Ontology Driven Meteorology Conceptual Data Dissemination through OGC Web Services

Project proposal submitted

To

The Director
Space Applications Centre
Jodhpur Tekra
Ahmedabad - 380 015, India.

By

Dr. SUNITHA ABBURU

Department of Computer Applications

Adhiyamaan College of Engineering

Hosur, Tamilnadu – 635 109.

9th July 2016

(Revised on 27th September 2016
Re Revised on 23rd February 2017
Changes are marked in GREEN color font)

Proposal Format
Application for Grant of Funds

1.	Name of the Institution with Full Address	Adhiyamaan College of Engineering Dr.MGR Nagar,Hosur, Krishnagiri - 635109 Tamilnadu.		
2.	Title of the Research Proposal	Ontology Driven Meteorological Conceptual Data Dissemination through OGC Web Services		
3.	Name of the Principal Investigator (Address/Phone/E-mail)	Dr. Sunitha Abburu Prof. & Director, Dept. of Computer Applications Adhiyamaan College of Engineering Hosur, Krishnagiri - 635109, Tamilnadu. Mail id: drsunithaabburu@yahoo.com Contact No: +91 (0) 8050594248, +91 (0) 9600507590		
4.	Name(s) of Co-investigator(s) with the name(s) of their Institution	Dr.Ramya Durai Associate Prof, Dept. of CSE Adhiyamaan College of Engineering Mail id: ramayadorai16@gmail.com		
5.	Proposed duration of Research Project	2 years		
6.	Amount of grant requested in Rs.	1st Year	2nd Year	Total in Rs.
	Manpower	3,36,000	3,36,000	6,72,000
	Hardware upgradation	2,30,000	-	2,30,000
	Satellite Data/Data	MOSDAC		
	Consumables & Supplies	50,000	50,000	1,00,000
	Internal Travel	30,000	30,000	60,000
	Contingency	-	-	-
	Others	-	-	-
	Overheads	1,69,000	1,31,000	3,00,000
	Total in Rs.	8,15,000	5,47,000	13,62,000
7.	a) Bio-data of all the Investigators (Format-A). b) Brief description of the Research Proposal with details of budget (Format-B). c) Declaration (Format-C).			
a)	Bio-data of all the Investigators (Format-A).			

Bio-data of the Principal Investigator (Form A)

1.	Name	Dr. Sunitha Abburu
2.	Date of Birth	04/06/1971
3.	Designation	Prof. & Director, Dept. of Computer Applications
4.	Degrees conferred	

Degree	Institution conferring the degree	Field(s)	Year
B.Sc	Anwar-ul-uloom college, Osmania University, A.P	Maths,Physics, Electronics	1993
M.C.A	St. Anns, Osmania University, Hyderabad, A.P	Computer Application	1996
M.Phil	Sri Venkateswara University, Tirupathi, A.P	Computer Science	2001
Ph.D	Sri Venkateswara University, Tirupati, A.P	Computer Science	2007

5. Research/training experience (in chronological order)

Research Experience: Central Government Sponsored Research Projects

1. Title of the Project : Ontology Based Knowledge Management and Semantic Information Retrieval by Constructing Multiple sub Ontology.

Funding Body : DRDO

Duration : 3 Years (January 2012- January 2015)

Total Cost : 18.75 Lakhs

Status : Completed

2. Title of the Project: Ontology-Based Semantic Annotation Generation and Retrieval of Images Using Multiple Sub Ontologies

Funding Body : ISRO

Duration : 2 Years (June 2013- June 2015)

Total Cost : 10.01 Lakhs

Status : Completed

3. Title of the Project : Disaster Management Conceptual Modelling, Simulation and Visualization on City GML Model for Effective Decision Making”

Funding Body : DST

Duration : 2 Years (April 2015 – April 2017)

Total Cost : 21.20 Lakhs

Project Status : Ongoing

4. Title of the Project : "Development of Semantics Driven Geospatial Public Health Management System".

Funding Body	:	DST
Duration	:	2 Years (June 2015- June 2017)
Total Cost	:	14.60 Lakhs
Project Status	:	Ongoing

National conference on Disaster Management, funded by DST-SERB. Technically sponsored by Science Q international Publisher

Title	:	Exploration of Computation and Information Technology for Disaster Management
Dates (1st Series)	:	August 8th- 9th 2014
Dates (2nd series)	:	September 11th-12th 2015
Website	:	http://ecitdm.in/

Work Experience:

Duration	Institution	Name of work done
3 Years	Caterpillar	IT Analyst
16 Years	Academic Institution	Teaching, Administration and Research.

6.	Major scientific fields of Interest	Ontology, Semantic Technology, Information Retrieval, Big Data

7. List of publications

International Journal Publication

- Sunitha Abburu and Nitant Dube, "Satellite Parametric Description to Ontology Concepts and Semantic Classification of Satellite Data", International Journal on Semantic Web and Information Systems (IJSWIS), Vol 12, Issue 2 , pp 53-75.
- Sunitha Abburu and Nitant Dube, "Ontology concept-Based Management and Semantic Retrieval of Satellite Data", Journal of Intelligent Systems, Feb 2016, ISSN (Online) 2191-026X), Vol 12, Issue 2. **Free Journal.**
- Dr Sunitha Abburu, G.Suresh Babu "Ontology Storage Models and Tools - an Authentic Survey" Journal of Intelligent Systems, ISSN :2231-2307, August 2015. Free Journal.
- T.K. Das, Arati Mohapatro , Sunitha Abburu, "A Decision Making Mechanism During Disaster Event Monitoring and Control", Middle-East Journal of Scientific Research 23 (9): 2251-2255, 2015, pp 2251-2255.
- Sunitha Abburu, Nitant Dube, Nayak M. R., Suresh Golla,"An Ontology Based Methodology for Satellite Data Semantic Interoperability", Advances in Electrical and Computer Engineering (AECE), ISSN: 1582-7445, Volume 15, Number 3, 2015, pp 1-5-110.

- J. Vijay Fidelis, Sunitha Abburu, "Ontology based disaster prediction using Animals behavioral changes", Journal Of Computation In Biosciences And Engineering, Volume 2/ Issue 3, pp 1-6.

- Sunitha Abburu, Suresh Babu Golla, "Satellite Image Classification Methods and Techniques: A Review", International Journal of Computer Applications (IJCA), Vol. 119, No.8 June, 2015, pp 20-25. Free Journal

- Dr Sunitha Abburu, G.Suresh Babu "Effective Partitioning and Multiple RDF Indexing for Database Triple Store", Engineering Journal, Vol 19, Issue 5, October 2015, pp 139-154. Free Journal

- Sunitha Abburu, Suresh Babu Golla, "An Engineering Evaluation on the Glimpse of Satellite Image Pre-processing Utility Tools", Engineering Journal (EJ), Vol. 19, No. 2, April, 2015, pp. 129-138, DOI:10.4186/ej.2015.19.2.129 (IF 0.1). Free Journal.

