

**GGE6900 Research methods**

**Writing Skills Assignment**

**Part 2**

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Paper: Automated mobile sensing: Towards high-granularity agile indoor environmental quality monitoring

* Research premise (s)

Several studies exist to deploy robots for monitoring and identifying pollutants both indoor and outdoor, however, the methods do not distinguish the global trend of physical parameters from their local variations, which might lower the estimation accuracy, and the results have not been validated against a ground truth, which requires a dense sensor network for comparison.

* Research question(s)

What are the environmental sensing platform and robotic base in the autonomous sensing system?

* Research hypothesis (s)

Is the automated mobile sensing approach able to determine the air-change effectiveness with accuracy?

How to implement an IEQ for collecting environmental measurements which is not limited in scale in terms of cost and maintenance

* Research objectives(s)

Existing IEQ monitoring approaches rely on sensor networks deployed at selected locations to collect environmental measurements, and are limited in scale and adaptability. To enable high-granularity IEQ monitoring with agile adaption to the dynamic indoor environment, an “automated mobile sensing” system is proposed.

A spatio-temporal interpolation algorithm is developed to capture the global trend and local variation in order to use the data efficiently to reconstruct the IEQ dynamics.

Paper: Big data analytics: a survey

* Research premise (s)

Several data analytics and frameworks have been presented in recent years, with their pros and cons being discussed in different studies researchers on the data mining and distributed computing domains to have a basic idea to use or develop data analytics for big data

* Research question(s)

How to develop a high performance platform to efficiently analyze big data and how to design an appropriate mining algorithm to find the useful things from big data.

How to store the data safety, how to make sure the data communication is protected, and how to prevent someone from finding out the information about us.

* Research hypothesis (s)

From the perspective of big data analytics framework and platform, focused on the performance-oriented and results-oriented issues. From the perspective of data mining problem, this paper gives a big data mining algorithms which consist of clustering, classification, and frequent patterns mining technologies.

One of the important security issues on the input part of big data analytics is to make sure that the sensors will not be compromised by the attacks. For the analysis and input, it can be regarded as the security problem of such a system.

* Research objectives(s)

To identify the data analysis of KDD from the platform/framework to data mining and summarized into three parts: input, analysis, and output.

Paper: Big Data Collection: Analysis and Processing of Efficient IoT Based Sensor

* Research premise (s)

We can observe that most of the relative work papers are involving and trying to improve issues related to Quality of Services (QoS), Efficiency and propose both Indoor and Outdoor Surveillance Environment. Topology-architecture system for a smart building, in order to offer energy efficient solution by using the collected and managed sensors‟ data is the best work in this paper.

* Research question(s)

Four aforementioned technologies in order to find out their common operations, and combine their functionality, in order to have beneficial scenarios of their use.

How to implement makes smart cities more efficient?

* Research hypothesis(s)

By investigating new systems for collecting and managing sensors’ data in a smart building which operates in IoT environment.

As a result, the proposed solutions for collecting and managing sensors’ data in a smart building could lead us in an energy efficient smart building, and thus in a Green Smart Building

* Research objectives(s)

Making Smart Cities more efficient. Cost reduction, safer environment, comfortable and friendly applications could be achieved through a system which can exploit all the abilities of the technologies we studied.

Paper: Untraceable Sensor Movement in Distributed IoT Infrastructure

* the Research premise (s)

There are some protocols cause higher computational overhead which is not adequate for a tiny-powered sensor nodes. Nevertheless, none of the aforesaid authentication protocol supports the properties such as anonymity, and untraceability of the sensor nodes, which are greatly imperative, especially in the sense of their location privacy and movement.

* the Research question(s)

How to face with challenges for the security of systems and processes and the privacy of individuals, such as their location and movements and so on.

* the Research hypothesis (s)

Now, in order to allow WSN to become an intrinsic part of the IoT in a secure way, several security challenges are required to be considered.

* The Research objectives(s)

To achieve mutual authentication by preserving the feature of anonymity of the sensor node; to achieve untracebilty; to defeat forgery attack, and cloning attack and to reduce computation and communication cost

T-Patterns Revisited: Mining for Temporal Patterns in Sensor Data

* the Research premise (s)

Recent progress in sensor technology makes it necessary to create algorithms that are capable of discovering structure in large-scale and possibly heterogeneous sensor systems.

* the Research question(s)

The original T-pattern algorithm has quadratic time complexity in the number of sensors, as well as in the number of discrete time steps considered for pattern search.

* the Research hypothesis (s)

With the T-pattern approach, which takes advantage of the time dimension to find the typical delay between related events.

* The Research objectives(s)

The trend to use large amounts of simple sensors as opposed to a few complex sensors to monitor places and systems creates a need for temporal pattern mining algorithms to work on such data. The authors remedy the T-pattern approach with a statistical model to obtain a fast and robust algorithm to find patterns in temporal data.