F) Commissioning of mock drill setup for evaluation of network security infrastructure:

As per CERT-In (Computer Emergency Response Team, India) requirements, a mock drill setup for testing network security related preparedness at RRCAT, has been commissioned. RRCAT participated in both Layer-II and Layer-III mock drills, as carried out by CERT-In, on 19th and 20th of December 2012 respectively. Various mock drill reports were prepared and submitted to CERT-In and CISAG (Computer Installations and Security Audit group) using this setup.

G) RRCATNet Planning, Expansion and Upgradation:.

Commissioning of a new OFC (Optical Fiber Cable) segment between SCLS building and IT building has been completed. Commissioning of an alternate OFC segment between medical centre and IT building has been completed. HSL and Fabrication buildings have been added to the OFC ring.

Seven number of new network switches were commissioned (IT Extension – 24 port, C1-block – 24 port, PGH and RTSH network – 02 nos. of 48 port switch, SCLS building – 24 port, CTL -24-ports, IT Extension – 24 port). Three number of faulty switches were replaced (H-Block and Old Library- 48-port, New-Library- 24-port). Forty Seven number of new network ports were added in various buildings (AECS – 02 ports, RTS hostel – 02 ports, Indus-I extension – 05 ports, HSL – 04 ports, Store – 01 port, LFL – 02 ports, ADL – 04 ports, Indus-I – 15 ports, C1 Block – 12 ports). One ADSL (Asymmetric Digital Subscriber Line) connection was provided in Blue shed of CME laboratory area to provide network connectivity to three users. Rack installation has been completed in five buildings (CTL building, Indus user hall building, LBAID building, UHV and MFL building).

H) Expansion of communication network:

58 number of new telephone connections were provided at various locations in RRCAT campus, 27 telephone connections were shifted to other location as per user requirement, 7 additional telephone lines were commissioned in new SCRF building.

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I.4: Developments in library & scientific information resources at RRCAT

A) Science Direct full text article usage at RRCAT during 2009 to 2012:

RRCAT Library is providing subscription based online scientific information resources such as journals, conference proceedings, standards etc. to the users in the field of Laser, Accelerators and its allied areas. Library also ensures uninterrupted access to these subscribed online resources. Elsevier's 'Science Direct' is one of such online resource being subscribed through DAE libraries consortium, which enables campus wide full text access of scholarly literature to the users. The Science Direct in its platform offers full text content to over 3687 serial publications and 15662 non-serial publications of various publishers such as Elsevier, Pergamon Press, Academic Press, etc. However, RRCAT Library has access (subscription) to full text content of 2397 serials, 140 complimentary serials, and 322 non-serials collections. This article briefly reports the number of full text articles downloaded /accessed during 2009 to 2012 from serials publications.

Tables I.4.1 and I.4.2, show the number of articles downloaded between the year 2009 and 2012. It is clear that the number of articles downloaded at RRCAT is increasing every year. Compared to recent years, the number of articles published prior to 1995 is **accessed marginally** lesser, as shown in table I.4.2, It is observed that the use of Science Direct online journals by the user is increasing every year.

Table I.4.1: Year 1995 onwards published articles

Accessed Year	Number of Journals Used	TDY HTML	TDY PDF	TDY Total
2009	914	16272	27422	43694
2010	967	16482	30482	46964
2011	978	17859	30636	48495
2012*	880	14343	23365	37708
TDY = Total Downloads in a Year		* --> Till October 2012		

Table I.4.2: Prior to 1995 published articles

Accessed Year	Number of Journals Used	TDY HTML	TDY PDF	TDY Total
2009	132	6	3762	3768
2010	161	6	7346	7352
2011	168	28	6770	6798
2012*	147	1	5708	5709
TDY = Total Downloads in a Year		* --> Till October 2012		

In the year 2011, top 10 used journals are shown in the table I.4.3 below. Out of the top 10 journals, presently the library has subscription for six print plus online journals and four online only journals, through DAE consortium.

Table I.4.3: Top 10 journal articles used

Sl. No.	JOURNAL	TDY Total
1	Nuclear Instruments and Methods in Physics Research Section A:	3976
2	Optics Communications	2941
3	Journal of Crystal Growth	2610
4	Thin Solid Films	1611
5	Applied Surface Science	1400
6	Journal of Magnetism and Magnetic Materials	1370
7	Optics & Laser Technology	1080
8	Journal of Alloys and Compounds	1078
9	Solid State Communications	1041
10	Chemical Physics Letters	949

This deliberates that RRCAT users' literature use behavior is current in nature. Continuation of online resource at RRCAT library is inevitable since number of articles downloaded is quiet high. Library in its initiative, offers, many such valuable online resources to the user community. It was also observed that many other journals through Science Direct had also been highly utilized at RRCAT.

