

**A Novel En-route Filtering Schema against False Data Injection Attacks in
Cyber-Physical Networked Systems**¹Pooja Buchake, ²Prajakta Bhosale, ³Chaitrali kamble, ⁴Shruti Lal^{1,2,3,4}Department Of Computer Engineering,AISSMS,Pune,Maharashtra,India

Abstract — AMR (Automatic Meter Reading) concept is developed in which automatic collection of readings, transmission and sending bill to customer is done easily. In today's scenario area decided for the energy provider employee to take the meter reading in terms of snapshot of meter and submits these photos to the main office which are used to read the readings and accordingly bill is generated but in this whole process due to human intervention accuracy is not achieved. AMR is used efficiently a chip is used in back of energy meter of each house will capture the reading of meter when it gets command to get reading and send this data to energy provider office wirelessly where it undergoes pre-processing and recognition of digits which are further used for generation of bill.

Keywords: Cyber-physical networked system, Sensor network, AMR.

I. INTRODUCTION

In these days in every sectors, there are number of customers which use the electricity but they are not satisfied with the services provided by power distribution companies, also electricity authority & the government realizes problems occurring in the existing transmission network, such as increasing cost due to poor operational efficiency, environmental impacts and an ongoing demand for energy. Nowadays worker after liveliness worker drives each household and receipts the photo of tempo owing toward which time compulsory upsurge for photo of each household meter interpretation. All these photos have to submit at main workplace and the pattern interpretations are protected by other operative of vigor dealers to brand control mouth. In this whole procedure physical errors may income place. Greatest of the period if entrance is locked for additional months the previous months pattern interpretation regular is taken as a understanding through power panel consequently the customer expressions the problematic of modifying that advertisement after workplace. Therefore the scheme has intended an vigor pattern to simplicity the effort of together operators by way of glowing as majors.

II. LITERATURE SURVEY**Paper Name: Automation of Electricity Billing Process**

Author: Manisha V Shinde, Pradip W Kulkarni

Meter reading is done for the electricity, gas or water consumption where meter is used to record the consumption of this energy. Here we will focus more on electricity which is very essential in day to day life. In this paper AMR (Automatic Meter Reading) concept is developed in which automatic collection of readings, transmission and sending bill to customer is done easily. This AMR technology mainly saves utility providers expense of periodic trips to each physical location to read a meter, so that efficiency, reliability and effectiveness increases. AMR is used efficiently as camera fixed in front of energy meter of each house will capture the image of meter when it gets command to capture and send this image to energy provider office wirelessly where it undergoes pre-processing and recognition of digits which are further used for generation of bill. This bill is again send to the respective meter owner as a massage using GSM module.

Paper Name: Negotiation-Based Task Scheduling and Storage Control Algorithm to Minimize User's Electric Bills under Dynamic Prices

Author: Ji Li, Yanzhi Wang, Xue Lin, Shahin Nazarian, and Massoud Pedram

Energetic dynamism valuing remains a talented method cutting-edge the Keen Network toward ease the incongruity amid energy group and ingesting. Vigor customers remain incentivized towards form their control stresses, or additional exactly, timetable their electricity-consuming requests (tasks) additional sensibly to decrease their electronic advertisements. This takes developed a mostly motivating problematic by the obtainability of housing photovoltaic (PV) control group services and manageable liveliness storing schemes. In this paper it give a talk to the problematic of pooled

charge preparation and drive storing regulator for dynamism customers through PV and vigor storing services, in instruction to minimalize the power advertisement. Correspondingly the cooperation based method has been planned aimed at combined assignment development and energy storing regulator that is Field-Programmable Gate Array (FPGA) course-plotting algorithms. In this procedure all repetition, is rips-up and re-schedules completely responsibilities underneath a immovable storing switch arrangement, and formerly originates a novel charging/discharging scheme for the drive storing founded happening the newest undertaking preparation.

