Society for Promotion of Excellence in Electronics Discipline

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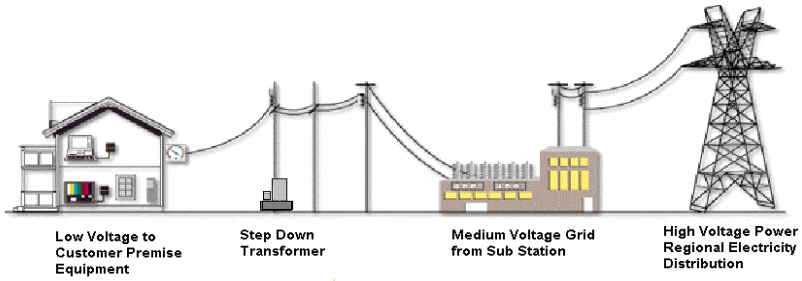
SPEED e- NEWSLETTER

Main Article

Power Line Communication

- An Emerging Technology

Power Line Communication (PLC) is identified as a technology which utilizes existing Power Lines for transporting data. The power cables connected to electrical or electronics systems can be used for providing power as well as control or retrieve data in a half/full duplex manner.



Power Line for communication offers several advantages:

- No need for installation of new wires for communications purposes,
- Total cost reduction of new installation of PLC system accounting to saving cost of new wires and saving labors charges,
- Availability of Power Line outlet/ socket makes PLC technology flexible.
- Regarding the industrial uses, because of the place limitation and environment limitation imposed by the infrastructure of factories and power plant, new installation of extra wiring for monitoring purposes present several difficulties.

Based on the nature of band, PLC can be broadly classified as: **Narrowband PLC** technology and Broadband **PLC** technology. Narrowband PLC technology works at lower frequencies 3 to 500 KHz, lower data rate up to 100kbps, and has range of operations up to 50 kilo meters and can be extended using repeaters. The broadband PLC technology can work at higher frequencies from 1 to 250 MHz, with higher data rates up to 500 Mbps and used for shorter range applications.

AC-PLC technology has been used in many applications for example,

- Low data transfer rate applications applied in smart home, automation system, remote metering for electricity billing and light controlling system.
- Also recently concerning high data transfer rate it has been used in internet web.

Further, DC –PLC technology has been essentially used in cars, trains and aeroplane.

Electricity boards can use PLC for Automatic Meter reading (AMR) as well as for remotely controlling the equipments across the grid. Low data rate PLC is also finding applications in Home automation and car automation. Narrow band PLC is gaining widespread attention due to its applications in Smart Homes, Smart Cities and Smart Grid. It is also useful for smart energy generation such as micro inverters for solar panels.

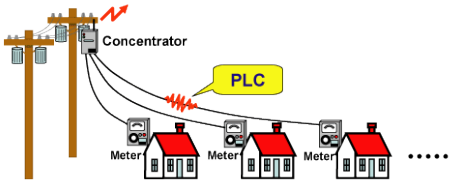
With the advancement in the broad band PLC technology, higher data rate chips that allow several Mbps data rate are providing solutions to integrate telephone, internet, video and multimedia applications for smart homes.

IEEE working group P1901 is working on the standardization PLC and handling the issues of interoperability and coexistence of different PLC device on a common electrical network.

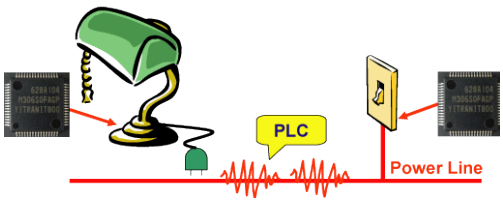
PLC : Power Line Communication

Power line as Physical media for communications

◆AMR (Automatic Meter Reading)