- Dr.Sunitha Abburu, G.Suresh Babu "Ontology Centric Dynamic and Automated User Interface Creation". Accepted for publication in International Journal of Applied Engineering Research (IJAER), Vol 10, No 18, 2015, pp 13577-13580.

- Dr.Sunitha Abburu, G.Suresh Babu "A System for SPARQL Query Execution over RDF Triple Store and Effective Visualization of Results". International Journal of Applied Engineering Research (IJAER), vol. 10, no.18, 2015, pp 13581-13584 (SNIP 0. 166).

- Dr Sunitha Abburu, Suresh Babu, "A Generic Mapping Method and Tool to Execute Semantic Queries on Relational Database", International Journal of Applied Engineering Research (IJAER) Volume 9, Number 24 (2014), pp. 29227-29238.

- Dr. Sunitha Abburu, Suresh Babu Golla, "Ontology-Driven Knowledge-Based Health-Care System an Emerging Area - Challenges and Opportunities – Indian Scenario", The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XL-8, 2014, ISPRS Technical Commission VIII Symposium, 09 – 12 December 2014, Hyderabad, India, doi:10.5194/isprsarchives-XL-8-239-2014.

- Sunitha Abburu, Nitant Dube, Nayak M. R., "Ocean Data Techniques and Standards - Tools and Analysis Using Semantic Sensor Ontology - An Emerging Area - Indian Scenario". ISRS Proceeding Papers of Sort Interactive Session ISPRS TC VIII International Symposium on "Operational Remote Sensing Applications: Opportunities, Progress and Challenges", Hyderabad, India, December 9 – 12, 2014 No.496/ISRS Proceedings, 9-12 December, 2014/ISPRSTCVIII Mid-Symposium, Hyderabad.

- J. Vijay Fidelis, Dr. Sunitha Abburu, "Observation of L'aquila Toads in Ponds, To Forecast Earthquakes' Using Semantic Web and Ontology", Journal of Computation in Biosciences and Engineering, Volume 1/ Issue 3, pp1-3.

- Dr Sunitha Abburu, G.Suresh Babu, "Survey On Ontology Languages ",CiiT International Journal of Artificial Intelligent Systems and Machine Learning, Vol 5 , No 11 November 2013, pp 440-445. DOI: AIML112013002 (IF 1.261). Print: ISSN 0974-9667, Online: ISSN 0974 – 9543.

- Dr Sunitha Abburu, G.Suresh Babu, "A framework for Ontology Based Knowledge Management", International Journal of Soft Computing and Engineering™(IJSCE), Volume-3 Issue-3 on July 05, 2013,pp 21-25.(IF 1.0). ISSN: 2231-2307.

- Dr Sunitha Abburu, G.Suresh Babu, " Multiple Ontology Parallel Merge Process: A Cluster Based Approsach" , Third International Conference on recent trends in Information Technology (ICRTIT 2013) , Organized by Anna University, Chennai, 25th-27th July 2013, IEEE Explorer, ISBN:978-1-4799-1024-3/13/$31.00 ©2013 IEEE,pp 335-340.

- Dr Sunitha Abburu, G.Suresh Babu, " Survey On Ontology Construction Tools" , International Journal of Scientific & Engineering Research(IJSER) , Vol 4 Issue 6 June 2013, pp 1748-1752 (IF 1.4).

- Dr Sunitha Abburu, G.Suresh Babu, "Format Sparql Query Results Into Html Report", International Journal of Advanced Computer Science and Applications (IJACSA), Vol. 4, No. 6, 2013,pp 144- 148. (IF 1.324). ISSN: 2156-5570 Online, ISSN: 2158-107X Print.

- Dr Sunitha Abburu, G.Suresh Babu, "A Frame Work For Web Information Extraction And Ananysis" International Journal Of Computers & Technology(IJCT), Vol 7, No 2, June 2013,pp 574-579. (IF 1.043). ISSN 2277-3061.

- Dr Sunitha Abburu, G.Suresh Babu, " Indian Music Instruments Semantic Knowledge Representation " International Journal of Computer Applications (IJCA), Vol 71,No 15, June 2013, pp 1-5. (IF 0.835). DOI: 10.5120/12431-8540. ISSN 0975-8887.

- Dr Sunitha Abburu, G.Suresh Babu, "Survey On Ontology Methodologies" CiiT International Journal of Artificial Intelligent Systems and Machine Learning, Vol 5 , No 4 April 2013,pp 173 177. DOI: AIML042013005 (IF 0.763). ISSN 0974 – 9667-Online: ISSN 0974 – 9543

- Dr Sunitha Abburu, "A Survey On Ontology Reasoners and Comparison" International Journal of Computer Applications (0975 – 8887), IJCA, Volume 57, No.17, November 2012. pp 33-39, DOI: 10.5120/9208-3748 (IF 0.814). ISSN 0975-8887.

- Dr Sunitha Abburu, "Knowledge Based Semantic Annotation Generation of Music", International Journal of Computer Applications, IJCA Volume 47 - Number 8, 2012, pp 8-12, DOI: 10.5120/7206-9990 (IF 0.814). ISSN 0975-8887.

- Perumalsamy Ramasamy and Dr. Sunitha Abburu, "Sql Injection Attack Detection and Prevention", International Journal of Engineering Science and Technology (IJEST), Vol. 4 No.04 April 2012, pp 1396-1401 (IC 3.14). ISSN 0975-5462.

- Deepanchakaravarthi Purushothaman and Dr Sunitha Abburu, "An Approach for Data Storage Security in Cloud Computing", International Journal of Computer Science Issues (IJCSI), Volume 9, Issue 2, March 2012 (IF 0.242). ISSN Online: 1694-0814.

- Kanagaraj.S and Dr.Sunitha Abburu, "Converting Relational Database Into Xml Document", International Journal of Computer Science Issues (IJCSI), Volume 9, Issue 2, March 2012 (IF 0.242). ISSN Online: 1694-0814.

- Parameswaran Vellachu and Dr. Sunitha Abburu, "Tag Based Audio Search Engine", International Journal of Computer Science Issues (IJCSI), Volume 9, Issue 2, March 2012 (IF 0.242). ISSN Online: 1694-0814.

- Saranya Eswaran and Dr Sunitha Abburu, "Identifying Data Integrity in The Cloud Storage" International Journal of Computer Science Issues(IJCSI), Volume 9, Issue 2, March 2012 (IF 0.242). ISSN Online: 1694-0814.

- Dr. Sunitha Abburu, "Cinema Music Semantic Knowledge Management", CiiT International Journal of Artificial Intelligent Systems and Machine Learning, Vol 4, No 2, February issue 2012 (IF 0.763) ISSN 0974 – 9667-Online: ISSN 0974 – 9543.

