

OPEN SOURCE HARDWARE – An Emerging World of Opportunities

The IT world is witnessing phenomena of a kind due to massive availability of open source software, which has become an important part of software development process and has given people a wide range of choices and benefits. On parallel lines, the same is being conceptualized in hardware field also, not as an idea but as a reality. Free Open Source hardware (OSH) is relatively a new concept emerging in the world and internet is aiding in its vast spread across the trans-national boundaries. Chris Anderson in his book 'Free the future of Radical Price' has predicted that hardware is the next natural extension of the open source movement. He further writes that we are very familiar with the concept of open source software but the new idea of extending that to hardware – from circuit boards all the way up to consumer gadgets, like Google's Android phone, is just emerging.



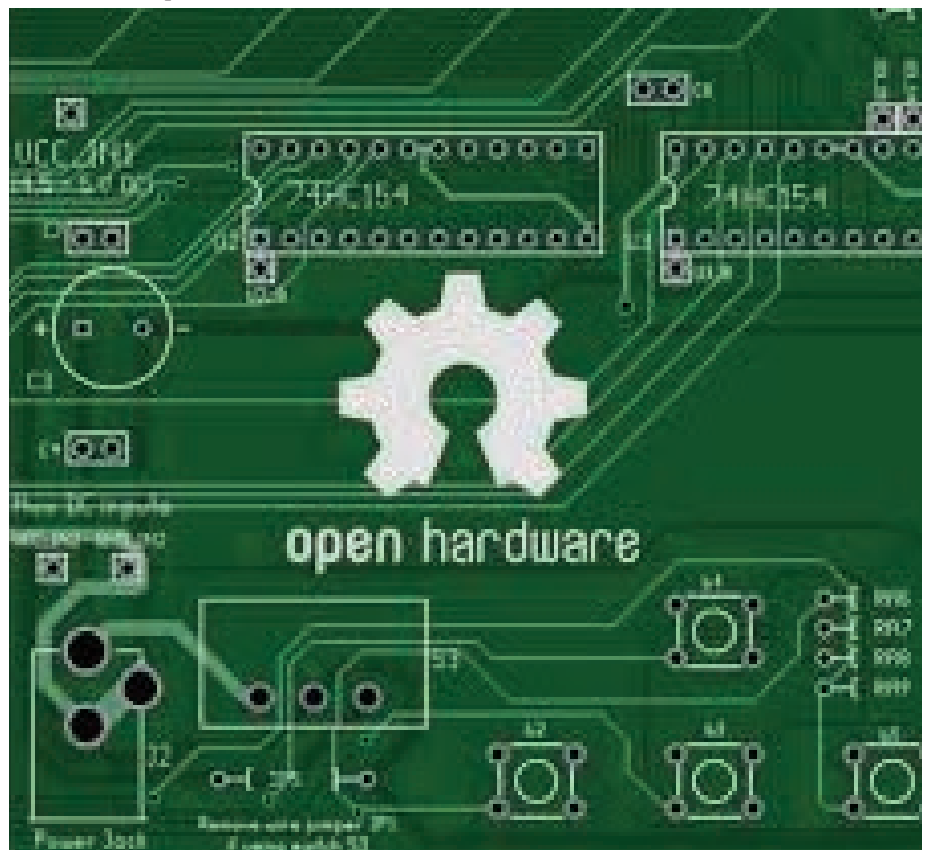
MUKESH KUMAR RALLI
Technical Director
ralli.mukesh@nic.in

Edited by Vivek Verma

Many people in this world often have good ideas and some execute them to reality but others are not lucky enough to give their ideas a definitive shape. Though there is no data to prove this ratio of unfinished to finished ideas, but it is fairly high. Due to increasing trend in the publishing of information on Internet, the information is made available for R&D and used by others (individuals/companies) to convert ideas into reality. The benefits are tremendous for all countries, particularly for developing countries that lack in R&D activities, expertise, education and

finances but with abundant availability of cheap labor, can reap the benefits to bridge the technological, educational and cultural gaps.

Open Source hardware is based on publishing of all necessary data about hardware. It also incorporates design specifications, Hardware Definition Language (HDL) files, simulations, Test Benches, Synthesis Results, utilization instructions and interfaces to other systems etc. and emerging views on openness of necessary design documentation and its disclosure to the public on the pattern of terms of GPL like licenses.



There is a budding community of companies, individuals, and groups that are actively involved in designing and creating open-source hardware. Some well-known examples include the Arduino Boards (a microcontroller development platform), Chumby (a Wifi device), MakerBot Replicator (a 3D printer), OpenFlow (easy deploying of innovative routing and switching protocols in a network).

On March 2011, CERN released the Open Hardware License (OHL) or CERN-OHL, which specifies the terms and conditions for using, copying, modifying and distributing open source hardware. The document establishes legal framework that will allow formal recognition and endorsement of open source hardware, while protecting intellectual property rights. The Open Hardware Repository (OHR) is the online venue where engineers can collaborate and share information in accordance with the OHL.

PROBLEMS & CHALLENGES

High costs of EDA (Electronic Design Tools) and its affordability issue demands development of low costing Open Source EDA tools. There is progress in this but still much more needs to be done. Alliance and gEDA are available for as Open EDA tools but need continuous improvements.

Hardware manufacturing cost is relatively expensive & prohibitive. Therefore, there is need for implementation on FPGA-based prototyping boards or simulation of

designs using formal verification techniques.

There is need to have good GPL like licenses to protect the open designs and reserve rights for original designers, according to particular terms and rules because many scrupulous manufactures place no attribution and try to remove all the identifying marks from their product.

Multi-nationals and big companies may oppose aspects of open source because that will generate alternatives for commercially protected products. Market competition is mainly based on patents and intellectual property that maintains all rights for the originator firm. However, even these companies might take advantage of open source as a way of bridging the gap for time and costs absorbed in R&D and remain in win-win situation because on one hand there will be less investment in R&D and on the other hand end-result will be cutting-edged reliable products with affordable prices.

Despite the challenges, there is an emerging consensus on the issue of open source hardware. The open source hardware can produce a whole new generation of computers and internet. Computational engines might change from traditional architecture that are based on software instructions, which execute on hardware resources into algorithm that further process hardware functions, which load and unload dynamically onto a programmable logic platform.

The future might give rise to a new internet service called 'Hardware Computing Resource Protocol' (HCRP) which would enable developers to design their algorithms, based on hardware core, and upload them on these machines that run and implement them. The open source design, open source computational resources and global networking has introduced a new era of innovative technologies and platform.

The development in this field has already begun to reap the results in the form of many open source hardware projects ranging from computer systems & components, cameras, radio, telephony, science education, machines & tools, robotics, renewable energy, home automation, medical & biotech, automotive, prototyping, test equipments, and musical instruments. However, a lot more efforts are required in this area on similar lines as has been the case with open source software. It is on the governments of developing countries to take the call and wake up and gear for the emerging opportunities in this field.

For Further Information:

*Mukesh K Ranni
Technical Director,
NIC Punjab State Centre
Chandigarh
E-mail: ralli.mukesh@nic.in*

We at Informatics constantly endeavor to make our efforts more ICT oriented and worthy. We look forward towards your encouraging feedback and suggestions to improve the content and feel of Informatics. Readers can send their suggestions/articles at the following address:

Editor-in-Chief

Room No.-375, 3rd Floor, NIC-HQ
A-Block, CGO Complex, Lodhi Road,
New Delhi- 110003
E-mail: editor.info@nic.in