◆Home Network



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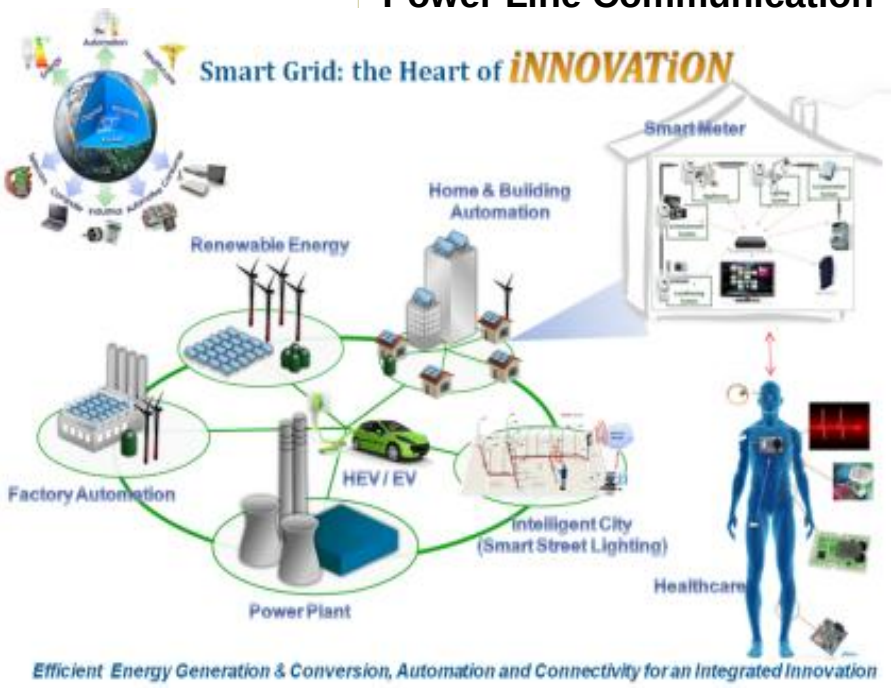
INSIDE THIS ISSUE:

Power Line Communication - An Emerging Technology



PLC systems are designed separately for indoor and outdoor power lines. The indoor i.e. the customer premise network is a low voltage (LV) distribution network normally helpful to convert it as Smart home or Smart office. Whereas the outdoor power line network is usually a medium voltage distribution network spread over several buildings for access to the backbone data network.

PLC (power line communications) technology can also provide universal-connectivity. It helps anyone to connect just about anything that plugs into a wall socket to each other and to the internet. Smartness in connectivity and access from anywhere as well as any time through broadband access to homes are the key features of future ready PLC.

PLC can change our lives at home through various means

- High-speed, always on Internet access
- High-quality streaming video/audio
- Voice-over-IP and low-cost telephony services
- Real-time security monitoring/reporting
- Networked energy management
- Online communication between smart appliances
- The ability to control appliances remotely by email/phone/PDAs etc.
- A variety of content services such as weather and other promotional information

"We love those subjects which we understand and later work on it."

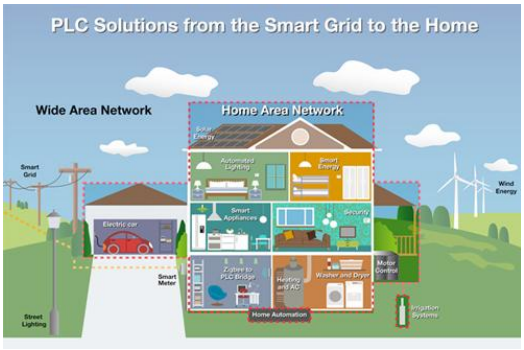
-N. M. Kulkarni

For power distribution company can perform many

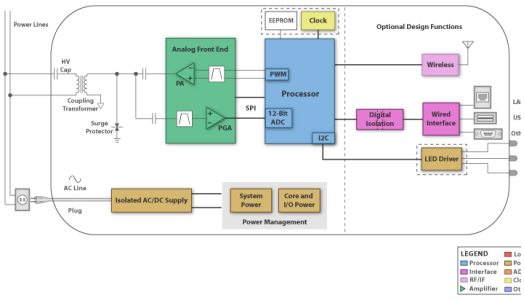
- Real-time automated meter reading
- Fault detection and location/outage reporting
- Load switching/balancing
- Power quality monitoring
- Protection against tampering
- Substation-to-substation communications

With the implementation of PLC technology, Power Distribution Company or private organizations can convert its own grid into Smart Grid with more efficient, flexible and intelligent energy distribution system.

In addition to traditional thermal and hydroelectric power, it is possible to incorporate distributed renewable energy sources like wind power or solar power. PLC can facilitate two way communications across the grid, allowing end user energy management, minimizing power failures and optimize delivery of power with load balancing.



