UGC Special Assistance Programme for Departmental Research Support - Phase-I
(UGC SAP DRS- I) (Order No. F.530/5/DRS/2009 (SAP-I))
University Grants Commission, New Delhi, Govt. of India

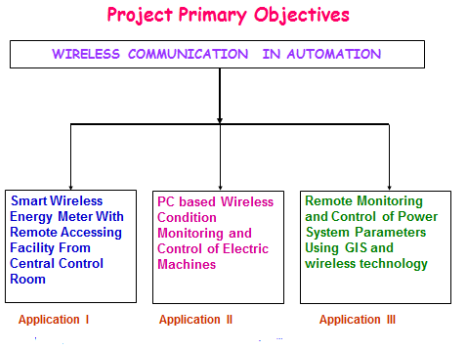
Project Title:

Development of Remote Monitoring, Analysis and Control of Electrical Machines and Power System Using Smart Wireless Communication Technology

Theme of the project: Remote Communication Systems

1: Primary Objectives

Under the approved thrust area "Remote Communication System", three application areas were chosen as shown below.



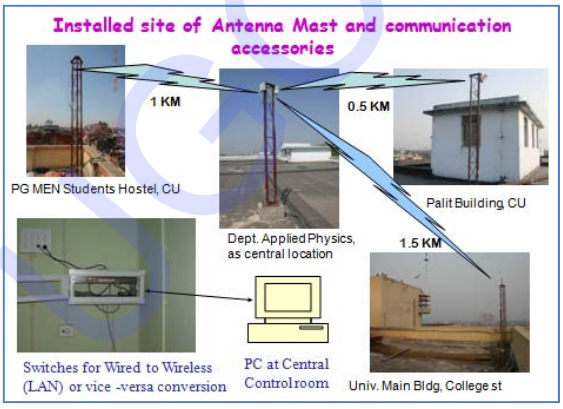
2: Objective (Application Area-I)

Development of a wireless digital energy meter or Watt-hour meter

- Measurement of the consumed energy, both active and reactive part
- Wireless Connectivity of the meter with a centralized control room
- Storage of the amount of energy consumption with real time

Achievements made with break-through and innovations

- International Journal Paper published – 55
- Circuit design, PCB design, wireless ZIGBEE module and studies on FPGA, Calibration of energy meter
- Four Antenna Masts have been installed in rooftops of four buildings in three campuses of our University
- W-LAN between the energy meters of all three campuses and the Dept. has been established. Load Pattern of all Campuses is visible from SAP Lab
- VB and VB.NET based software front end GUI and back end to manage the wireless network for collection of energy meter data, their analysis and management
- The EMS software is loaded in our own server



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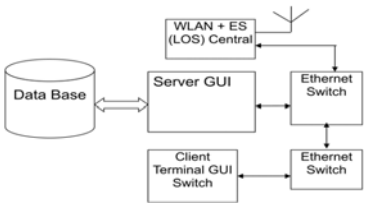
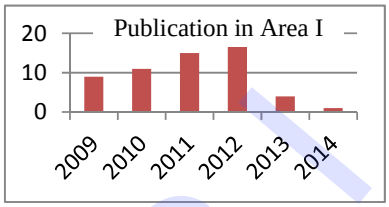
Energy Management Software (EMS)

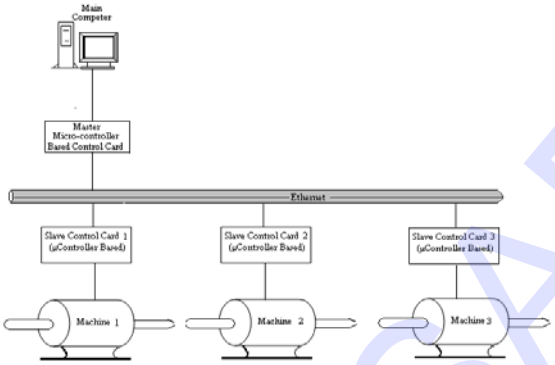




AREA II: PC based Wireless Condition Monitoring and Control of Electric Machines

Objective:

- Measurement and control of various parameters of an electric machine
- Condition Based Monitoring for predictive maintenance (CBM)
- Development of a state-of-the-art stand alone smart card per machine.
- Wireless tie-up of these cards with a central control room for remote access , control and condition monitoring of the machines



Scheme of the multi-machine monitoring system

Achievement:

