



# **NATIONAL INSTITUTE OF TECHNOLOGY HAMIRPUR (H.P.)**

## **CANDIDATES' DECLARATION**

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We hereby certify that the work which is being presented in the project report titled **“Energy Efficient Clustering In Wireless Sensor Networks”** in partial fulfilment of the requirements for the award of the Degree of Bachelor of Technology and submitted to the Department of Computer Science & Engineering, National Institute of Technology Hamirpur, is an authentic record of our own work carried out during a period from January 2017 to May 2017, under the supervision of **Er. Rajeev Kumar**, Assistant Professor, Department of Computer Science & Engineering, National Institute of Technology Hamirpur.

The matter presented in this project report has not been submitted by us for the award of any other degree of this or any other Institute/University.

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This is to certify that the above statements made by the candidates are correct to the best of my knowledge.

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## **ABSTRACT**

Wireless sensor networks were initially developed for the defence purpose but now they are applicable to many other fields like health, traffic analysis, etc. Energy is always the primary constraint on designing wireless sensor network. Wireless sensor nodes are small in size and have constraints on the battery size. Also, these nodes are deployed in the remote area, it becomes infeasible to replace the battery over the lifetime of the sensor nodes, hence the power consumption should be very efficient to improve the lifetime of the sensor node and hence the lifetime of the wireless sensor network.

Clustering is one of the most popular approaches used in wireless sensor network for the energy efficient data capturing and data sensing. Main concept behind clustering is to divide the nodes into different clusters and each cluster is having a cluster head. The idea is to reduce the data redundancy using spatial and temporal metrics. All the nodes in the cluster send their data to the cluster head which further transmits the data to the base station. Clustering improves the energy consumption, various algorithms have been proposed for the clustering. Sometimes the clustering involves message overhead in cluster formation and cluster head selection.

The main idea behind our approach is to reduce the message overhead required during cluster head selection and cluster formation by forming the static clusters. Grid based clustering concept is proposed for initially selecting the cluster head and cluster formation. Further using the concept is extended to make our approach dynamic based on entropy and distances from the adjacent cluster head.

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## Sensor Networks

2.2.5 LEACH (Low Energy Adaptive Clustering Hierarchy)

2.2.6 PEGASIS (Power-Efficient Gathering In Sensor Information Systems)

2.2.7 TEEN

2.2.8 EEHC

2.2.9 HEED (Hybrid, Energy Efficient And Distributed)

2.2.10 UCS (Unequal Clustering Size)

2.2.11 PEACH (Power-Efficient And Adjustive Cluster Hierarchy)

2.2.12 TTCRP (Two Tier Cluster Primarily Based Routing Protocol)

2.2.13 DAIC (Distance Aware Intelligent Clustering)

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## LIST OF ABBREVIATIONS

Abbreviation	Expansion
WSN	Wireless Sensor Network
BS	Base Station
MEMS	Micro-Electro-Mechanical System
CH	Cluster Head
PCA	Principal Component Analysis
EECRU	Energy-efficient clustering method using random update
CHS	Cluster Head Selection
CF	Cluster Formation
E-BACH	Entropy-Based Clustering Hierarchy for Wireless Sensor Networks
LEACH	Low Energy Adaptive Clustering Hierarchy
PEGASIS	Power-Efficient Gathering In Sensor Information Systems
HT	Hard Threshold
ST	Soft Threshold
TEEN	Threshold sensitive Energy Efficient sensor Network
EEHC	Energy Efficient Hierarchical Clustering
HEED	Hybrid, Energy Efficient and Distributed

UCS	Unequal Clustering Size
PEACH	Power-Efficient and adjustive cluster Hierarchy
TTCRP	Two Tier Cluster primarily based Routing Protocol
DAIC	Distance Aware Intelligent Clustering
GPS	Global Positioning System
GAF	Geographic Adaptive Fidelity
MATLAB	Matrix Laboratory