- Dr. Sunitha Abburu, "Effective Personal Digital Photo Semantic Management Using Ontology", CiiT International Journal of Digital Image Processing, Vol 3, No 17, November 2011, pp 1094-1099. (IF 0.652) ISSN 0974 – 9667-Online: ISSN 0974 – 9543

- Dr. Sunitha Abburu, "Effective Semantic Knowledge Management Using Ontology For Student Academic Projects", CiiT International Journal of Artificial Intelligent Systems and Machine Learning, Vol 3 No 10, September 2011, pp 630-635. (IF – 0.763). ISSN 0974 – 9667- Online: ISSN 0974 – 9543.

- Mathiseelan.V , Dr. Sunitha Abburu, "Multiple Component Based Information Tracking System", International Journal of Computer science and engineering Survey (IJCSES), Vol 2, No 2, May 2011, pp 57-67.ISSN 0976-2760 online- 0976-3252 print.

- Vasu.R, Dr.Sunitha Abburu, "One Time Secret Key Mechanism For Mobile Communication", International Journal of Computer science and engineering Survey (IJCSES), Vol 2, No 2, May 2011, pp 12-20. ISSN 0976-2760 online -0976-3252 print.

- Elavarasan.R , Dr.Sunitha Abburu , "Multilayer Bit Allocation For Video Encoding" International Journal of Managing Information Technology(IJMIT), Vol 3 ,No 2 , May 2011, pp 1-7.

- A.Saravanan, Dr. Sunitha Abburu, "Computing Conditional Intermeeting Time In Conditional Shortest Path Routing " , International Journal of Computer Science Issues(IJCSI) , Volume 8, Issue 3, No 2, May 2011,pp 365-369 (IF 0.242). ISSN Online: 1694-0814.

- Dr. Sunitha Abburu, "Multiple Sub Ontology Frame Work For Comprehensive Video Database System", CiiT International Journal of Artificial Intelligent Systems and Machine Learning, Vol 3 No 1, January 2011, pp 25-30 (IF – 0.763). ISSN 0974 – 9667, Online: ISSN 0974 – 9543.

- Dr. Sunitha Abburu, "Concept Measure Supported Aesthetics Ontology Construction For Videos ", International Journal of Computer Science and Information Security (IJCSIS), Vol8, No 10, December 2010, pp 4-7 (IC 5.50). ISSN 1947-5500.

- Dr. Sunitha Abburu, "Context Ontology Construction For Cricket Video", International Journal on Computer Science and Engineering (IJCSE), Vol. 02, No. 08, Nov- 2010, pp 2593-2597. ISSN : 0975-3397.

- Dr. Sunitha Abburu, "Semantic Segmentation And Event Detection In Sports Video Using Rule Based Approach", International Journal of Computer Science and Network Security (IJCSNS), VOL.10 No.10, October 2010, pp 35- 40. ISSN : 1738-7906.

- Dr. Sunitha Abburu, Jinesh V N , "Development Of Cinema Ontology: A Conceptual And Context Approach" , International Journal of Computer Science and Information Security (IJCSIS), Vol. 8, No. 7, October 2010, pp 26-31(Best paper of the Issue – IC 5.50). ISSN 1947-5500.

- Dr. Sunitha Abburu, "Multi Level Semantic Extraction For Cricket Video By Text Processing", International Journal of Engineering Science and Technology (IJEST) , Vol. 2(10), October 2010, pp 5377-5384 (IC 3.14).ISSN 0975-5462.

- Dr. Sunitha Abburu, R.J Anandhi, "Concept Ontology Construction For Sports Video" published in ACM digital library, presented at Amrita ACM-W Celebration of Women in Computing (A2CWIC), Paper no 60, International Conference on Emerging trends in computing, held on September 16th -17th 2010, Pg no 282-287, Amrita University, Coimbatore, Tamilnadu, India.

- R.J Anandhi, Dr. Sunitha Abburu, "An Enhanced Clusterer Aggregation Using Nebulous Pool" published in ACM digital library, presented at Amrita ACM-W Celebration of Women in Computing (A2CWIC), paper no 105. International Conference on Emerging trends in computing, held on September 16th -17th 2010, Pg 342-346, Amrita University, Coimbatore, Tamilnadu, India.

- Dr. Sunitha Abburu, Dr. P. Govindarajulu, "Multilayer Semantic Data Model for Sports Video" International journal of computer sciences and network security (IJCSNS), Vol 7, No3, March 2007, pp 330-341.

List of International Conference Papers

- Sunitha Abburu a, Nitant Dube b, M.R.Nayak , " Ocean Data Techniques And Standards – Tools And Analys is Using SSN – An Emerging Area - Indian Scenario" , ISRS Technical Proceedings**,** ISPRS Technical Comm ission VIII Mid-Term Symposium on Operational Remote Sensing Applications: Opportunitie Progress and C hallenges Hyderabad, India, December 9-12, 2014.
- Dr Sunitha Abburu, G.Suresh Babu, "A Frame Work for Assessment of Disaster Severity and Impact Using Satellite Image Processing for Agile and Effective Decision Making" International Conference ICDM'14, Organized by St.Peter's University,Chennai, January 23rd-24th 2014,pp C16-1-C16-4.
- Dr Sunitha Abburu, G.Suresh Babu, " Multiple Ontology Parallel Merge Process: A Cluster Based Approsach" **, IEEE conference proceedings of T**hird International Conference on recent trends in Information Technology (ICRTIT 2013) , Organized by Anna University, Chennai, 25th-27th July 2013, pp. 335 – 340, DOI: 10.1109/ICRTIT.2013.6844226.
- Dr. Sunitha Abburu, R.J Anandhi, "Concept Ontology Construction For Sports Video" published in **ACM digital library**, presented at Amrita ACM-W Celebration of Women in Computing (A2CWIC), Paper no 60, International Conference on Emerging trends in computing, held on September 16th -17th 2010, Pg no 282-287, Amrita University, Coimbatore, Tamilnadu, India.
- R.J Anandhi, Dr. Sunitha Abburu, "An Enhanced Clusterer Aggregation Using Nebulous Pool" published in **ACM digital library**, presented at Amrita ACM-W Celebration of Women in Computing (A2CWIC), paper no 105. International Conference on Emerging trends in computing, held on September 16th -17th 2010, Pg 342-346, Amrita University, Coimbatore, Tamilnadu, India.
- Dr. Sunitha Abburu, Dr. P. Govindarajulu, International Conference On Systemics, Cybernetics and Informatics (ICSCI - 2008), held on January 02 - 05, 2008.International conferences Organized by Pentagram Research Centre Private Limited, Hyderabad, Andhra Pradesh, India. The title of the paper is "Sports Video Event Detection And Semantic Extraction By Video Text Processing And Rule Based Approach" ICSCI - 2008 Proceedings, Pg 414-418.
- Dr. Sunitha Abburu, Dr. P. Govindarajulu, International Conference On Systemics, Cybernetics and Informatics (ICSCI - 2007), held on, January 03 - 07, 2007.International conferences Organized by Pentagram Research Centre Private Limited, Hyderabad, Andhra Pradesh, India. Title of the paper is "Efficient Video Indexing And Retrieval"**,** ICSCI – 2007 Proceedings, Pg 508-513.
- Dr. Sunitha Abburu, Dr. P. Govindarajulu, International Conference on Next Generation Communication Systems. A Perspective ICONGENCOM - 2006 held on December 9-11, 2006. Organized by J.K Institute of Applied Physics & Technology, University of Allahabad, and Allahabad, India. The title of the paper is: **"**Concept Based Video Indexing And Retrieval", ICONGENCOM Proceedings 2006, Pg 219-225.

