



## Our Patrons : Pimpri Chinchwad Education Trust

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## Samvaad Editorial : Data Storage: What the future holds in DNA ?

In the recent decade, there has been a paradigm shift in data storage. With the amount of data being created, the world is on the verge of a data storage disaster. We have seen a huge surge in the use of digital tools in the last few years as a result of Covid-19. Videoconferencing and online teaching-learning tools have become commonplace. Artificial intelligence, augmented reality, virtual reality, Industry 4.0, and the Internet of Things (IoT) are all part of a modern culture that generates more than 3 quintillion bytes of data and increasing every day.

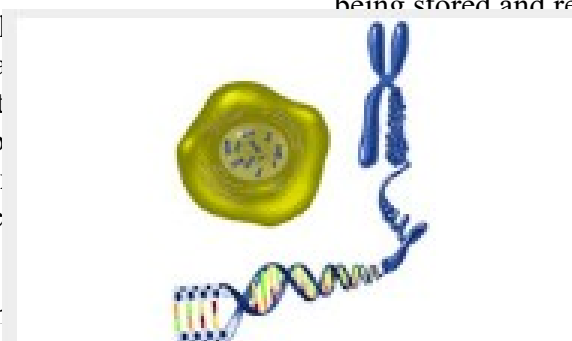
Humans have been inspired by nature, which has led to the development of various technology. Data science cannot be developed without deriving inspiration from DNA, the blueprint of human existence. Catalog Technologies, a Boston-based company, is working on DNA-based data storage and depends on molecular biology methods to print synthetic molecules that store information.

The data, can be read by sequencing the same DNA molecule through a proprietary software program to return it to its original text, photo, or video form. It is recently shown that a DNA molecule can store 14 gigabytes of data and 215 petabytes will need to be stored. Irrespective of all these developments, the DNA storage field is still in its infancy. The DNA storage and DNA computing could be a promising solution to the data storage.

The DNA, inherited from the human anatomy, is a messy organic molecule, that looks nothing like the magnetic disk drives or switching arrays that make up the fundamental building blocks of our storage infrastructure. DNA consists of four nitrogenous bases Adenine (A), Guanine (G), Cytosine (C), and Thymine (T). These bases in a group of four different combinations of 0s and 1s are encoded in the form of A (00), G (01), C (10) and T (11).

This data when synthesized in the artificial DNA, can be preserved for the longer time. Moreover, the experiments show that the synthesized DNA can be further replicated trillion times using polymerase chain reaction, thus forming as many copies with no considerable loss of data.

This technology was first reported in 1988, when Joe Travis, Harvard University encoded 35 bits of data. New York based group of scientist, in 1999, coded a 23-character message in DNA. A data like high quality video, Shakespeare's sonnets, a film, operating system, is being stored and retrieved over the years using DNA. Recently, Intel developed the fastest coding write that encoded data at substantially lower cost, however system is slower than conventional read/write speed of the hard drive. The universities and organizations like Microsoft, Applied DNA Sciences, are focusing on exploring this technology for scientific purposes.



### Dr. Narendra R. Deore

Professor, Mechanical Dept., Associate Dean -  
Industry Institute Interaction  
Institute SIG Coordinator, PCCoE.

Before DNA storage to become mainstream, it must overcome some difficulties. DNA synthesis and sequencing are expensive and take a lot of money, time, and resources. The current process, with rates of around 400 bytes per second, is much slower than a silicon memory chip's speed. Synthesizing DNA molecules is also expensive. Experts calculate the cost to be \$800,000 for Microsoft's 200 MB project and \$7,000 for the synthesis of 2 MB of data for the DNA Fountain project.

The cost was incurred primarily due to a technological breakthrough, and researchers think that as DNA synthesis processes advance and take less machine time, the cost will drop dramatically. DNA data storage has a bright future in the long run, but due to cost and time constraints, its early use will be limited to critical archive applications.

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## Guest Article: Undergraduate studies an effective Leadership Platform

In the past Indian diaspora has seen great leaders emerging from the academic institutions. They have immensely contributed to the Indian ecosystem at global level. The journey begins at the early stages in the institute. The leadership qualities seek to empower students to build their aptitude towards high-performance contribution and self-knowledge through participation in both formal and informal opportunities.

There is always need to have the student can have the skills to be a high-performing contributors and students having the skills to be an effective leader. The key competencies of an individual to perform are through their ability, likability and the contrary, the leadership demands a broader range of character traits, including high levels of integrity. However, the leaders should have the ability to foresee and predict the future, not to glory the past. Hence, to develop sustainable ecosystem, one needs to appreciate high-potential students, not just top performers.

