



CYBER TECHNOLOGY

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Wilhelm Sch Caickard designed the first mechanical calculator in 1623, but did not complete its construction.¹ Blaise Pascal designed and constructed the first working mechanical calculator, the Pascaline in 1642. Charles Babbage first designed a difference engine and later an Analytical Engine for general purpose during Victorian times,² the manual of which was written by Ada Lovelace. Because of this work Ada Lovelace is regarded today as the world's first programmer.³

The punched card machines were first introduced around 1900. During the 1940s, as newer and more powerful computing machines were developed, the term computer came to refer to the machines rather than their human predecessors.⁴ Computer science began to be established as a distinct academic discipline in the 1950s and early 1960s.⁵ A more comprehensive study of the history of development of computer and its use could be had from the work of the learned Dr. M. Dasgupta, in his much acclaimed book *Cyber Crime in India*. Today computers are used in almost all the research studies including forensic studies. The United States government recognized the interconnected information and computer technology in the forensic field and also the interdependent computer network of the information technology infrastructures which operated on this virtual medium—the cyberspace as part of the US national critical infrastructure. People who use cyberspace, are believed to share a code of ethics and rules amongst themselves which are useful for everyone to follow, and are referred to as cyber ethics, and the forensic field is not an exception to it. In other words cyber ethics plays an important role in the forensic field. For instance the right to privacy is considered to be most essential to the functional code of cyber ethics. It is believed that moral responsibilities are essential when working online in cyberspace, particularly, when views are on the online social experiences. However, the word cyberspace has been criticized by William Gibson who described it as an “evocative and essentially meaningless” buzzword that could serve as a cipher for all of his “cybernetic musings”. This in a sense gives an impression that cyber forensics itself is a buzzword that could itself serve as a cipher for all the electronic or digital evidences.

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¹ Nigel Tout, “Calculator Timeline”, Vintage Calculator Web Museum. (2006), *available at*: <http://europeandataservices.com> (last visited on Nov. 14, 2018).

² “Science Museum - Introduction to Babbage”, *available at*: http://www.sciencemuseum.org.uk/objects/computing_and_data_processing/1878-3.aspx. (last visited on Nov. 14, 2018).

³ A Selection and Adaptation from Ada's Notes found in Betty Alexandra (ed.), *Ada, The Enchantress of Numbers* (Strawberry Press, Mill Valley, 1992).

⁴ The Association for Computing Machinery (ACM) was founded in 1947, *available at*: <http://history.acm.org/> (last visited on Nov. 14, 2018).

⁵ Denning, P.J., “Computer Science: The Discipline”(PDF). Encyclopedia of Computer Science. (2000), *available at*: <http://web.archive.org/web/20060525195404/http://www.idi.ntnu.no/emner/dif8916/denning.pdf>. (last visited on Nov. 14, 2018). Also see, “Some EDSAC statistics”, *available at*: <https://www.cl.cam.ac.uk/events/EDSAC99/statistics.html> (last visited on Sept. 5, 2018).

I. CYBERSPACE AS THE SYNONYM OF INTERNET

Cyberspace and Internet are not the same and should not be confused as such. Cyberspace is usually used to mention the identities and objects which largely exist within the realm of communication network. Thus a Website, for instance could metaphorically be said to “exist in cyberspace.” So, therefore the events which take place on Internet do not take place in the locations where the servers or users or participants are located physically, but such events take place “in cyberspace”. Cyberspace explains the flow of digital data. In cyberspace this data goes through a network of computers connected with each other. Cyberspace is not the “real world”, as we cannot locate it spatially as a tangible object doing “real” functions. Also, cyberspace is where the computer-mediated communication (CMC) occurs, wherein the online relationships and different forms of online identity got enacted which in turn raises some significant questions on the social psychology in the use of the internet. The social psychology is important due to the relationships between the “online” and “offline” variety of interaction. Mr. S.K. Verma and Raman Mittal, have examined regulations of cyber world in their book ‘*Legal Dimensions in Cyberspace.*’ The relationship varies between the “real world” and the “virtual world.”⁶ Cyberspace has given rise to a different cultural pattern as new media technologies have emerged. Thus Cyberspace is not only a tool of communications but is also a social destination and has cultural importance. Lastly, cyberspace provides new opportunities in reshaping both the culture and the society via the identities which are “hidden.” Hence, cyberspace does not have any territories or boundaries where culture and communication of the people are concerned. The meaning of cyberspace alludes to not just the content being provided but ability to surf on different web sites and there is a constant feedback to the user and the rest of the computer network which also poses a danger that something which is unexpected or unknown may be countered. In cyberspace there is a difference between the videogames and communication which is text-based because the images which come on screen are actually figures which occupy a space and the movement of these images or rather figures is shown by animation. Thus images are meant to form a positive volume which defines the empty space. Thus the videogame adopts the cyberspace and engages several players in it. Thereafter the videogame in a figurative way represents these figures on the screen as replicas or avatars or avatar-players.