Paper Name: HDL Implementation of Prepaid Electricity Billing Machine on FPGA

Author: Nidhi Gaur, Ashutosh Gupta, Anil Kumar Sharma, Rahul Malviya

In this paper an interactive interface has been designed to make user interaction with the system at runtime using prepaid electricity billing machine (PEBM). Power analysis of the system is done with Xpower Analyser tool which shows a total power consumption of 0.034W.

Paper Name: Software Agents Based Home Automation An Intelligent Electrical Billing and Maintenance System

Authors: R.G.Yadawad, U.P. Kulkarni, S.M. Joshi, J.V.Vadavi, A.R.Yardi

In this paper author proposes a novel computing model to achieve an autonomous environment for home automation. A model is based on agent technology in which agents are assigned certain tasks to achieve. The architecture is portable, flexible and can easily integrate with other architectures.

III. PROPOSED SYSTEM

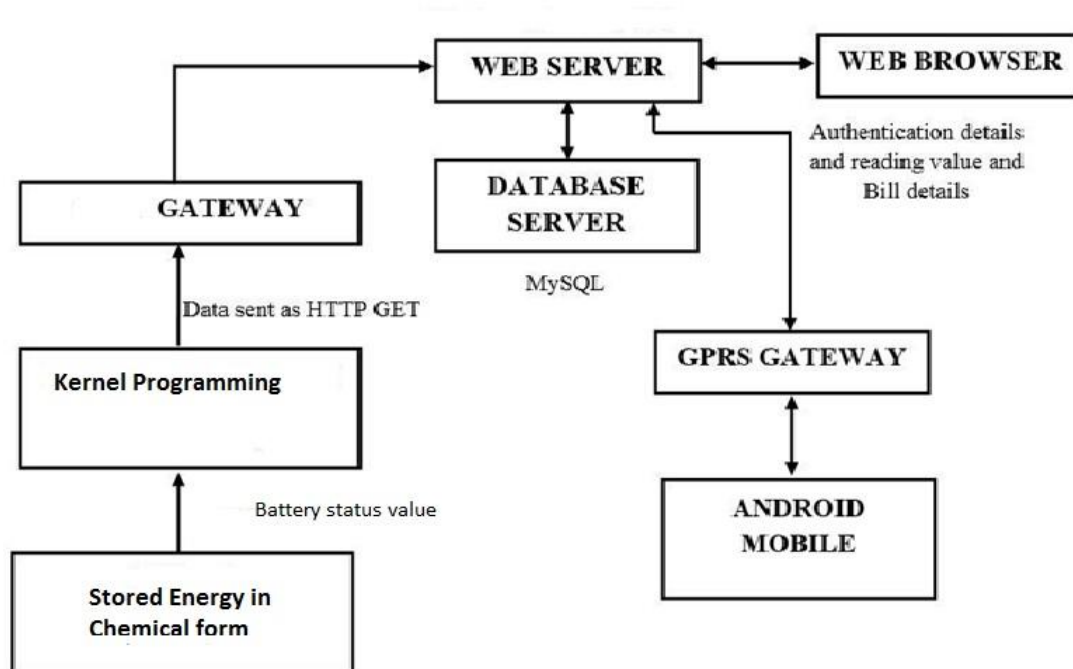


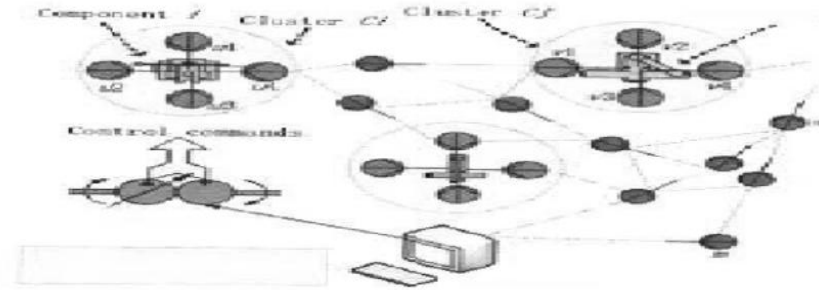
Figure 3.1: Proposed system

The above diagram shows the proposed system architecture for billing generation process, first of all the system will take energy from computer battery which is stored in chemical form using kernel programming. The battery Status will be send to the server via gateway, web server will update the database server and user may access from the web browsers. User may access web server from the android phones using the GPRS gateway.