Students are greatly benefitted by a certain level of technical competence to establish their credibility. However, broad knowledge of ecosystem does help student to elevate to the leadership role. Students having expertise in one domain, often hindered by fixed mind-sets and narrow views. Students with broad knowledge are able to remain open and to adapt, no matter how experienced they are. They succeed because they are able to continually learn. Professionals like software developers, salespersons, and stockbrokers having exceptional domain knowledge, technical skills, discipline and abilities to self-manage are successful in their tenure.

However, what sets them apart from the rest is their ability to understand the growing complexity, uncertainty, and change. In today's ever-changing world, individuals should be flexible and lean towards adapting as fast as the technologies surrounding them.

Things that have worked in past or current may not work in future and needs to build the strategies by assessing the situations and undergoing though constant transformation.

This indicates motivating people who think differently and placing them into key decision makers roles. Give them support and time to prove themselves.

Some takeaways from student journey that might help.

Time is a finite resource; no one has more than the other, what matters is how much we do in the time we have. It's all about setting aside time. Every day, we are confronted with a jumble of never-ending tasks. We require appropriate techniques to assist us in coming down on the most critical and significant tasks.

**Ms. Pradnya Pawar,**  
Alumnus of PCCoE and  
currently working on her own startup

**Organize your calendar:** Put meetings, birthdays, and other important dates or schedules on Google/phone calendar. One way to become popular with friends and family.

**Start your day with a plan and end it with an audit:** Set aside 10 to 15 minutes in the morning to plan out the day. Prepare the checklist to track the deadlines and prioritize what has to be accomplished. Before going to bed, review the unfinished tasks and plan the things accordingly.

**Forget the mental note; write it down:** Keep a notepad/diary handy and make a note. The to-do list for the day.

**Effective 24 Hours:** Skip the time hours where you are engaged or busy, focus on free time and plan. Make sure, each second counts.

**Make WhatsApp self-groups:** Create a group with yourself only. This will help us organize our own things and ideas. Store documents, images or forwards, for handy access.

**Don't spread yourself too thin; delegate:** Delegation of the work is helpful. We must be aware of our bandwidth and limitations. Trying to handle everything on our own can leave us drained and frustrated. Share work with others that will give us breather for other high-priority activities. It is a very important part of the productivity toolkit.

**Schedule your distractions:** Manage the Modern-day distractions like WhatsApp, Facebook, YouTube, Twitter, Insta-gram and whatnot, effectively. Fix time slots for attending to distractions.

## Persistent Corner: Health is Wealth

Along with keeping the mind sharp, it is also required to keep your body fit and healthy. ***"It is health that is real wealth and not pieces of gold and silver."*** are the wise words by Mahatma Gandhi. Hence, it becomes each and every one's responsibility to ensure that we are healthy. Persistent helps its employees to understand their health by providing free annual checkups, so when anything out of the ordinary is found, it can be taken care of as soon as possible. Not only that, Persistent also has a HealthCare plan provided for each employee to take care of themselves, as well as their families.

Even if you have everything materialistic in the world, it won't do you much good unless you have your health to experience those things. So stay safe, take care and since there are COVID cases increasing everyday, observe constant vigilance.

**Mr. Ritvik Bhavan**  
Lead Software Engineer

## Other Initiatives

A National Workshop on Foster Care Services in association with PCET's Campus Akurdi Pune. For this workshop trainees came from all over India. Social workers related to Foster Care Services. Chief Guests for this event were Mr. N. Kulkarni, Mrs. Seema Kamble, Mrs. Shreya Bhartiya and Dr. Deepak Walokar.

Around 47 trainees participated in this workshop for two days. The Business School managed and helped trainees and other people working under the service.

On both days 12th and 13th people attending this workshop were aware of the laws to be kept in mind while being a part of this service, also few orphan inspired people. All NSS volunteers, PCCoE, closely witnessed the reality and brought a change for them.



Vice Chancellor of SPPU Dr. Nitin R. Karmalkar interacting with trainees.

from 12th to 13th May 2022 at PCET's Campus Akurdi Pune. The workshop to discuss and educate about Foster Care Services. Chief Guests for this event were Mr. N. Kulkarni, Mrs. Seema Kamble, Mrs. Shreya Bhartiya and Dr. Deepak Walokar.

and 7 volunteers from Pune

are, need of it and also different people in their life shared their journey and experiences and also what we can do to bring a change for them.



Founder "Swanath Foundation" Mrs. Shreya Bhartiya explaining about their foundation.