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# A Novel Data Gathering Protocol with Node Detection and Sharing (DGPNDS) in Mobile-Sink Based Java Environment

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## Abstract

***From a long time various research works are done in the field of wireless sensor network. In large scale wireless sensor networks, clustering is an effective technique for the purpose of improving the utilization of data gathering from the access point. However, the problem of security and sensing the node in a locking way protocol is essential. In this research paper we proposed a novel algorithm named Data Gathering Protocol with Node Detection and Sharing (DGPNDS) in Mobile-Sink Based Java Environment. In our algorithm we first request to the node for accessing the data or for the requirement gathering. If the node agrees for the mutual coordination, then the node demand for the secret key if it is valid then the requirement gathering and sharing process is started. In this algorithm service provider node also shares data from the other service provider nodes. By the above phases we show that it accesses the data gathering requirement in a very efficient manner. Our algorithm also provides two way securities in mobile sink based java environment.***

## Keywords

***Sensor Network; Mobile Sink, WSN, DGPNDS***

## 1. Introduction

A wireless sensor network consists of a large number of sensor nodes deployed over a geographical area for monitoring physical phenomena like temperature, humidity, vibrations, seismic events, and so on. Each sensor node is a tiny device that includes three basic components: a sensing subsystem for data acquisition from the physical surrounding Environment, a processing subsystem for local data processing and storage, and a wireless communication subsystem for data transmission to a central collection point (sink node or base station). In addition, a power source supplies the energy needed by the device to perform the programmed task.

Wireless Sensor Networks (WSNs) [1][2] have been extensively explored recently due to their wide applications like military surveillance, home network, healthcare, inventory management and monitoring etc. The sensor nodes will sense, process and then transmit the data to certain remote sink node (or base station) in an autonomous and unattended manner. In recent years, many clustering-based data gathering protocols of wireless sensor networks have been presented [3], in which the data is transmitted to sink through multi-hop communication of cluster-heads [4].

In contrast to traditional wireless networks, a WSN has its own design and resource constraints. Resource constraints include limited battery power (energy), low sensing power, limited processing power, limited memory and storage space, low communication range and low bandwidth. Design constraints are application dependent and may include random deployment, hundreds or thousands of sensor nodes and environment inaccessible by humans. All these constraints make protocol design in WSN a challenging task.

So we want to design a secure protocol which effectively works on WSN environment with ease of computation. Most of the existing methods transmit mobile sink nodes along certain routes based on specific tracks or anchor points and collect data. However, general applications do not need data of all sensor nodes. Queries requiring monitor of events or collection of data on certain fields need data transmission only from specific nodes of network. Therefore, the existing methods that use the mobile sink based on certain routes fail to reflect environmental features and consequently, result in reducing Quality of Service (QoS). The network lifetime is commonly defined as the time when the first node dies out of energy, and the whole network will get partitioned and be out of function afterward. Thus, the residual energy of the remaining alive nodes will be wasted, which is not desirable.

With recent advances in microelectronics, wireless visual sensor networks (WVSN) have drawn a lot of attention both in the academia and in the industry. Due to the low cost, low power, and small footprint characteristics, wireless sensors can be used in various applications, such as battlefield surveillance, distance monitoring, product inspection, inventory management, virtual keyboard, and smart office. Most of these applications span over an open area, and a large number of wireless visual sensors may be

required for an adequate coverage.

In this paper we provide an overview of several aspects about previous research. The rest of this paper is arranged as follows: Section 2 introduces Data Gathering; Section 3 describes about literature review; Section 4 shows Mobile Sink with java environment; Section 5 describes about proposed method. Section 6 describes Conclusion and outlook.