IV. RESULTS

A Novel En-route Filtering Scheme against False Data Injection Attacks in Cyber-Physical Networked Systems

[Home](#) [Registration](#) [User Node](#) [Cluster Head](#) [Controller](#)



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Network User Login

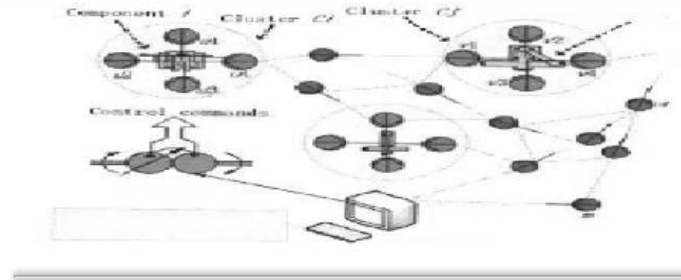
Username

Password

A Novel En-route Filtering Scheme against False Data Injection Attacks in Cyber-Physical Networked Systems

A Novel En-route Filtering Scheme against False Data Injection Attacks in Cyber-Physical Networked Systems

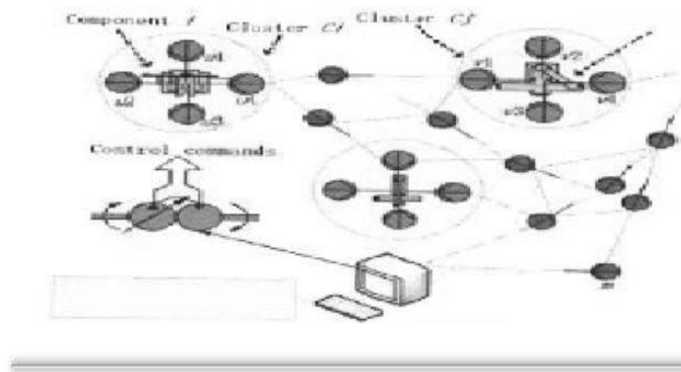
Home PC Status Lift Status CCTV Status Fix Lift Fix Cam Logout



A Novel En-route Filtering Scheme against False Data Injection Attacks in Cyber-Physical Networked Systems

A Novel En-route Filtering Scheme against False Data Injection Attacks in Cyber-Physical Networked Systems

Home All Cam Status Logout

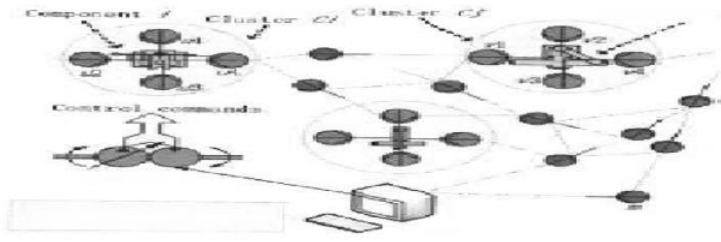


Cam-6	Working
Cam-5	Working
Cam-4	Working
Cam-3	Working

A Novel En-route Filtering Scheme against False Data Injection Attacks in Cyber-Physical Networked Systems

A Novel En-route Filtering Scheme against False Data Injection Attacks in Cyber-Physical Networked Systems

Home System Status Add Fault Logout

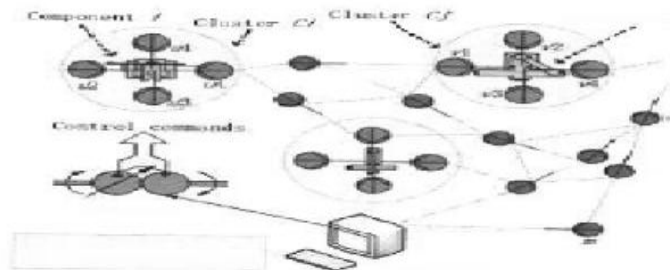


BatteryLife 53%
BatteryLeft Unknown
BatteryFlag Charging
ACLineStatusOnline
BatteryFull Unknown