8.	Email id and Telephone number of PI with STD Code	drsunithaabburu@yahoo.com +91 (0) 8050594248, +91 (0) 9600507590
9.	Email id of the Head of the academic institution	principal@adhiyamaan.ac.in

Bio-Data of Co-Investigator

1.	Name	Dr.D. Ramya Dorai
2.	Date of Birth	16-06-1980
3.	Designation	Associate Professor Dept. of Computer Science and Engineering Mail- ID: ramayadorai16@gamil.com
4.	Degrees conferred	

Degree	Institution conferring the degree	Field(s)	year
B.E	Bangalore College of Engineering and Technology	B.E	2003
M.E	Sona College of Technology/ Anna University-Chennai	Computer Science and Engineering	2006
Ph.D	Anna University	Computer Science and Engineering	2015

5. Research/training experience (in chronological order)

Work Experience:

Duration	Institution	Name of work done
5 years (January 2007 to till date)	Adhiyamaan College of Engineering & Research Institute, Hosur, Tamilnadu	Associate Professor
6 months (June 2006 – December 2006)	Sacred Heart College, Tirupattur, Tamilnadu	Lecturer

6.	Major scientific fields of Interest	• Data Mining • Semantic information retrieval • Semantic web • Networking

7. List of publications

- Kalaivani.R,Ramya Dorai.D(2013), Cluster Based Leader Election and Intrusion Detection System for MANET. International Journal of Computer Science and Management Research. Vol. 2 pp. 1459-1462.
- Kalaivani.R,Ramya Dorai.D(2013), Secure Protocol for Leader Election and Intrusion Detection in MANE International Journal of Advanced Research in Computer Science and Software Engineering Ts. Vol. 2 pp. 62-66.
- Kanimozhiveena.E,D.Ramya Dorai(2013), A Framework for Building Applications based on Hidden Topics with Short and Sparse Web Documents. International Journal of Advanced Research in Computer Engineering and Technology. Vol. 2 pp. 984-988.
- Kanimozhiveena.E,D.Ramya Dorai(2013), , An approach for Reducing Data Sparseness in Web Documents using Hidden Topics from External Data, Australian Journal of Wireless Technology, Mobility and Security, January 2013
- A.Melveena,D.Ramya Dorai(2013), A Novel Framework for Self-Reconfigurable wireless mesh Networks. International Journal of Science Engineering and Technology Research(IJSETR). Vol. 2 pp. 167-171.

- A.Melveena,D.Ramya Dorai(2013), QARS for Self-Reconfiguration Mechanism in Wireless Mesh Networks. International Journal of Advanced research in Computer Engineering and Technology (IJARCET). Vol. 2 pp. 739-743.
- Meyanand.R,D.RamyaDorai(2012), Dynamic HLR Location Management Scheme in Wireless Mesh Networks ,International Journal of Computer Information Systems,ISSN:2229- 5208 Vol.4,No.1,pp-89-95
- Meyanand.R,D.RamyaDorai(2011),Analysis of Mobility Management in Wireless Mesh Networks Using Random Walk Model,International Journal of P2P Network Trends And Technology,ISSN:2249-2615,Vol.1,Issue.2,pp-39-44.
- K.Ramya,D.RamyaDorai,Dr.M.Rajaram(2011),Tracing Illegal Redistributors of Streaming Contents Using Traffic Patterns,IJCA Special Issue on Computational Science-New Dimensions & Perspectives,pp.80-85.
- Radhika.R,Ramya Dorai.D(2011),Stroke Segmentation in Form Processor, International Journal of Computer Information Systems,ISSN:2229-5208,Vol.3,No.6,pp.96-99.
- Shyamasree Ghosh ,Ramya Dorai.D .Enhanced Distributed Accountability Framework with Indexing In The Cloud and its Security Analysis, International Journal of Engineering And Science, Vol. 3 pp.01-06 Issue:,January 2014
- Shyamasree Ghosh ,Ramya Dorai.D ,Enhanced Distributed Accountability Framework with Indexing In The Cloud, International Journal of Engineering Research and Technology, ,vol. 03,pp.1429-1433 ,Issue:1,January 2014
- Jenifer.G D.Ramya Dorai,, Evaluating pure Nodes in Wireless Sensor Networks, International Journal of Advance Research in science, Vol. 03pp.75-81 ,Issue:2 ,February 2014
- Jenifer.G D.Ramya Dorai, Ranking Wireless Sensor Networks, International Journal of Engineering Research and Technology, Vol. 03 pp.52-55 ,Issue:1,January 2014
- D.Ramya Dorai ,Performance Evaluation of Worm hole Attack on AD HOC On Demand Multipath Distance Vector Routing , Paper ID: 23944 ,Journal Of Theoretical And Applied Information Technology.(Awaiting for Publication)
- A number of Workshops/FDP/Seminars Attended
- Participated and presented various Technical and Non-Technical papers in National and International Conferences.
- Published papers in Journals.
- Guided various Projects for UG and PG Students.
- Co- ordinator for National level Workshops conducted through Professional Societies.
- Faculty Advisor in Institution of Engineers (India) Student chapter in the Department of CSE .
- Produced 100% Results in various semesters in both UG & PG Results.
- Acted as Practical Exam in-charge in the department of CSE.
- Actively involved in various programs organized by the department.
- Acted as Internal & External Examiner for Practical exams conducted by Anna University.
- Acted as a Examiner in Anna University Valuation.
- Member of Board of Studies @ Adhiyamaan College of Engineering, Hosur.
- Received the Faculty Excellence Award from Infosys Limited on 14th May 2014.
- Received Best Faculty Award from IE (I) chapter, Salem division.

8.	Email id and Telephone number of PI with STD Code	ramayadorai16@gmail.com
9.	Email id of the Head of the academic institution	principal@adhiyamaan.ac.in

b)	Brief description of the Research Proposal with details of budget (Format-B).

Proposal Format (Form B)

1	Title of the research proposal	Ontology Driven Meteorology Conceptual Data Dissemination through OGC Web Services
2	Summary of the proposed research	

India Meteorological Department (IMD) [1], American Meteorological Society (AMS) [2], Canada Govt. Open Data Portal [3], Giovanni [4], Meteorological & Oceanographic Satellite Data Archival Centre (MOSDAC) [5], etc. provides satellite data products for various scientific applications. NASA provides ontology-driven interactive search environment for Earth Science (ODISEES) [6]. It describes the meteorology data products using ontology concept hierarchy and facilitate data product search using ontology concept nomenclature. WMO provides satellite data for a simple taxonomy of concepts [7]. the current research brings:

- Ontology driven meteorology conceptual data
- Ontology Conceptual data catalogue generation and facilitate catalogue services to users
- Meteorology conceptual data dissemination through OGC WMS [8] and WCS [9] services
- Fast Visualization of WMS layers using concepts of caching of tiles

Fig1. Shows the process flow of the project proposal research work.