Commercial ICs are available for power line communication applications. The manufacturer list include: Intersil, Texas Instruments, Yitran, Maxim, ST microelectronics, National semiconductors. Typical PLC modem chip block diagram include the following



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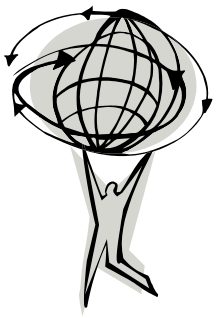
News & Events:

1. Apple claims for iphone 5
2. Electronic devices to get smaller with Spintronics
3. New touch technology – Swept Frequency Capacitive Sensing (SFCS)
4. New robot butler "HERB" can microwave your dinner (phys.org)
5. An environmentally friendly robot – that decomposes itself at the end of their mission
6. Wearable devices track people via wireless network
7. Innovative IC can't trap lightening but can let you know it's coming



"Let us work towards Excellence in Electronics for the betterment of society"
-N. M. Kulkarni

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1. Patron Members	10,000
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3. Ordinary members	500 (per year)
4. Student	200 (per year)

Membership drive Months – March 2012 & April 2012

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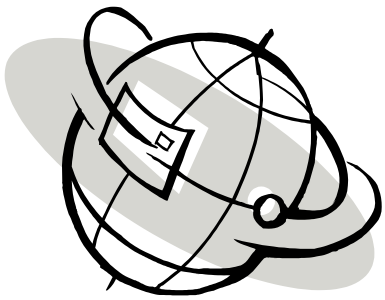
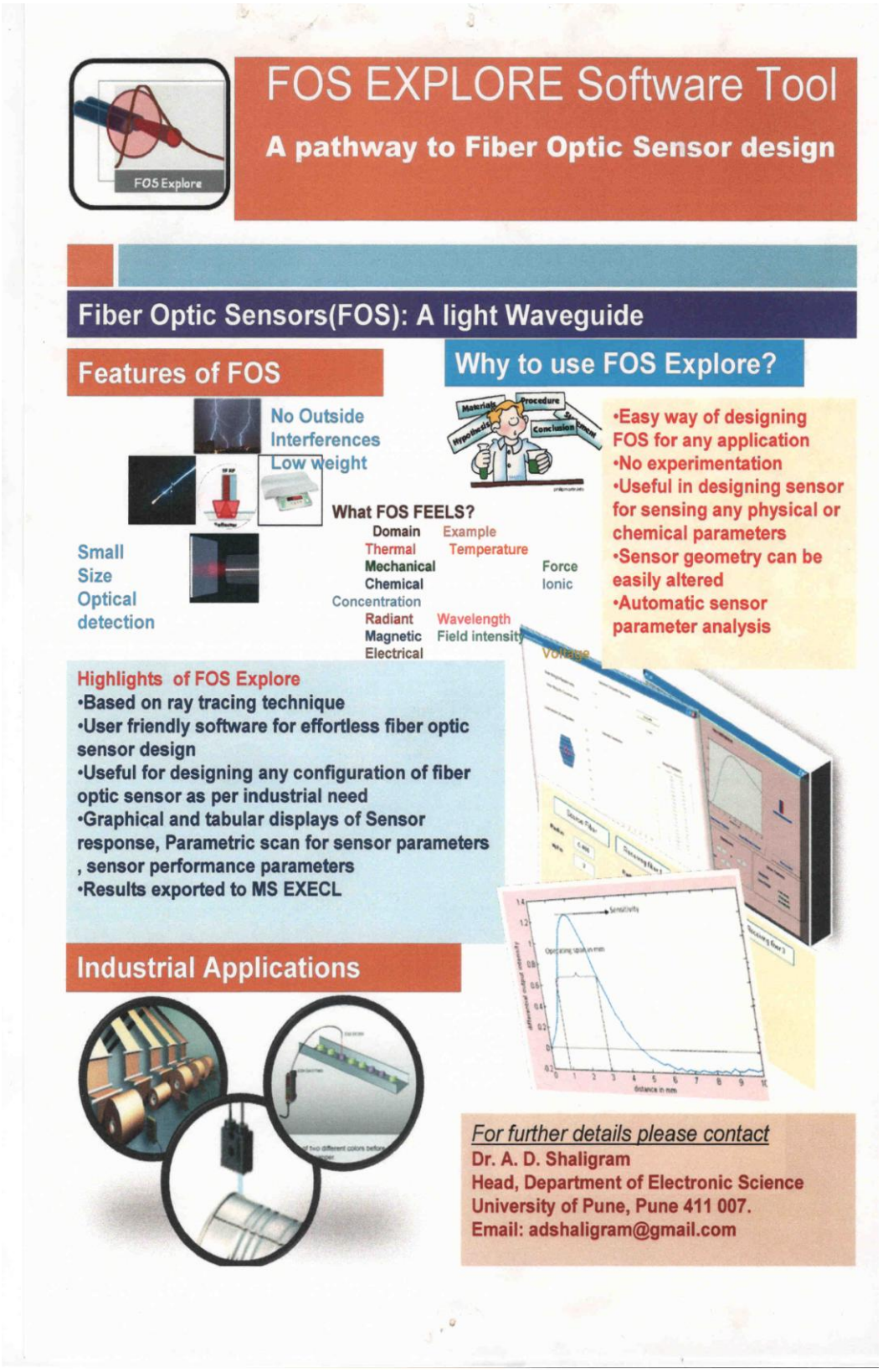
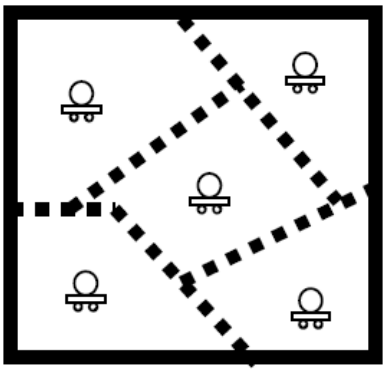