## 2. Data Gathering

The process of grouping the sensor nodes in a densely deployed large-scale sensor network is known as clustering. The intelligent way to combine and compress the data belonging to a single cluster is known as data aggregation in cluster based environment. There are some issues involved with the process of clustering in a wireless sensor network. First issue is, how many clusters should be formed that could optimize some performance parameter. Second could be how many nodes should be taken in to a single cluster. Third important issue is the selection procedure of cluster-head in a cluster. Another issue is that user can put some more powerful nodes, in terms of energy, in the network which can act as a cluster-head and other simple node work as cluster-member only.

In Data Aggregation, value is derived from the aggregation of two or more contributing data characteristics. Aggregation can be made from different data occurrences within the same data subject, business transactions and a de normalized database and between the real world and detailed data resource design within the common data architecture.

Reporting and data analysis applications that work closely to tie together company data users and data warehouses need to overcome problem on database performance. Every single day, the amount data collected increases at exponential proportions. Along with the increase, the demands for more detailed reporting and analysis tools also increases.

Data aggregation helps company data warehouses try to piece together different kinds of data within the data warehouse so that they can have meaning that will be useful as statistical basis for company reporting and analysis.But data aggregation, when not implemented well using good algorithm and tools can lead data reporting inaccuracy. Ineffective way of data aggregation is one of the major components that can limit performance of database queries.

We can apply the aggregate function for query the result of the database like sum (), avg (), max () etc. It support the context in clustering so that it effectively done the job.

## 3. Literature Review

In 2010, Young Sang Yun et al. [7] proposed a framework to maximize the lifetime of the wireless sensor networks (WSNs) by using a mobile sink when the underlying applications tolerate delayed information delivery to the sink. Within a prescribed delay tolerance level, each node does not need to send the data immediately as it becomes available. Instead, the node can store the data temporarily and transmit it when the mobile sink is at the most favorable location for achieving the longest WSN lifetime. To find the best solution within the proposed framework, we formulate optimization problems that maximize the lifetime of the WSN subject to the delay bound constraints, node energy constraints, and flow conservation constraints. They conduct extensive computational experiments on the optimization problems and find that the lifetime can be increased significantly as compared to not only the stationary sink model but also more traditional mobile sink models.

In 2010, Saeed Rasouli Heikalabad et al. [8] proposed the new cluster head selection protocol namely HEECH. This protocol selects a best sensor node in terms of energy and distance as a cluster head. They produce the Simulation Results which show that the HEECH increases the network lifetime about 56% and 9% compared to the LEACH and HEED, respectively.

In 2010, Babar Nazir et al. [9] proposed and address hotspot problem and Mobile Sink based Routing Protocol (MSRP) for Prolonging Network Lifetime in Clustered Wireless Sensor Network. In MSRP, mobile sink moves in the clustered WSN to collect sensed data from the CHs within its vicinity. During data gathering mobile sink also maintains information about the residual energy of the CHs. Mobile sink based on the residual energy of CHs move to the CHs having higher energy. Consequently, the hotspot problem is minimized as the immediate neighbor of the sink is high energy node and it changes because of regular sink movement. It results in a balanced use of WSN energy and improves network life time.

In 2010, Xu Jianbo et al [10] proposed a MSDG (Mobile Sink-based data gathering), sink chooses the closest fixed nodes along the path as roots to build a routing tree dynamically, cluster-heads gather the data of all common nodes within cluster and perform data aggregation, the aggregated data is sent to sink reversely by tree.

## 4. Mobile Sink with Java Environment

The main function of the network layer is routing packets from the source machine to the destination machine, often requiring multiple hops. For broadcast networks routing is an issue if source and destination are not on the same network. The routing algorithm is that part of the network layer software responsible for deciding which output line an incoming packet should be transmitted on. With VC's networks one speaks of session routing, because a route remains in force for an entire user session (e.g. a login session or a file transfer). The following properties are desirable in a routing algorithm:

- correctness and simplicity.
- robustness, against software and hardware failures, traffic changes and topology changes for very long periods.
- stability, some algorithms never converge to an equilibrium.
- fairness and optimality, which are conflicting goals.