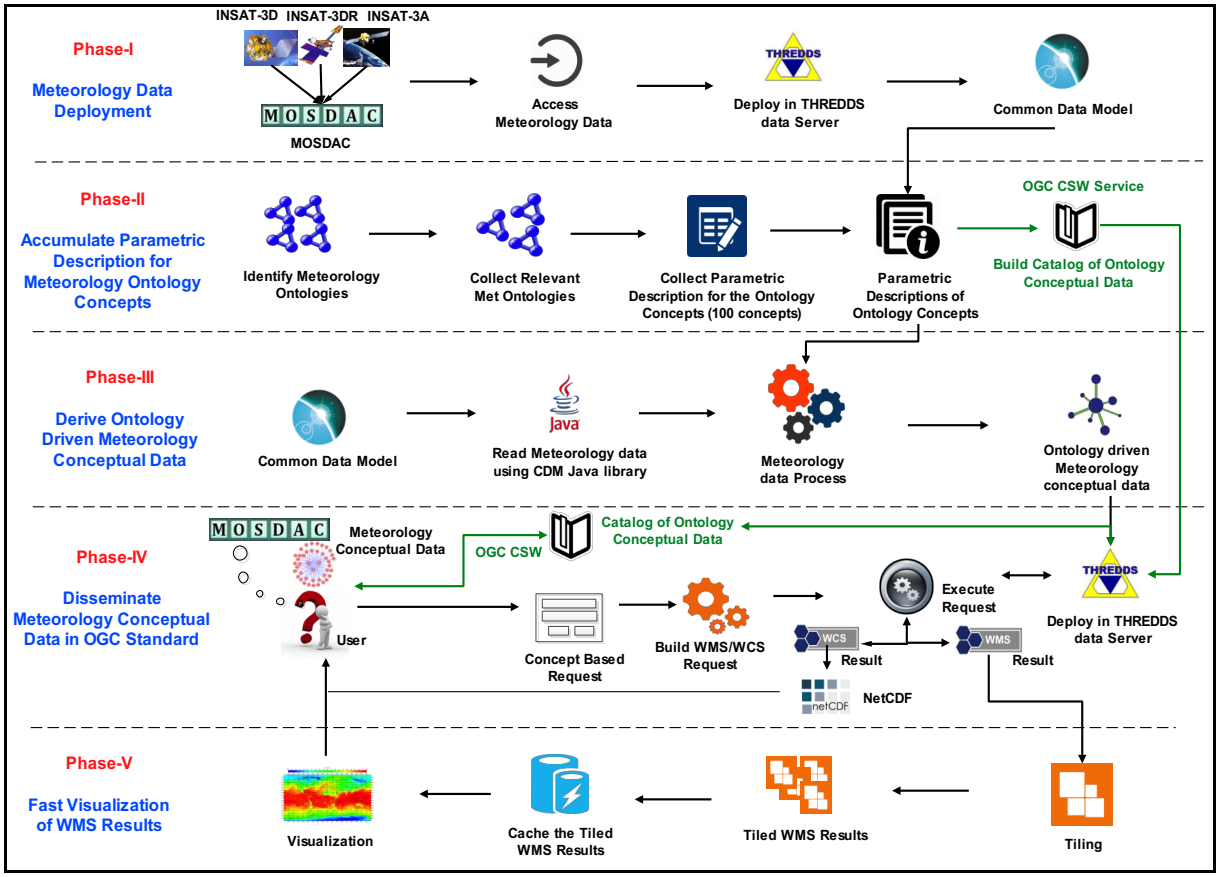

Figure1. Architecture of the proposed research work.

The proposed project designs, develops and implements a methodology to:

- Processes meteorology satellite data using parametric description of ontology concepts
- Generates Ontology Driven Meteorology Conceptual Data (ODMCD)
- To facilitate interface for OGC CSW, WMS and WCS service, on Ontology Driven Meteorology Conceptual Data.
- Visualization of WMS and WCS request results.
- Design and develop a web portal for the above

The project enhances satellite meteorology data query system from product based data access to concept based data access through OGC CSW, WMS and WCS services. The project deliverables facilitate spatio-temporal analysis of meteorology conceptual data.

3	Objectives

Aim:

- Process and transform meteorology satellite data to derive Ontology Driven Meteorology Conceptual Data (ODMCD)
- Ontology concept based meteorology data access through OGC CSW, WMS and WCS services
- Fast Visualization of WMS layers using concepts of caching of tiles

Objectives:

- Publish meteorology data in THREDD Data Server (TDS) [10] Design and develop a software component that process meteorology data using parametric conceptual description and generate ODMCD
- Generate meteorology conceptual data file
- Enable OGC CSW, WMS and WCS services for ODMCD
- Search criteria:
  - Date (one day)
  - Time span
  - Geo-location (Bounding box)
  - Ontology concept

Build a web component that facilitates the above

4	Major Scientific fields of Interest	Annexure - I
5	Linkages to Space Programme /Deliverables to ISRO on successful completion of the project	

The proposed framework can be used to generate and visualize conceptual meteorological data for any satellite data parameters.

The current research work is planned to "design and implement a **generic conceptual model**" which can be used for any satellite data, to define Ontology concepts using satellite data parameters.

The anticipated major challenge would be getting the Ontology concepts descriptions using satellite data parameters.

The current research work builds a system and facilitates the scientists to generate ontology concepts descriptions using the satellite data parameters.

The proof of concept will be implemented for around 100 ontology concepts and sub concepts with the assurance of subject knowledge experts using the data from INSAT-3D, Kalpana-1, INSAT-3A and forthcoming INSAT-3DR satellites.

Ontology driven Meteorology conceptual data base for ontology concepts and sub concepts (Around 100 concepts).

- Web portal that facilitates:
    - User friendly interface to define and publish meteorology ontology concepts
    - Process meteorology data using parametric conceptual description
    - Generates Ontology Driven Meteorology Conceptual Data

An interface to request Ontology Driven Meteorology Conceptual Data through OGC WMS and WCS for meteorology ontology concept with the support of OGC CSW service.