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Home PC Status Lift Status CCTV Status Fix Lift Fix Cam Logout



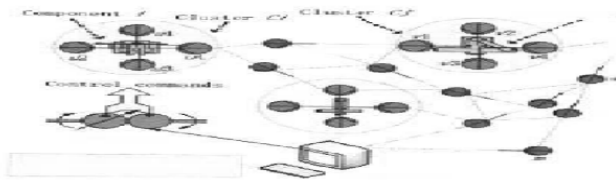
Name	Status
Cam-2	Ground Loop
Cam-1	Report is Recovered
Cam-6	Working
Cam-5	Working
Cam-4	Working
Cam-3	Working

CCTV is suffering from Ground Loop problem
CCTV is suffering from Report is Recovered problem

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[Home](#) [System Status](#) [Add Fault](#) [Logout](#)



Add Lift Fault

Lift-1 ▾

Not Working ▾

Add Cam Fault

Cam-1 ▾

Electrified Surface ▾
Electrified Surface
Ground Loop
Power Supply
Infrared Cut Filter

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Network User Login

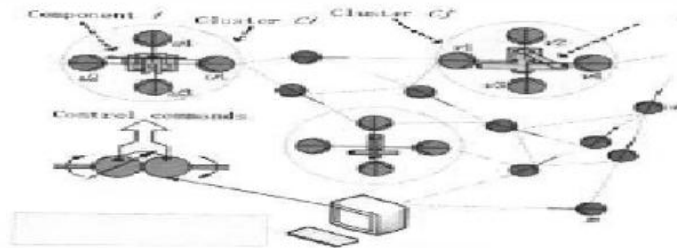
Username

Password

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Home System Status Add Fault Logout



Add Lift Fault

Lift-1 ▾

Not Working ▾
 Not Working
 Overload
 Door Lock

Add Cam Fault

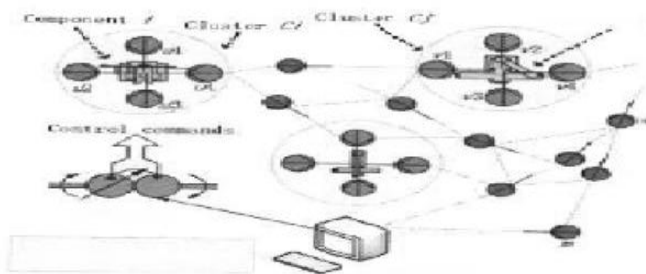
Cam-1 ▾

Electrified Surface ▾

Submit

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Home PC Status Lift Status CCTV Status Fix Lift Fix Cam Logout



Name	Status	
Lift-3	Overload	Lift is suffering from Overload problem Solve Problem
Lift-6	Report is Recovered	Lift is suffering from Report is Recovered problem Solve Problem
Lift-5	Report is Recovered	Lift is suffering from Report is Recovered problem Solve Problem
Lift-4	Report is Recovered	Lift is suffering from Report is Recovered problem Solve Problem

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CONCLUSION

Live Electric Meter Reading and Billing system is successfully implemented using existing Electronic Energy Meters where GPRS is used as the communication medium to get the values of the meter. The earlier versions had used SMS as the communication medium; however the current implementation uses GPRS which reduces the cost of communication and enables frequent updates of the readings. The proposed system avoids electricity theft to a large extent and also makes the energy meter tamper proof. This system also helps the users to be aware of their energy consumption. The information is transmitted to the EB server using GSM/GPRS modem on GSM network using direct TCP/IP connection with EB server through GPRS. EB server uses PHP scripts to get the values from the energy meter and stores this information in database. This information is available to authorized users of the system via website over the internet or using mobile application.

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