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B) Development and deployment of a digital archive of Electronic Theses and Dissertations (ETD) at Raja Ramanna Centre for Advanced Technology Library:

In this digital era, Electronic Theses & Dissertations (ETD) is a missing link in libraries. Library obviously is a central place where ETDs can be made available to the researchers, and also where subsequent new ETDs can be added, building an important resource for research activities of the institute. RRCAT library has stepped forward to make the ETDs available to its users. Our library took up the task, of digitizing and disseminating the theses and dissertations, to users, in digital format, using open access software, dSpace, as shown in Fig.I.4.1. Making the theses & project reports available in digital form is even more beneficial to library users since these can be now read in their respective place of work (labs), which saves time and offers convenience.
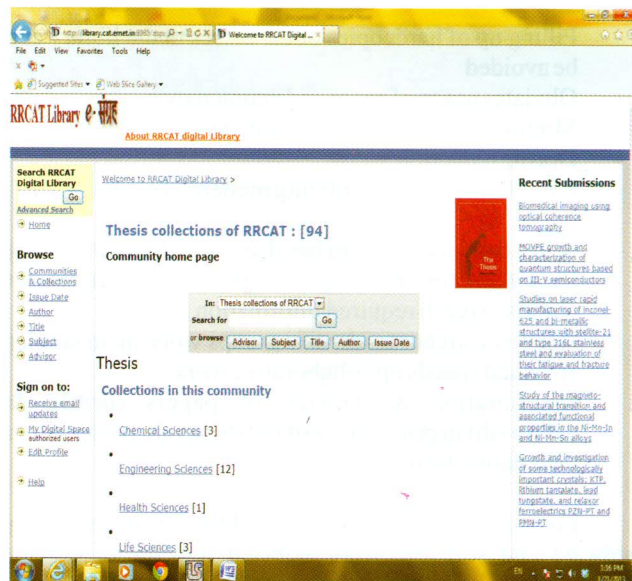

Fig. I.4.1: Electronic Theses and Dissertations in dSpace

RRCAT research activities are generally focused in a few specialized areas of technological importance, and theses covering these areas are rarely available through publishers or other libraries. We have more than 100 Ph.D. holder scientists and engineers from various disciplines working at RRCAT. Their theses have been digitized and added as ETD to our digital archive. Total 92 number of theses have been uploaded till date, under different disciplines. Users of ETDs are not only the scientists and Ph.D. students at RRCAT, but also B.Tech/M.Tech/M.Sc/B.E./M.E. students from several educational institutes, across India, visiting RRCAT, to execute their project work. Whereas 76 number of project reports in hard copies were submitted by the students in last several years (from 1993 to 2009), 135 number of e-project reports were received in last three years (from 2010 to 2012) in the library after implementation of the new policy of making the submission of e-copy of the project reports in the library, mandatory.

Now since RRCAT has become a constituent unit of deemed university under HBNI (Homi Bhabha National Institute), all the scientists and engineers of RRCAT in future will pursue their Ph.D. through HBNI, RRCAT. In recent time, several universities and research institutes are making submission of Ph.D. thesis and project reports in electronic form mandatory for several following reasons:

- Submission of thesis in a digital form is simple
- Plagiarism and reproduction of research work can be checked, being in electronic form
- Proper acknowledgement and citations can be checked

- Pilling up of hardcopies of the theses in the library can be avoided
- Obviates usage of paper and maintenance
- Minimize shelf space and maintenance
- Drastic reduction in cost
- Easy desktop access utilizing modern IT tools

- Saves time of the researcher that is required for visiting library and for browsing through the theses & project reports to reach required information
- Helps researcher to identify groups working in similar areas and speeds up collaborative work
- Deterioration & damage of papers (brittle & yellowish) in print copies of old theses are preserved in their digital form

For storage and dissemination of the ETDs, following hardware and software were selected. Overhead scanner model 'Minolta PS7000, Book Pro 7000'was used and it came with allied software 'ABBY Fine Reader Professional Edition 9.0' for retrieving & cleaning scanned images. For storage and dissemination of the ETDs, existing server based software dSpace Version 1.7.2 was utilized. dSpace is a freeware and upgraded regularly. We have installed and customized dSpace on Linux platform for storage and access of the ETD's, to meets our requirements. The ETD collection was grouped under the main subject categories related to our area of research such as Physical Sciences, Engineering Sciences, Mathematical Sciences Chemical Sciences, Life Sciences, Health Sciences, and Strategic Sciences.

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I.5: Developments in electronic security and support systems:

A) Commissioning of Electrical Fence Intrusion Detection System:

Electrical fence of 4Km. length, has been installed around the lab area of RRCAT, to prevent unauthorized intrusion inside the premises. One segment of electrical fence comprises of an energizer, wires, corner posts, line posts, insulators for zone separation and a central monitoring unit. An energizer is responsible to generate 5 to 7 kV pulses with pulse separation of 1 second and pulse energy between 1.5 and 5 Joule. These pulses provide a non lethal repulse shock to an intruder. One energizer can energize two zones of about 300 meter length each. Eight such energizers in sixteen zones have been commissioned to cover the entire perimeter. The zoning scheme makes it possible to easily locate the point of intrusion on such a large periphery. Wires carry high voltage pulses along the zone and back to the energizer for the detection of pulses. Corner posts and line posts provide mechanical support to the wires.

The central monitoring system is located in guard house, which is observed on round the clock basis by the security staff. It is connected to all the eight energizers, using RS485 communication network, and connected in daisy chain manner. The warning and error messages are sent to the central monitoring unit by the energizer. These errors and warnings are logged and displayed on the screen with date and time stamp. Recently, the old LCD (Liquid Crystal Display) based system was replaced with an indigenously developed PC (Personal Computer) based central monitoring system. This system displays the warnings graphically. Warnings are superimposed on the aerial view of the RRCAT lab campus image. Because of graphical representation, it is easier for the security personnel to locate the exact location of intrusion attempts. It also generates audio alarms in case of intrusions. The system is equipped with a redundant wireless communication network system for transmitting warnings to the central unit. Currently, the entire electrical fence is fully functional and operational round the clock. Figure I.5.1 depicts a portion of the electrical fence with an energizer and figure I.5.2 depicts sample warning as observed on central unit in case of intrusions.

Figure I.5.1: A portion of electrical fence with an energizer