6	Approach	Annexure – II
7	Data base and analysis	Annexure -III
8	Available Institutional facilities	Annexure-IV
9	Fund Requirement Detailed year wise break-up for the Project budget should be given as follows:	

Amount of grant requested in Rs	1st Year	2nd Year	Total in Rs.
Senior Research Fellow-1* (28,000/month*12)	3,36,000	3,36,000	6,72,000
Hardware upgradation	2,30,000	-	2,30,000
Satellite Data/Data	MOSDAC		
Consumables & Supplies	50,000	50,000	1,00,000
Internal Travel	30,000	30,000	60,000
Contingency	-	-	-
Others	-	-	-
Overheads	1,69,000	1,31,000	3,00,000
Total in Rs.	8,15,000	5,47,000	13,62,000

10	Whether the same or similar proposal has been submitted to other funding agencies of Government of India.	No

Details and justification of proposed items

Research Fellows (1) Budget for salaries/wages:

Fellowship	Ist Year	IInd Year	Total (in Rs)
Senior Research Fellow (SRF) (1)	28,000/month*12	28,000/month*12	6,72,000/-
Total in Rs.	3,36,000	3,36,000	6,72,000/-

Equipment (II) **List** of equipment proposed (Hardware):

Upgradation of previous hardware purchased in last project	-	1	Rs. 2,30,000/-	Rs. 2,30,000
Total			2,30,000	2,30,000

3. Consumables and Supplies (III)

	Ist Year	IInd Year	Total (in Rupees)
Consumables	25,000	25,000	50,000
Stationary	25,000	25,000	50,000
Total	50,000	50,000	1,00,000

4. Travel (IV) (only Domestic):

	Ist Year	IInd Year	Total (in Rupees)
Travel (Inland)	30,000	30,000	60,000

5. Institutional overheads

	Ist Year	IInd Year	Total (in Rupees)
Institutional overheads (in Rupees)	1,69,000	1,31,000	3,00,000

Justification

The high technical significance of the current project proposed, stresses on voluminous data processing and analysis. Concept based satellite data processing involves heavy data collection, processing and expert consultancy. The project also includes processing of MOSDAC data in various formats. The proposed approach essentially necessitates dealing with heterogeneous data formats analysis, data extraction, processing and integration from heterogeneous data sources and construction of mapping Ontology, and evolving a research methodology for concept based Meteorological data retrieval through OGC services.

Due to short duration of the project, and for speedy implementation of the project in addition to executing the project uninterruptedly, in addition to the significance and voluminous semantic data processing and testing the methodology, it is absolutely essential to procure workstations with powerful

processers, and server. The external hard disk facilitates portability of the research objects and facilitates availability of the research elements at any location to help in extending the work beyond the working hours. Further, it is very important to have an UPS for power backup due to severe power crisis in Hosur, Tamilnadu. Though there is power back up facility in the college it is only sufficient to assist the labs and other office systems. In the research domain, this becomes a great handicap to assure and assist providing the essential continuous power uninterruptedly.

The existing available systems in the department are engaged for the laboratory use to complete the academic syllabus requirements. These systems are always attached to students who are allotted a system each. Hence, it is quite difficult to engage these systems for the research project work. Exclusive availability of systems is very essential and justified to make the research more efficient, to be under the supervision and control of one SRF.

The proposed equipment and manpower is very much essential for smooth and efficient execution and timely completion of the project in view of the cutting edge front-line objectives of this important ISRO project.

Reliability of Cost Estimates: The cost estimated for the equipment and manpower is highly realistic and very reasonable as per the prevailing/current market and extensive work involved in this project. Hence, it is earnestly requested once again to seek the support and encouragement from ISRO to execute and complete the project in time, as a great opportunity and indeed a privilege to work with ISRO.

Annexure –I

Major Scientific fields of Interest

Benefits of current proposed research work (Ontology Driven Meteorology Conceptual Data):

- The project enhances meteorology data query system from product based data access to concept based data access through OGC WMS and WCS services with OGC CSW service
- The project deliverables facilitate spatio-temporal analysis of meteorology conceptual data.
- Enriches meteorology data query system from data product level to ontology conceptual level
- Disseminate ontology driven meteorology conceptual data in open and interoperable data standard using OGC WMS and WCS service, with OGC CSW service
- Common Data Model (CDM) for meteorology data
- Meteorology data can be accessed through HTTP and OPeNDAP [11] protocols
- The conceptual meteorology data can be obtained in geographical maps and NetCDF file formats
- Meteorology data can be obtained in various CRS such as (EPSG: 4326, 41001, 27700, and 3408 etc.)
- The current research work provides ontology conceptual meteorology data in NetCDF format which enable ISRO to use existing visualization techniques of ISRO to visualize ontology concept based meteorology data.

Current State of the Art: National and International Perspective

Ontology is a formal, explicit specification of a shared conceptualization [12]. It is used for conceptual modeling of a domain and knowledge representation. Ontology enables machines as well as people to understand, share and reason at execution time. Ontology is a vital semantic technology.

Many prominent researchers and organizations are working towards bring semantic technology to the meteorology domain, to:

- Reduce semantic heterogeneity in sensor vocabulary [13]
- Describe sensors and its observations [14]
- Semantic validation of meteorology data [15]
- Semantic retrieval from scientific data [16]

NASA has developed Semantic Web for Earth and Environmental Terminology (SWEET) Ontology [17]. The ontology defines 6000 concepts of various realm such as atmosphere, ocean, land surface, geo sphere etc. in 200 ontologies. The Institute of Computer Aided Automation [18] has developed an ontology that defines weather concepts. David A. McMeekin [19] listed several ontologies and vocabularies of meteorology and oceanography domain. NASA, The Climate Data Services group [20] is developing a climate ontology that describes the variables used in climate model data sets and related observational data sets. The climate ontology helps climate scientists to:

- Understand the characteristics of hundreds of variables
- Select the right ones for their analysis
- Compare results from different climate models
- Compare model results with satellite observations

Yuki Onozuka [21] developed ontology for weather observation system for different viewpoints such as operational, physical, functional and service etc. The ontology helps to visualize the weather observation data in different viewpoints and the relationship between them.

Line Pouchard et al., [22] described role of ontologies in the context of scientific grid data analysis. They presented an ontology of scientific information that defines concepts and relationship between the concepts in the Earth system domain. Thiago Silva Barbosa et al., [23] presented an approach to pre-process, organize and query high quality meteorological data using ontologies.

Sunitha Abburu and Nitant Dube et al., [24] developed a four phase methodology to: 1) Interlink the multidisciplinary and heterogeneous sensor data products 2) Address satellite data semantic interoperability. The methodology links multiple ontologies to arrive at ontology vocabulary for sensor observations.

Sunitha Abburu and Nitant Dube [25] developed an ontology driven methodology for concept based classification of satellite data. The methodology has two phases. The phase 1 defines ontology concepts through satellite observation parameters and phase 2 describes ontology concept based satellite data classification.

The Marine Metadata Interoperability (MMI) is a project funded by the National Science Foundation in 2004. MMI Provides semantic mediation framework through ontologies and vocabularies to deal with semantic heterogeneity in ocean observing systems.

The Open Geospatial Consortium (OGC) is an international consortium of over 517 companies, government agencies and universities participating in a process to develop publicly available interface standards. The standards empower technology developers to make complex spatial information and services accessible and useful with all kinds of applications [26].