WSN Planner Version 1.0



Released on
Auspicious occasion of **Gudhi Padva**, March 23rd, 2012.

Developing Team:
Mrs. Neha R. Deshpande
Mr. Amod P. Rale
Mentor: Professor A.D.Shaligram

Wireless Sensor Network Planner simulation tool is developed in the Department of Electronic Science, University of Pune under the guidance of Dr. A.D. Shaligram. We are happy to announce the release of the first version of this planner. This planner accepts various arrangements and communication related parameters of wireless nodes from user and computes the network connectivity and coverage. It is intended to evolve as a tool to provide facility for the user to find most efficient arrangement of nodes with minimum/optimum number of nodes to cover maximum possible area.

This application simulates connectivity pattern between these wireless nodes for given parameters such as range and arrangement. This can be used for wireless sensor network deployment planning in applications such as:

- Large food grain warehouse monitoring,
- Power grid monitoring,
- Building automation,
- Monitoring animal attacks on large farms etc.

This tool is available in the Department of Electronic Science, University of Pune and prospective users/researchers are encouraged to avail this facility to support their research work in wireless sensor networks.

University of Pune

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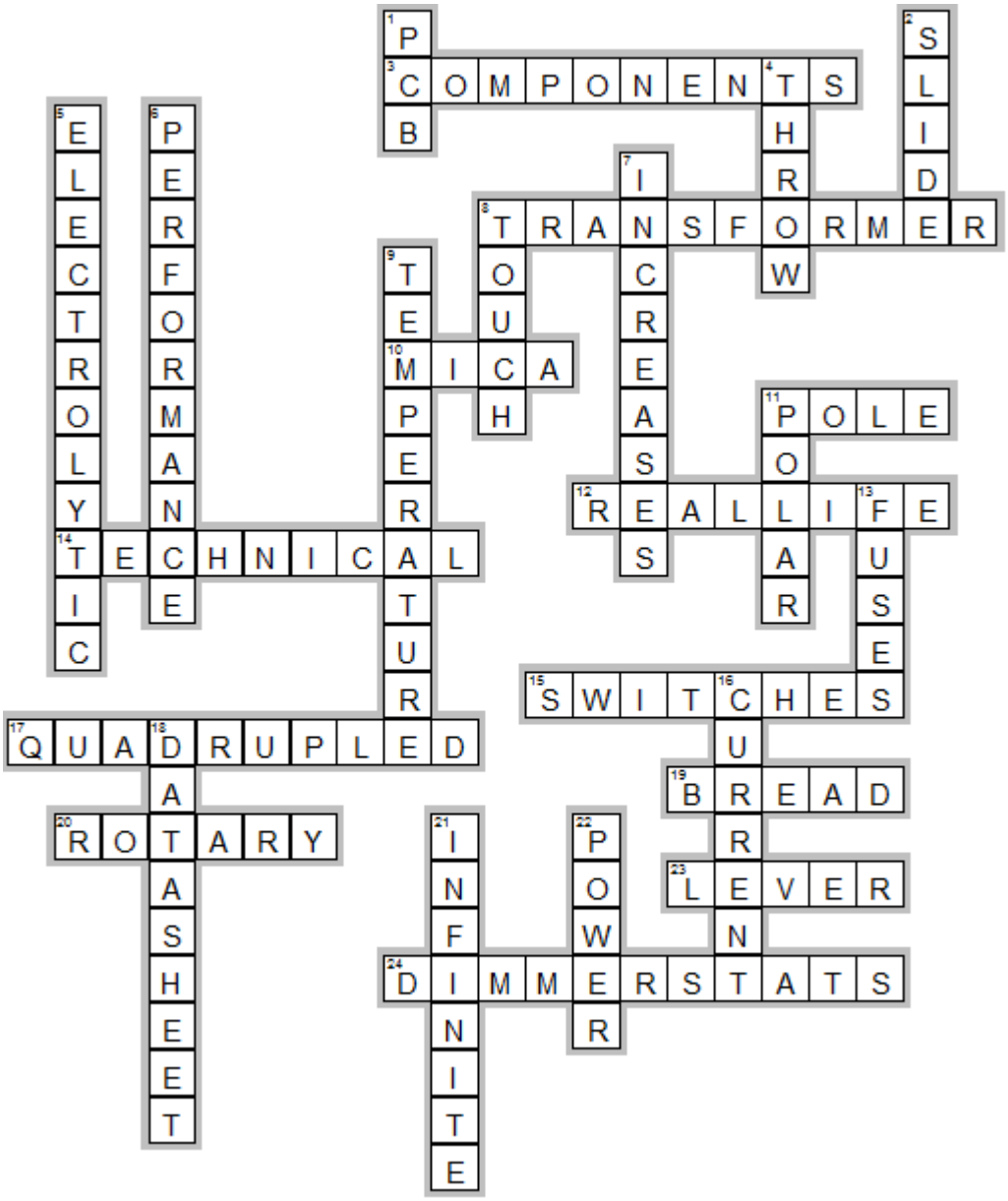
University of Pune