- International Journal Paper published –43
- PCB design for DHU, Interfacing with three machines, wired network with RS485 and wireless IEEE 802.15.4 module. Laboratory Prototype is in working condition**.**
- VB based software to monitor and control the machines through DHU using RS485 protocol and addition of encryption algorithm for data security and compression

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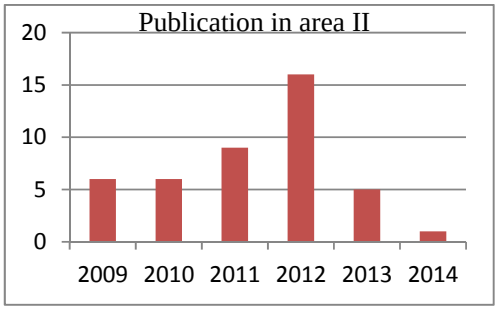
Few Snapshots of Development

Hardware setup for Electric machine monitoring system

Dedicated Hardware Unit (DHU) for Machine Monitoring

Test Bench of DHU with machines and GSM unit



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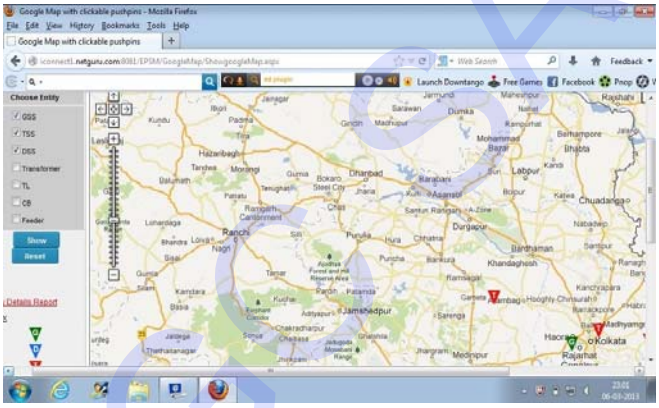
AREA III: Remote Monitoring and Control of Power System Parameters Using Geographical Information System and Wireless Technology

Objective:

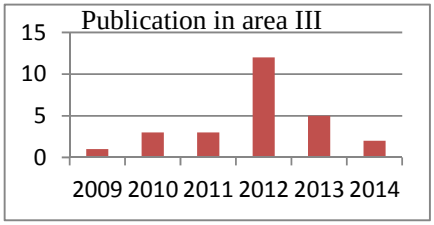
- Interlinking of electrical power system equipment and/or parameters with the Geographical Information System (GIS)
- Establishing wireless connectivity of these acquired data with a remote central station
- Centralized monitoring and control of these equipment from any remote location

Specific Achievement

- International Journal Paper published – 25
- Utilization of ARCGIS software and Google Map for the development of distribution artwork of Departmental electrical layout using Mapview and interfacing of electrical parameters with this software
- Software has been developed to locate different Generating stations and substations at different places of West Bengal.
- Levels have been created to reach different equipment in those stations. On-line demonstration of a model has been made.
- This is the stepping stone towards establishing a GIS based system monitoring scheme.
- A power system restructuring algorithm simulation software (MATLAB based) is developed.
- The algorithm is tested by adopting a load flow analysis based on the geo-referenced data collected from four different buses manually.



GIS based software



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Overall Technical Achievements:

- **Hardware development :**
  - Prototype developments of Energy meter, DHU, DAS for GIS
- **Software development :**
  - Energy Management System for AMR
  - Power System monitoring using GIS
  - Multi Machine Monitoring Software
- **Memorandum of Understanding (MOU): with Landis + Gyr**
- **Patent Applied For : two**
- **Software Copyright : one**
- **Technology Transfer: One Under process**

Few Snapshots of MoU with Landis + Gyr India on 4th July, 201

Report on Seminar held on July 27, 2013

Practices of Power Transmission Technologies: An Overall Scenario

Inaugural Session

Inaugural Speech

One of the Technical Sessions

Section of Audience

Report on International Conference CIEC14 held on 31st Jan-2nd Feb, 2014

Control, Instrumentation, Energy and Communication

Inaugural Session

One of the Plenary Speech

One of the Technical Sessions

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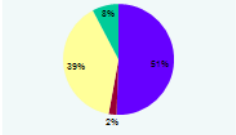
Research Publications : 2009-2014



Total Number of Publications:259

1 - International Journal
2 - National Journal
3 - International Conference
4 - National Conference