The Meteorology & Oceanography Domain Working Group [27] is hosted by the OGC and co-chaired by a representative from the World Meteorological Organization's (WMO) Commission for Basic Systems (CBS). The working group aims to support the meteorological community to develop effective interoperability for web services and content across the wider geospatial domain. The group brings OGC members across the world in an open forum to work on:

- Oceanographic, meteorological and climatological data and Metadata
- Web services interoperability to improve information share and use

OGC providing continuous and significant contributions to attain interoperability in data model, publish data and exchange etc. OGC standards have been broadly adopting in Geographic Information Systems (GIS) worldwide [28]. OGC Geospatial data and processing services enables enhanced utilization of geospatial data in analysis and scientific workflows [29].
India-WRIS [30], Biodiversity Information System [31] and Bhuvan [32] are using OGC WMS service to publish geospatial data in maps that can be used in different applications.

India Meteorological Department (IMD), American Meteorological Society (AMS) , Canada Govt. Open Data Portal, Giovanni, Meteorological & Oceanographic Satellite Data Archival Centre (MOSDAC), etc. provides satellite data products for various scientific applications. NASA provides ontology-driven interactive search environment for Earth Science (ODISEES). It describes the meteorology data products using ontology concept hierarchy and facilitate data product search using ontology concept nomenclature. WMO provides satellite data for a simple taxonomy of concepts. For the first time in the world the current research brings:

- Ontology driven meteorology conceptual data
- Meteorology conceptual data dissemination through OGC WMS and WCS services with OGC CSW service

Annexure –II
(Approach)

Technical concepts to be used

- An OWL ontology(ies) that gives hierarchical classification of meteorology concepts
- PostgreSQL is an open source relational database will be used to store satellite observation parametric description of ontology concepts
- THREDDS Data Server (TDS) is a web server will be used to provide metadata and data access for scientific datasets
- CDM java library will be used to implement algorithms that provides Ontology Driven Meteorology Conceptual Data
- OGC CSW, WMS and WCS services will be used to provide interoperable data access for meteorology data
- Advanced web technologies will be used to develop web portal

Open Source - Platform Independent Technologies to be used in proposed work:

Technologies		Components in Proposed work
THREDDS Server		• Deploy satellite data • Deploy Ontology driven meteorology conceptual data • Disseminate ontology driven meteorology conceptual data through OGC CSW, WMS and WCS services

Common Data Model (CDM)		• Data model for:
		  ○ Satellite data
		  ○ Ontology driven meteorology conceptual data

CDM Java Library		• Parametric description • Ontology driven meteorology conceptual data creation
PostgreSQL		• Parametric description storage
PostgreSQL JDBC driver		• Store/retrieve parametric description in database
Ontology Technologies	Ontology Library	• Identify and collect relevant meteorology ontologies
	Ontology Language-OWL	• To encode selected meteorology ontologies
	JOWL-Semantic Java Script Library	• Navigate and visualize OWL ontology for parametric description
Web Technologies	HTML	• User interface design in web portal
	CSS	
	Java Script	
	jQuery	
	Servlet	• OGC CSW, WMS and WCS request building • Execute WCS request execution (NetCDF)

OpenLayers Java Script Library	• Execute WMS against THREDDS server • Tile WMS results • Visualize Tiled WMS results in Web

Methodology

- Deploy and configure meteorology data in THREDDS Data Server and bring meteorology data into Common Data Model (CDM)
- Store satellite observation parametric descriptions of meteorology concepts in an open source database
- Uses Common Data Model java library to read and process meteorology data against satellite observation parametric descriptions of meteorology concepts
- Develops algorithms to generates Ontology Driven Meteorology Conceptual Data
- Configure and deploy Ontology Driven Meteorology Conceptual Data in THREDDS Data Server
- Ontology Conceptual data catalogue generation and facilitate catalogue services to users
- Enable OGC services environmental setup
- An interface to build OGC WMS and WCS request
- Develops an interface to view WMS and WCS output on the web

Time schedule

1-3 Months	• JRF Requirement • Equipment purchase • Request for approval to access meteorology data from MOSDAC • THREDDS Data Server installation and configuration • Deploy meteorology data in THREDDS Data Server
4-6 Months	• Enable data access services on meteorology data deployed in THREDDS Data Server • Tailor existing ontologies of meteorology domain for data products • Collect scientific definitions for the concepts from meteorology dictionaries and develop parametric description to the tailored ontology concepts
7-9 Months	• Evaluation of parametric description to the ontology concepts • Design and develop a database in PostgreSQL to store parametric description to the ontology concepts • Design and develop an interface to define ontology concepts and to store parametric descriptions in database
10-12 Months	• Develop algorithms to process meteorology data and to generate Ontology Driven Meteorology Conceptual Data. • Development of web portal.
13-15 Months	• Implementation the algorithms

	• Configure the generated Ontology Driven Meteorology Conceptual Data in THREDDS Data Server to avail through OGC WMS and WCS services
16-18 Months	• Design and develop a query interface for Ontology Driven Meteorology Conceptual Data • Ontology Conceptual data catalogue generation and facilitate catalogue services to users • Design and develop algorithms to build and execute OGC WMS and WCS request on Ontology Driven Meteorology Conceptual Data
19-21 Months	• Implementation of the algorithms • Visualization of OGC WMS and WCS output in the web
22-24 Months	• Product testing • Report preparation and submission

Annexure –III

Database and Analysis

Thredds data server will be used to store and process meteorology data.

PostgreSQL will be used to store satellite observation parametric description of ontology concepts.

One-week meteorology data for the specified satellite data products and ontology concepts will be considered for the research.

ISRO expert's assistance is required for the following:

- Ontology concepts description using various satellite data parameters
- To evaluate satellite parametric description of ontology concepts
- To integrate satellite data products of different kind and resolutions.

Data Products

A sample of below data products (see table 1) will be processed and transformed to derive the ontology driven meteorology conceptual data (satellite, sensor and products).

Satellite	Sensor	Data Products
INSAT-3D	IMAGER	Sea Surface Temperature (SST)
		INSAT Multispectral Rainfall (IMR)
		Outgoing Longwave Radiation (OLR)
		Upper Tropospheric Humidity (UTH)
		Winds (IRW)
		Visible Winds (VSW)
		Water vapour winds (WVW)
		Mid IR Winds (MRW)
		Cloud Mask (CMK)
		Hydro Estimator Precipitation (HEM)
		IMSRA(Improved)-Precipitation (IMC)
		Land Surface Temperature (LST)
Kalpana-1	VHR	Multispectral Rainfall (IMR)
		Outgoing Longwave Radiation (OLR)
		Quantitative Precipitation Estimates (QPE)
		Atmospheric Motion Vector (AMV)
		Sea Surface Temperature (SST)
		Brightness Temperature (BRT)
		Land Surface Temperature (LST)
		Wind (WND)
		Upper Tropospheric Humidity (UTH)

Table 1. Satellite, sensor and data products

Ontology Concepts

Table 2 shows few ontology concepts and sub concepts of Meteorology [33]. The project delivers a software component that disseminates ontology driven meteorology data for the below concepts through OGC WMS and WCS services, for the sample data.