Answers of Cross-Word Puzzle of Apr. 2012

Electronic Components



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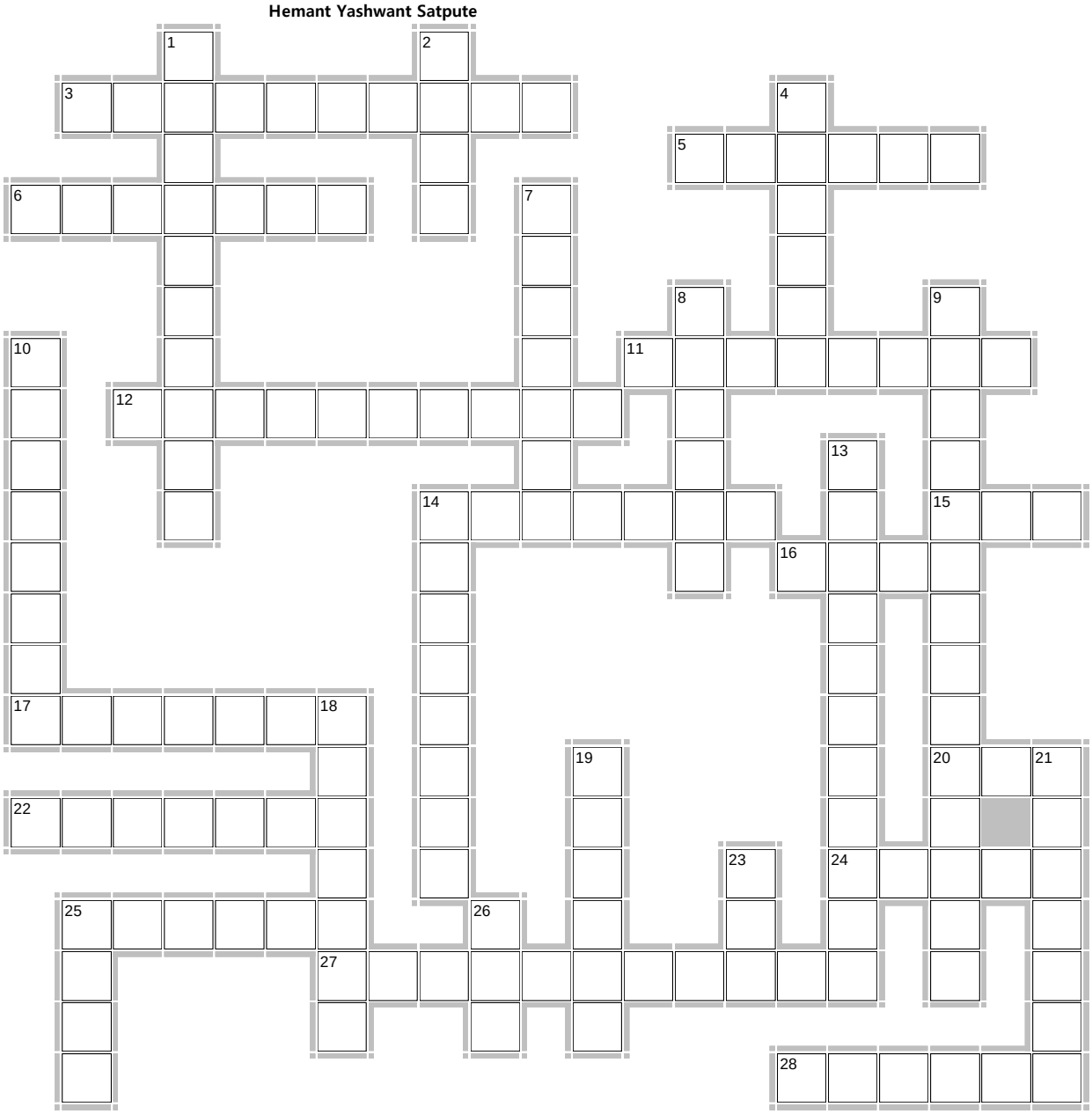
Get connected to SPEED.