Intuitively, increasing the sink velocity v will improve the system effciency, since in unit time interval the mobile sink can meet more sensors and gather more information throughout the sensor field. However, we should carefully choose this parameter as explained follows. On the one hand, the higher mobile sink velocity, the higher the probability for static sensors to meet mobile sinks. On the other hand, when mobile sinks are moving too fast across the effective communication region of static sensors, there may not be a suffcient long session interval for the sensor and sink to successfully exchange one potentially long packet. In other words, with the increase of sink velocity, the "outage probability" of packet transmission will arise. . Therefore, finding a proper value for sink velocity must be a tradeoff between minimizing the sensor-sink meeting latency and minimizing the outage probability.

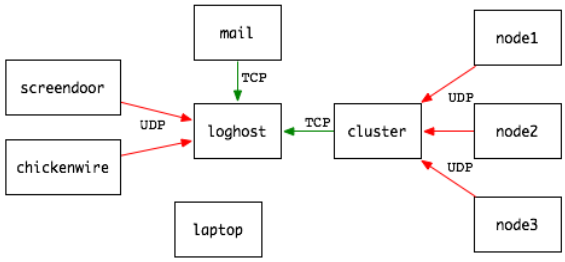


**Fig 1 Clustering in Java Environment**

Fig 1 shows clustering in java environment. Picture shows that how cluster nodes can infer to the local host area and provide a better communication in the environment of different nodes in the field of Transmission control protocol so that the values are transmitted on the cluster heads.

With mobile phones acting as mobile sinks in mWSN sensors will deliver the gathered information towards mobile phones regarding mobile phones as cluster-heads. As energy effciency is one of the focal design goals of mWSN system, sensors should choose the most energy-effcient clustering/routing strategy to deliver the collected data. Apparently, the most economic way is to let the sensor node hold sensed data in its buffer until the sink approaches, similar to the proposals in [5] and [6].

In mobile sink environment if we using java based environment then we take the advantage of java security and the flexibility. So it provides also the SQL capabilities in requirement gathering and analysis. This mechanism is shown in Fig 1. There are readymade classes in java which work on TCP/IP protocol which help us to make the connection and work done.

## 5. Proposed Method

Data gathering protocols are formulated for configuring the network and collecting information from the desired environment [11]. In each round of the data gathering protocol, data from the nodes need to be collected and transmitted to (BS)[12], where from the end user can access the data. A simple way of doing that is aggregating (sum, average, min, max, count) the data originating from different nodes [13]. A more elegant solution is data fusion which can be defined as combination of several unreliable data measurements to produce a more accurate signal by enhancing the common signal and reducing the uncorrelated noise. Sensor nodes use different data aggregation techniques to achieve energy efficiency. The aim is efficient transmission of all the data to the base station so that the lifetime of the network is maximized in terms of rounds, where a round is defined as the process of gathering all the data from sensor nodes to the base station, regardless of how much time it takes.

In 2011 Yogesh et al. [14] proposed that the main function of clustering heads in network layer is routing packets from the source machine to the destination through multiple nodes hope.

In this section we proposed the novel algorithm which is Data Gathering Protocol with Node Detection and Sharing (DGPNDS).
Our Proposed algorithm is divided into seven parts:

- Registration Phase
- Authentication Phase

- Request and Reply Phase
- Setup Phase(RS)
- Setup Phase(NN)
- Data Gathering
- Forwarding to Sink Assumptions

RS-Request sender
NN-New Node
DS- Data Source
UP-User Profile
SP-Service Provider
PR- Probe Request
PRS-Probe Response
AR-Acknowledge Request
ARS-Acknowledge Response
SSS- Sharing Secret Key
DGPNDS- Data Gathering Protocol with Node Detection and Sharing in Mobile-Sink Based Java Environment

**1) Registration Phase**

In this phase, directly user is not eligible. So Admin first register the user with his name, uid, pwd. After the registration user go to the mobile sink java environment. Directly user does not eligible to enter in the DGPNDS environment.