Cyberspace was referred as second life by a community in the virtual world called as Linden Lab which called its customers “Residents” of Second Life. Such communities can be referred for the comparative and explanatory objectives for instance by the author Sterling in *The Hacker Crackdown*, and several journalists who popularized cyberspace in the cyber-culture. Cyberspace has been used in the reasoning of novel military strategies across the world mostly led by the leaders in the US Department of Defense (DoD). However there are limits to the use of the metaphor cyberspace in areas where it gets confused with the physical infrastructure. It also has limitations in describing a computer network.

II. INFLUENCE OF THE COMPUTERS ON CYBERSPACE

⁶Andrew Pollack, “For Artificial Reality, Wear A Computer,” New York Times, April 10, 1989, *available at*: http://en.wikipedia.org/wiki/Cyberspace#cite_note-12 (last visited on January 8, 2018). Also see, Marshall McLuhan & W. Terrence Gordon, *Understanding Media: The Extensions of Man* (Ginkgo Press; Critical edition, 2003). Also see, Robert Dunne, *Computers and the Law: An Introduction to Basic Legal Principles and their Application in Cyberspace* (Cambridge University Press, Cambridge, 2009).

William S. Burroughs (who is acknowledged for his literary influence on Gibson and cyberpunk) and Timothy Leary for the purpose of individual empowerment have extolled the potential of computers and computer networks.

Virtual reality (cyberspace) is used in various thought experiments by the contemporary scientists and philosophers such as David Deutschin *'The Fabric of Reality'*. Another example is Philip Zhai in *Get Real: 'A Philosophical Adventure in Virtual Reality'*, in which he connected platonic tradition to cyberspace as follows:

“Let us imagine a nation in which everyone is hooked up to a network of VR infrastructure. They have been so hooked up since they left their mother's wombs. Immersed in cyberspace and maintaining their life by teleoperation, they have never imagined that life could be any different from that. The first person that thinks of the possibility of an alternative world like ours would be ridiculed by the majority of these citizens, just like the few enlightened ones in Plato's allegory of the cave.”

Cyberspace gets conflated with reality by the brain-in-a-vat argument, while more common explanations of cyberspace have contrasted it with the “real world”. The concept of cyberspace has been popularized mostly in films and literature. Artists who are working with other media has shown interest in the concept, like Roy Ascott who states that “cyberspace in digital art is mostly used as a synonym for immersive virtual reality and remains more discussed than enacted”.

Indian epics such as *Ramayana* written by sage Valmiki and *Mahabharata* written by sage Vyaas discuss the concepts of what we call ‘Virtual reality’ today. Those epics transported people and objects into the matrix and did web conferencing.⁷

Cyberspace has also been used to perpetrate corruption as it has brought almost all the services and facilities which one can imagine together to expedite operations such as money laundering.

Today on cyberspace one can easily buy false passports, credit cards which are anonymous, encrypted mobile telephones, bank accounts, and also false passports. On cyberspace one can pay the advisors to set up the corporations with anonymous ownership or IBCs (International Business Corporations) or structures such as OFCs (Offshore Financial Centers). The threat from cyber crime is multidimensional and there is a need to look for solutions.

In France a 5-level model of cyberspace was designed in 2010. It was composed of five layers. These layers relied on information discoveries such as printing, writing, language, Internet, etc. Thus, this model linked the telecommunication technologies world with the information technologies.

III. TECHNOLOGICAL ASPECT OF CYBER FORENSICS

People believe that the computational medium in cyberspace or virtual world is an amplification of the communication channel between the people in the real world. Taken as

⁷Nine unexplained miracles in India, *available at*: <https://www.indiatoday.in/education-today/gk-current-affairs/story/indian-mythology-311159-2016-03-12> (last visited on Sept. 5, 2018).

such the core feature of cyber forensics is that it acts in an environment which has many participants who have the ability to influence and affect each other leaving behind a trail of evidence.

The technological aspect of cyber forensic makes the electronic evidence admissible in court. Forensic analysis of the computer data is becoming more and more popular both in the areas of the cyber or computer security as well as the forensic science. Today there are various study courses in the universities dealing with the basics. Besides the fact that these universities also offer degrees and diplomas in computer science, there are also forensic software developers offering professional qualifications. With the passage of time, the free software programs are getting more and more advanced which is also reducing the costs incurred by the cyber forensics analysts.