We will be on the Web shortly

Student's corner: CROSS WORD PUZZLE

Crossword on Digital Counters

Hemant Yashwant Satpute



EclipseCrossword.com

Student's corner: CROSS WORD PUZZLE

Across

3. A 4 bit synchronous counter uses Flip-flops with propagation delay time of 25 ns each. The maximum time required for change of state will be ___ ns. (10)
5. The correct number of Flip-flops required to build a counter is determined by choosing the ____ natural count which is greater than the desired modified count. (6)
6. The ___ count of a counter consisting of n cascaded Flip-flops is given by 2^n. (7)
11. A counter consisting of 3 Flip-flops counts through 8 states. Hence it is known as ____ counter. (8)
12. A ring counter consisting of five Flip-flops will have ___. (10)
14. A 4 bit binary ripple counter uses Flip-flops with propagation delay time of 25 ns each. The maximum possible time required for change of state will be ___ ns. (7)
15. The number of states in a decade counter is ___. (3)
16. The minimum number of flip-flops required for a synchronous decade counter is ___. (4)
17. Mod - 8 counter can count the largest binary number 111 which has ___ equivalent of 7. (7)
20. In a ripple counter overall propagation delay time is the ___ of individual delays. (3)
22. The counter acts as a frequency _____. (7)
24. In ripple counter, there is ____ limitation. (5)
25. A mod - 2 counter followed by a mod - 5 counter is a ___ counter. (6)
27. In a counter circuit consisting of four JK Flip-flops, all the Flip-flops get triggered simultaneously. This counter circuit is a ____ circuit. (11)
28. The modulus of a counter is the total number of ___ through which the counter can progress. (6)

Down

1. In general, a ____ logic circuit consists of Flip-flops and combinational logic circuits. (10)
2. Instead of counting with binary numbers, ____ counter uses words that have a single high bit. (4)
4. The minimum number of flip-flops required for a divide by ____ circuit is 4. (6)
7. The maximum possible number of states in a ripple counter consisting of four flip-flops is ____. (7)
8. Decade counter is a ____ counter. (6)
9. Data can be changed from spacial code to temporal code by using ____. (14)
10. It is often desirable to construct counters which have moduli other than the natural counts. Such counters are said to have a ____ count. (8)
13. A counter is a special kind of register, designed to count the number of ___ arriving at its input. (11)
14. Speed of a ripple counter can be increased by using synchronous counter but with some increase in the ___. (8)
18. The ___ binary number counted by n cascaded Flip-flops has a decimal equivalent of of 2 raised to n minus 1. (7)
19. In a counter circuit, the output condition of the Flip-flop is a ____ number equivalent to the number of clock pulses received. (6)
21. A 4 bit presettable UP counter has preset input 0101. The presetting operation takes place as soon as the counter becomes maximum, i.e. 1111. The ____ of this counter is 10. (7)
23. Symmetrical square wave of time period 100 microsecond can be obtained from square wave of time period 10 microsecond by using a divide by 5 circuit followed by divide by ____ circuit. (3)
25. In ___ counter, each Flip-flop is triggered from the complementary output of the previous Flip-flop. (4)
26. Decoding gates can be used to convert ___ output of counter into decimal mode. (3)

- Prof. Hemant Y. Satpute