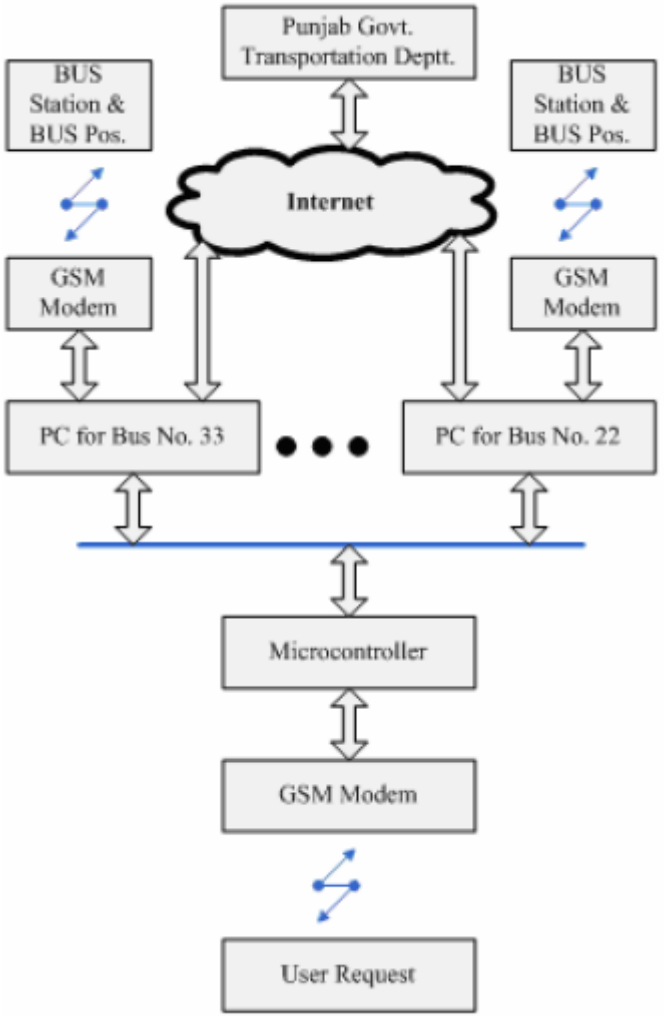
Base Station Module and Data Management

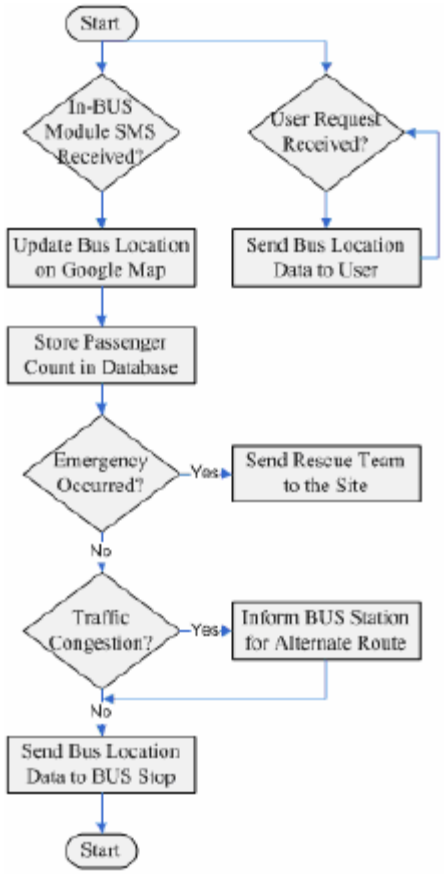
Hardware Modules

- GSM Engine
- Microcontrollers

Data Management

- Large Amount of Data
- Big Data Paradigm
- Semantics Technology (Query Transformation)
- Nearest Neighbor Algorithm





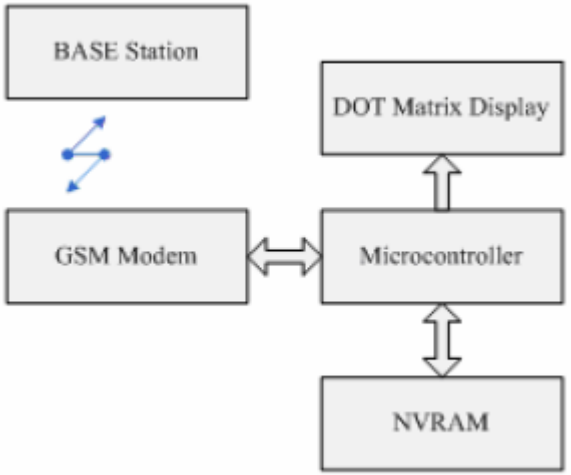
Bus Stop Module and Data Management

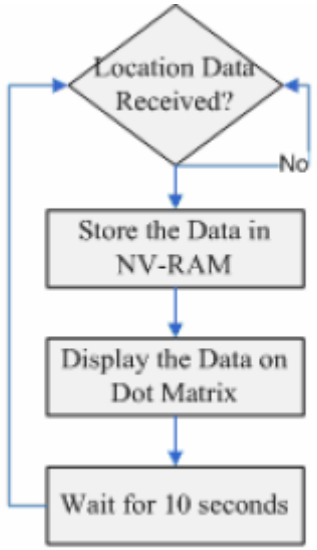
Hardware Modules

- GSM Engine
- Microcontrollers
- NV RAM
- Dot Matrix Display

Data Management

- Less Amount of Data
- Handled Locally





Big Data Analysis and Visualization

- All Computations Performed at Base Station on Virtualized Data
- Big Data Routines (Nearest Neighbor Algorithms)
- Recommendations Generated on Per Stop Basis