UID-User ID

PWD-Password

Computation:
1.1 ds=Combination (pwd||uid)
1.2 up=ds[i] [send to the user profile]

**2) Authentication Phase**

After the registration phase sender get Uid and Pwd and enter into this phase.

User enters the combination of (pwd||uid)

If (true)

Goto Request and Reply phase

Else

Invalid entry, enter again.

**3) Request and Reply Phase**

In this phase we show the request and reply mechanism.
This mechanism is shown in fig 2.

PR- Probe Request
PRS-Probe Response
AR-Acknowledge Request
ARS-Acknowledge Response
SP-Service Provider

Once the sender becomes active on the medium, it searches for access points or the service provider points in the available management frames known as probe request frames. The probe request frame is sent on every channel the sender supports in an attempt to find all access points.

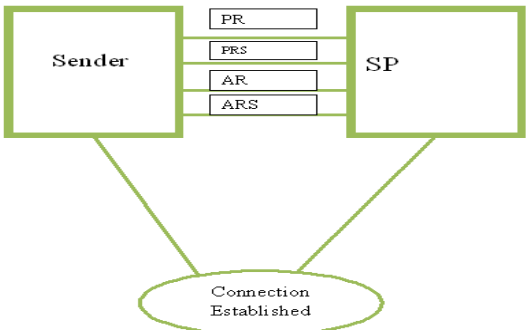


**Fig 2 Request and Reply Phase**

All service provider that are in range (Available list)and match the probe request criteria will respond with a probe response frame containing synchronization information and access point load. The client can determine which access point (SP) to associate to by weighing the supported data rates and access point load.

**4) Setup Phase (RS)**

In this phase fig.3 SP(service provider) wants a shared Secret Key for the next process. Sender sends the Secret Key on the basis of the secret key gathering process is finished. Shared key authentication is the second mode of authentication specified in the 802.11 standard. The Sp request for the shared key otherwise gathering process is not established. The Sender sends the secret key and if it is true then it goes to the next phase.
SSS- Sharing Secret Key
RS-Request sender

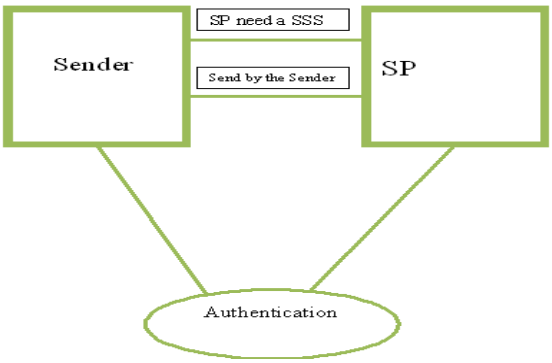


**Fig 3 Set up phase**

**5) Setup Phase(NN)**

NN - New Node

In this phase Service provider attempts to create its new friend list so that it can collect data from different sources so that it becomes available for the sender.

**6) Data Gathering**

DS- Data Source

In this phase Service provider collects the data which is required by the sender. It aggregates those data for the sender. It then sends the data to the sender, fulfilling his request.

**7) Forwarding to the Sink**

In this phase next movement decision in first cycle, mobile sink just move to predefined locations in network. Later in second and subsequent cycle node will move to the next access point and in this way scan through the network. It also maintains the record of the communication. We understand those aspects with the flowchart shown in Fig 4.

By the flowchart we easily understand the algorithm. In this model we can enter in any of the two modes.

1) Normal User
2) Admin

If we enter in the normal mode then we have to enter your correct user id and password. After entering the correct user id and password you can go to the authentication area. Where we establish the connection between user modes to the network mode by the available neighbors. If we establish a connection the node can access the data from the connecting node. But we do not access the data directly. We must enter a secure secret key which is maintained in the session; otherwise we only see the list of files but does not gather the data from the node or copy the data from the node.

