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E-NEWS LETTER

SRMSCET & R

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Empowering Robots for Ethical Behavior

Robots are becoming more common in our homes and workplaces. Many robots will have to interact with humans in unpredictable situations. For example, self-driving cars need to keep their occupants safe, while protecting the car from damage.

Recently, thinkers such as Stephen Hawking have warned about the potential dangers of artificial intelligence, and this has sparked public discussion. "Public opinion seems to swing between enthusiasm for progress and downplaying any risks, to outright fear," says Daniel Polani, a scientist involved in the research, which was recently published in *Frontiers in Robotics and AI*.

However, the concept of "intelligent" machines running amok and turning on their human creators is not new. In 1942, science fiction writer Isaac Asimov proposed his three laws of robotics, which govern how robots should interact with humans. Put simply, these laws state that a robot should not harm a human, or allow a human to be harmed.

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The laws also aim to ensure that robots obey orders from humans, and protect their own existence, as long as this doesn't cause harm to a human.

The laws are well-intentioned, but they are open to misinterpretation, especially as robots don't understand nuanced and ambiguous human language. In fact, Asimov's stories are full of examples where robots misinterpreted the spirit of the laws, with tragic consequences. One problem is that the concept of "harm" is complex, context-specific and is difficult to explain clearly to a robot. If a robot doesn't understand "harm," how can they avoid causing it? "We realized that we could use different perspectives to create 'good' robot behavior, broadly in keeping with Asimov's laws," says Christoph Salge, another scientist involved in the study.

The concept the team developed is called Empowerment. Rather than trying to make a machine understand complex ethical questions, it is based on robots always seeking to keep their options open. "Empowerment means being in a state where you have the greatest potential influence on the world you can perceive," explains Salge. "So, for a simple robot, this might be getting safely back to its power station, and not getting stuck, which would limit its options for movement. For a more futuristic, human-like robot this would not just include movement, but could incorporate a variety of parameters, resulting in more human-like drives."The team mathematically coded the Empowerment concept, so that it can be adopted by a robot.

While the researchers originally developed the Empowerment concept in 2005, in a recent key development, they expanded the concept so that the robot also seeks to maintain a human's Empowerment.

"We wanted the robot to see the world through the eyes of the human with which it interacts," explains Polani. "Keeping the human safe consists of the robot acting to increase the human's own Empowerment."

"In a dangerous situation, the robot would try to keep the human alive and free from injury," says Salge. "We don't want to be oppressively protected by robots to minimize any chance of harm, we want to live in a world where robots maintain our Empowerment."

This altruistic Empowerment concept could power robots that adhere to the spirit of Asimov's three laws, from self-driving cars, to robot butlers. "Ultimately, I think that Empowerment might form an important part of the overall ethical behavior of robots," says Salge.

Shh! Proven security for your secrets

While it is possible to rigorously test the strength of a cipher -- a kind of digital data lock -- there are rarely any definitive proofs of unbreakability. Ciphers are highly complex, and while they may ward off certain attacks, they might be vulnerable to others.

Now, in a series of papers published in *IEEE Transactions on Information Forensics and Security* and IEICE Nonlinear Theory and Its Applications, researchers from Kyoto University have definitively demonstrated the strength of a cipher which is based on principles of chaos theory.

The group's Vector Stream Cipher -- or VSC -- this is the first example of a 128-bit key chaotic cipher with provable security.

"We first developed VSC in 2004 as a simple, fast cipher, and parts of it have already been utilized in the private sector," explains Ken Umeno, leader of the study. "Many theoretical attacks in the past have failed to break it, but until now we hadn't shown definitive proof of security."

The researchers conducted a number of tests, such as a method to evaluate the lock's randomness. Many ciphers rely on number sequences that appear to be random, but are actually generated through recurring relations that are vulnerable to being reproduced."Before evaluating the security of VSC with randomness tests, we found a way to make it significantly more reliable and sensitive," continues Umeno. "We then continued this refinement during the actual investigation."

The research highlights that VSC is not only secure, but structurally simple and low on memory usage compared with existing technology, making it useful for high-density data transmission applications such as in 5G mobile networks and 4K television broadcasts.

Umeno concludes, "Chaotic ciphers have been in use for about 30 years, but before this study we had not expected to find proof of security. We hope that our work will be studied widely and applied throughout our digital world."

New way to produce pure hydrogen efficiently

Christopher J. Kiely, Harold B. Chambers Senior Professor, Materials Science and Engineering at Lehigh University, and an international team have developed a new low-temperature catalyst for producing high-purity hydrogen gas while simultaneously using up carbon monoxide (CO). The discovery, described in a paper in the journal*Science*, could improve the performance of fuel cells that run on hydrogen fuel but can be poisoned by CO.