Concept	Sub Concept
Wind	FreshBreeze
	FreshGale
	GentleBreeze
	LightAir
	LightBreeze
	LightWind
	ModerateBreeze
	ModerateGale
	NoWind
	Storm
	StrongBreeze
	StrongGale
	ViolentStorm
	WholeGale
	Wind Chill
	Slight Breeze
	Hurricane type1
	Near Gale
	Hurricane type2
	Hurricane type3
	Hurricane type4
	Hurricane type5
Precipitation	HeavyPrecipitation
	LightPrecipitation
	ModeratePrecipitation
	NoPrecipitation
Temperature	AboveRoomTemperature
	AboveZeroTemperature
	BelowOrZeroTemperature
	BelowRoomTemperature
	ExtremeFrost
	ExtremeHeat
	Frost
	Heat
	RoomTemperature
	exceptionally warm
	very warm
	warm
	moderately warm
	transitional (frostthaw)

	moderately frosty
	frosty
	very frosty
	exceptionally frosty
	extremely frosty
Cloud	MostlyCloudy
	NoCloudCover
	Overcast
	PartlyCloudy
	UnknownCloudCover
SolarIrradiance	HighSolarIrradiance
	LowSolarIrradiance
	ModerateSolarIrradiance
	NeglectibleSolarIrradiance
Humidity	DryHumidity
	MoistHumidity
	OptimumHumidity
Rain Fall	HeavyRainFall
	Light
	Moderate
	VeryLight
UV Index	Extreme
	Very High
	High
	Moderate
	Low
Weather State	Airing Weather State
	Cooling Weather State
	Fair Weather State
	Heating Weather State
	Humidifying Weather State
	Neutral Weather State
	Rainy Weather State
	Snowy Weather State
	Sever Weather State
	Sunny Weather State
	Thunder Storm

Table 2. Few concepts and sub concepts of meteorology

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- American Meteorological Society, DataStreme Atmosphere, http://www.ametsoc.org/amsedu/dstreme/
- Canada Govt., Open Data Portal, http://open.canada.ca/data/en/dataset
- Giovanni, http://giovanni.gsfc.nasa.gov/giovanni/
- Meteorological & Oceanographic Satellite Data Archival Centre (MOSDAC), http://mosdac.gov.in/
- Advanced Research and Applications with NASA Climate Model Data, http://cmdb.nccs.nasa.gov:8080/odisees/index.html

- WMO, Advanced search, http://www.wmo-sat.info/product-access-guide/advanced-search
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- Weather Ontology, https://www.auto.tuwien.ac.at/downloads/thinkhome/ontology/WeatherOntology.owl

Annexure – IV

(Available institutional facilities)

Hardware Details
Total Number of Systems: 249 + 2
Total Number of Servers: 2+1

Configuration 1: (18 HP SYSTEMS)
HP, Intel(R)
Core™ i7-3770 CPU @
3.40GHz, 12.0GB,
Monitor 18.5 LED(HP)

Configuration 2: (120 HP Systems)
HP, Intel(R)
Core™ i7-3770 CPU @
3.40GHz, 12.0GB,
Monitor 18.5 LCD(HP)

Configuration 3: (111 DELL Systems)
Intel i3 Processor @ 3.10 Ghz
4 GB RAM
320 GB Hard Disk
18.5' LED Monitor

Configuration 4: (2 Servers)
HP Server PROLIANT
Intel Pentium Xenon Dual Core @ 3Ghz
512 MB RAM X 2
DVD RW Drive

Configuration 5: (1 Sun Server)
SPARC Processor @ 143 Mhz
64 MB RAM
1.44 Floppy Disk Drive
2.1 GB X 2 SCSI Hard Disk
17' SVGA Monitor

Software Details
Operating Systems:
Windows 2003 Server
Windows 95 / 98 / 2000 / Xp
Windows NT Workstation 4.0
SCO Open Server R5
MS-DOS 6.22
Linux 8.0

Application Software:
Microsoft Ms office XP
Ms Windows
Ms Windows OS Upgrade
Ms Core CAL
MS Visual Studio
Java Development Kit

Java Server Development Tool Kit

System Software:
- Power Builder 5.0
- Delphi Ver 3.0
- Acrobat Reader
- QMF for Windows for DB2 WS
- Application Developer for Windows
- Visual Age Java for NT and 2000
- Borland C++/Turbo C++
- Borland Visibroker

Multimedia Software:
- Adobe Photoshop
- Adobe Pagemaker
- Macromedia Studio MX
- Macromedia Director MX

Testing Tools:
- Rational Rose Enterprise Edition

Internet Tools:
- NET Package
  - Visual Studio .NET
  - Visual C++ .NET
  - Visual c# .NET
- Websphere Application Server for NT and 2000
- Websphere studio 3.5

Database Software:
- Oracle 9i
- Oracle Internet Developer Suite (Alt to D2k)
- Developer 2000
- DBASE
- FoxPro for DOS
- MS SQL CAL
- DB2 connect Personal Edition
  - OLAP Starter Lit
  - Admin Clients
  - Universal Developer Edition
  - Universal Database

Other Equipment Details
Total Number of UPS: 4
- 15 KVA X 2
- 20 KVA X 2

Total Number of Smart Boards: 1

Total Number of LCD Projectors: 2

c)	Declaration (Format-C).

Form C
Declaration

I / We hereby agree to abide by the rules and regulations of ISRO research grants and accept to be governed by all the terms and conditions laid down for this purpose.

I / We certify that I / We have not received any grant-in-aid for the same purpose from any other Department of the Central Government / State Government / Public Sector Enterprise during the period to which the grant relates.

	Signature & Name	**Designation**
Principal Investigator	Dr.Sunitha Abburu	Prof. & Director, Dept. of Computer Applications Adhiyamaan College of Engineering
Head of the Department / Area	Dr.Sunitha Abburu	Prof. & Director, Dept. of Computer Applications Adhiyamaan College of Engineering
Head of the Institution	Dr.G.Ranganath	Principal Adhiyamaan College of Engineering

8.	I/We have carefully read the terms and conditions for ISRO Research Grants and agree to abide by them. It is certified that if the research proposal is approved for financial is approved for financial support by ISRO, all basic facilities including administrative support available at our Institution and needed to execute the project will be extended to the Principal Investigator and other Investigators.

Name	**Institution**	**Designation**
Principal Investigator		
Dr.Sunitha Abburu	Adhiyamaan College of Engineering	Prof. & Director, Dept. of Computer Applications
Co-Investigator(s)		
Dr.Ramya Durai	Adhiyamaan College of Engineering	Associate prof, Dept. of CSE
Head of the Department/Area		
Dr.Sunitha Abburu	Adhiyamaan College of Engineering	Prof. & Director, Dept. of Computer Applications
Head of the Institution		
Dr.G.Ranganath	ACE,Hosur,Tamilnadu	Principal