In this algorithm we also provide a new approach of data gathering which is the main specialty of our proposed work. In our approach if we connect to any other network then we can gather data from the network and also from other nodes without any connection establishment. The node by which the connection is established had done the work. We request the data from other nodes, the node then list all the nodes and after providing the secure network key copy the desired file from the external node and provide the file for their users. User then accesses the file by applying the security key from the connected network. So our approach established two ways security key that achieve a higher degree of data gathering mechanism. Our approach does not need any distance algorithm and also saves time which provides faster execution. It also provides security in all levels, which provide a secure data gathering for today's environment.

Fig 5, Fig 6, Fig 7, and Fig 8 shows all the related activity regarding our algorithm which shows data gathering and two security mechanism with the internal and external nodes.

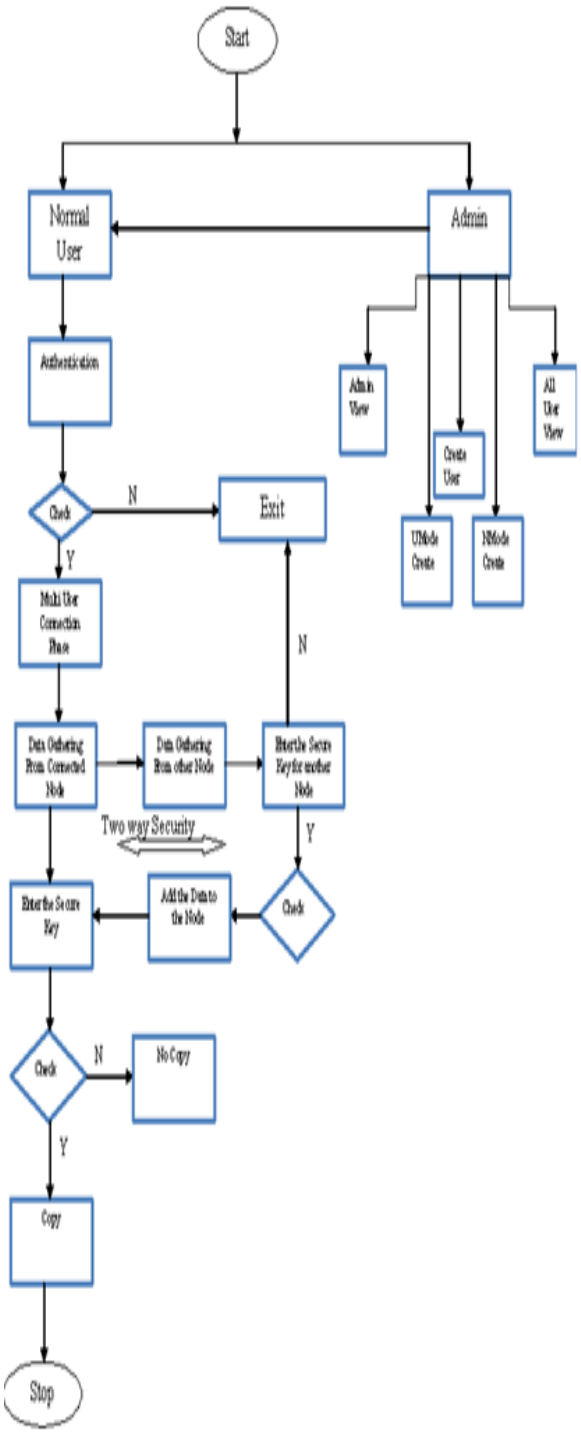


**Fig 4 Flowchart**

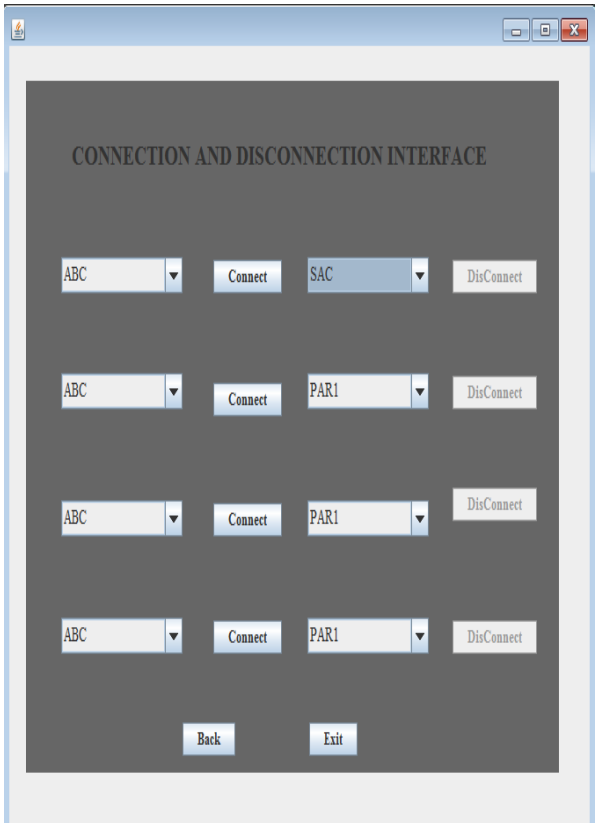


**Fig 5 Connection Interface**


**Fig 7 Secure Key for Data Gathering from Internal Node to User Node**

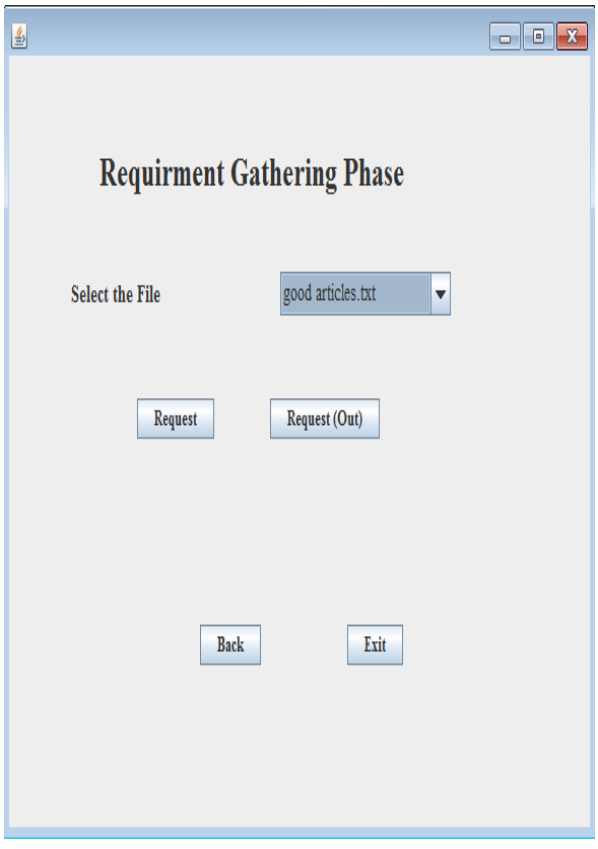


**Fig 6 Requirement Gathering Phase**

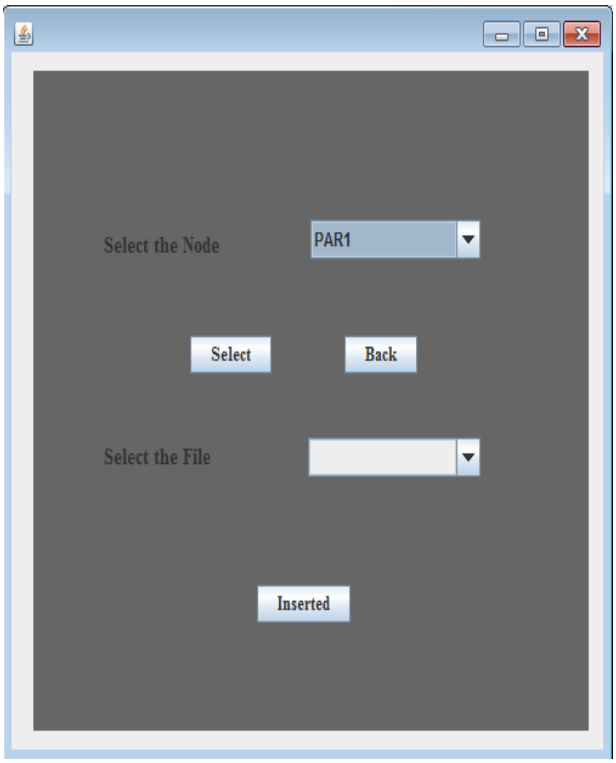


**Fig 8 Secure Node Key for Data Gathering from Internal Node to External Node**

**Fig 9 shows different admin tasks. The admin tasks are following:**

[1] Admin View: In admin view the admin can see the list of all users and their login details.
[2] Normal view: In this view admin have the functionality of the normal user.
[3] Create New User: In this mode Admin can create new users with their login details.
[4] All User View: In this view admin can see all the users which are created by the admin.
[5] UMode Create: In this mode Admin can create new node for users.
[6] NMode Create: In this mode Admin can create new node for network connection.

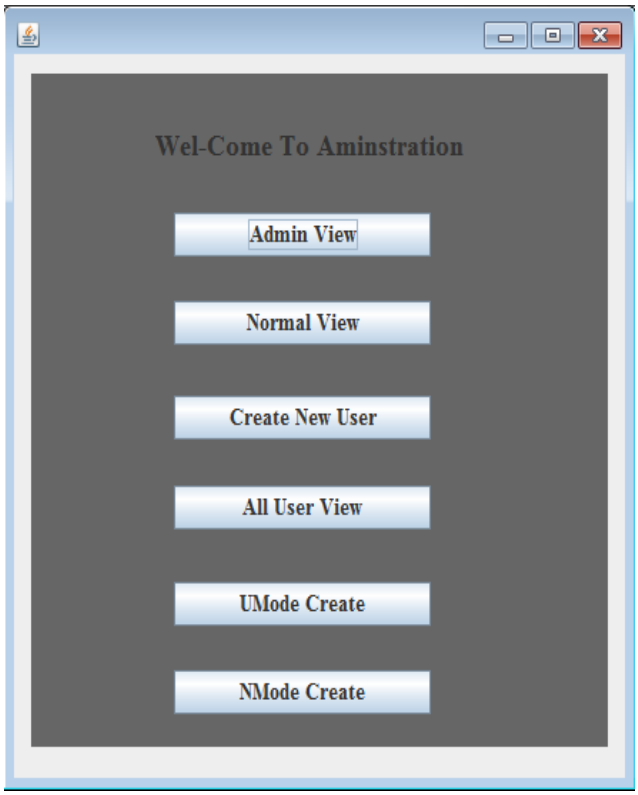


**Fig 9: Admin Mode**

## 6. Conclusion and Outlook

We provide some detail and analytical behavior base on the some survey. In this research paper we proposed a novel algorithm named Data Gathering Protocol with Node Detection and Sharing (DGPNDS) in Mobile-Sink Based Java Environment. Our algorithm is divided into seven parts .By the above phases we show that it access the data gathering requirement in a very efficient manner. Our algorithm also provides two way securities in mobile sink based java environment. For the mobile sink next movement decision in first cycle mobile sink just move to predefined locations in network. Later in second and subsequent cycle node will move to the next access point and in this way scan through the network. It also maintains the record of the communication.

In this paper we provide a framework where we can establish a connection from the network node and by providing a security key we can gather the data. We also provide data gathering from the external nodes by providing two way data gathering protocol. In future we can apply the work on the real time scenario and compare the work with the simulation result.

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