The new catalyst produces a purer form of hydrogen to feed into the fuel cell.

The paper, Atomic-layered Au clusters on ?-MoC as catalysts for the low-temperature water-gas shift reaction, is the ninth in Kiely's career to be published in the peer-reviewed journal.

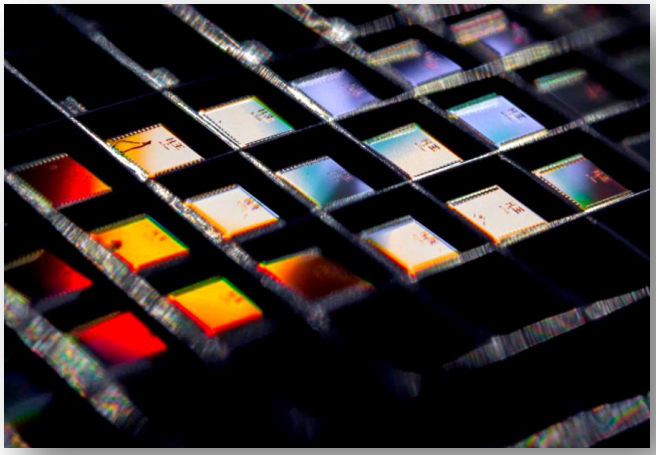
Among the authors are Li Lu, a final-year Ph.D. candidate advised by Kiely, and Wu Zhou, his former student who is now a professor at the University of the Chinese Academy of Sciences in Beijing.

As a result of the catalyst operating at low temperature and low pressure to convert water (H2O) and carbon monoxide (CO) to hydrogen gas (H2) and carbon dioxide (CO2), it could also lower the cost of running this so-called "water gas shift" reaction.

With low temperature and pressure, energy consumption will be lower, making the process less expensive and easier to use in small settings, such as in fuel cells for cars.

'Near-zero-power' temperature sensor could make wearable, smart devices less power-hungry

Electrical engineers at the University of California San Diego have developed a temperature sensor that runs on only 113 picowatts of power -- 628 times lower power than the state of the art and about 10 billion times smaller than a watt. This near-zero-power temperature sensor could extend the battery life of wearable or implantable devices that monitor body temperature, smart home monitoring systems, Internet of Things devices and environmental monitoring systems



The technology could also enable a new class of devices that can be powered by harvesting energy from low-power sources, such as the body or the surrounding environment, researchers said. The work was published in *Scientific Reports* on June 30.

"Our vision is to make wearable devices that are so unobtrusive, so invisible that users are virtually unaware that they're wearing their wearables, making them 'unawearables.' Our new near-zero-power technology could one day eliminate the need to ever change or recharge a battery," said Patrick Mercier, an electrical engineering professor at UC San Diego Jacobs School of Engineering and the study's senior author.

"We're building systems that have such low power requirements that they could potentially run for years on just a tiny battery," said Hui Wang, an electrical engineering Ph.D. student in Mercier's lab and the first author of the study.

Building ultra-low power, miniaturized electronic devices is the theme of Mercier's Energy-Efficient Microsystems lab at UC San

Diego. Mercier also serves as co-director for the Center for Wearable Sensors at UC San Diego. A big part of his group's work focuses on boosting energy efficiencies of individual parts of an integrated circuit in order to reduce the power requirement of the system as a whole.

One example is the temperature sensor found in healthcare devices or smart thermostats. While the power requirement of state-of-the-art temperature sensors has been reduced to as low as tens of nanowatts, the one developed by Mercier's group runs on just 113 picowatts -- 628 times lower power.

Minimizing power

Their new approach involves minimizing power in two domains: the current source and the conversion of temperature to a digital readout.

Researchers built an ultra-low power current source using what are called "gate leakage" transistors -- transistors in which tiny levels of current leak through the electronic barrier, or the gate. Transistors typically have a gate that can turn on and off the flow of electrons. But as the size of modern transistors continues to shrink, the gate material becomes so thin that it can no longer block electrons from leaking through -- a phenomenon known as the quantum tunneling effect.

Gate leakage is considered problematic in systems such as microprocessors or precision analog circuits. Here, researchers are taking advantage of it -- they're using these minuscule levels of electron flow to power the circuit.

"Many researchers are trying to get rid of leakage current, but we are exploiting it to build an ultra-low power current source," Hui said.

Using these current sources, researchers developed a less power-hungry way to digitize temperature. This process normally requires passing current through a resistor -- its resistance changes with temperature -- then measuring the resulting voltage, and then converting that voltage to its corresponding temperature using a high power analog to digital converter. Instead of this conventional process, researchers developed an innovative system to digitize temperature directly and save power. Their system consists of two ultra-low power current sources: one that charges a capacitor in a fixed amount of time regardless of temperature, and one that charges at a rate that varies with temperature -- slower at lower temperatures, faster at higher temperatures.

As the temperature changes, the system adapts so that the temperature-dependent current source charges in the same amount of time as the fixed current source. A built-in digital feedback loop equalizes the charging times by reconnecting the temperature-dependent current source to a capacitor of a different size -- the size of this capacitor is directly proportional to the actual temperature. For example, when the temperature falls, the temperature-dependent current source will charge slower, and the feedback loop compensates by switching to a smaller capacitor, which dictates a particular digital readout.

The temperature sensor is integrated into a small chip measuring 0.15 × 0.15 square millimeters in area. It operates at temperatures ranging from minus 20 C to 40 C. Its performance is fairly comparable to that of the state of the art even at near-zero-power, researchers said. One tradeoff is that the sensor has a response time of approximately one temperature update per second, which is slightly slower than existing temperature sensors. However, this response time is sufficient for devices that operate in the human body, homes and other environments where temperature do not fluctuate rapidly, researchers said.

Moving forward, the team is working to improve the accuracy of the temperature sensor. The team is also optimizing the design so that it can be successfully integrated into commercial devices.

STUDENT'S CORNER

Interesting Facts on India

1. A floating post office

India has the largest postal network in the world with over 1, 55,015 post offices. A single post office on an average serves a population of 7,175 people. The floating post office in Dal Lake, Srinagar, was inaugurated in August 2011.

2. Kumbh Mela gathering visible from space
The 2011 Kumbh Mela was the largest gathering of people with over 75 million pilgrims. The gathering was so huge that the crowd was visible from space.

3. Shampooing is an Indian concept.
Shampoo was invented in India, not the commercial liquid ones but the method by use of herbs. The word 'shampoo' itself has been derived from the Sanskrit word champu, which means to massage.

4. The Indian national Kabaddi team has won all World Cups.
India has won all 5 men's Kabaddi World Cups held till now and have been undefeated throughout these tournaments. The Indian women's team has also won all Kabaddi World Cups held till date.

5. Water on the moon was discovered by India.
In September 2009, India's ISRO Chandrayaan- 1 using its Moon Mineralogy Mapper detected water on the moon for the first time.

6. Science day in Switzerland is dedicated to Ex-Indian President, APJ Abdul Kalam.
The father of India's missile programme had visited Switzerland back in 2006. Upon his arrival, Switzerland declared May 26th as Science Day.

7. India's first President only took 50% of his salary.
When Dr Rajendra Prasad was appointed the President of India, he only took 50% of his salary, claiming he did not require more than that. Towards the end of his 12-year tenure he only took 25% of his salary.

8. The first rocket in India was transported on a cycle.
The first rocket was so light and small that it was transported on a bicycle to the Thumba Launching Station in Thiruvananthapuram, Kerala.

9. India has a spa just for elephants.
Elephants receive baths, massages and even food at the Punnathoor Cotta Elephant Yard Rejuvenation Centre in Kerala. Now that's a BIG step for the country.

10. Largest number of vegetarians in the world
Be it because of religious reasons or personal choices or both, around 20-40% of Indians are vegetarians, making it the largest vegetarian-friendly country in the world.

11. The human calculator
Shakuntla Devi was given this title after she demonstrated the calculation of two 13 digit numbers: 7,686,369,774,870 × 2,465,099,745,779 which were picked at random. She answered correctly within 28 seconds.

12. Astronaut Rakesh Sharma said India looks saare jahaan se achcha from space.
Former Prime Minister Indira Gandhi asked the first Indian in space, Rakesh Sharma, about how India looked from space. His response was our famous patriotic song, "Saare Jahaan Se Achcha."

Aindri Sharma
CS-15

Words of Wisdom

Successful person do not wait for opportunity, rather they create opportunity for themselves.

Aashi Agarwal
CS-16

Evolution of Programming Languages

In 1945, John Von Neumann developed two important concepts that directly affected the path of computer programming languages.

- **"Shared-program technique"** This technique stated that actual computer hardware should be simple & complex instructions should be used to control the simple hardware, allowing it to be reprogrammed much faster.
- **"Conditional control transfer"** This idea gave rise to the notion of subroutines, or small blocks of code that could be arranged in any order.

In 1949, Short Code developed. It was the first computer language for electronic devices and it required the programmer to change its statements into 0's and 1's by hand. It was the first step towards complex languages.

In 1957, Major language developed FORTRAN (Formula Translating system). The language was designed at IBM for scientific computing. The components were very simple, and provided the programmer with low-level access to the computers. It is restrictive as it only include IF, DO, and GOTO statements, but at the time, these commands were a big step forward. The basic types of data in use today got their start in FORTRAN. FORTRAN was good at handling numbers, but not good at handling input, output, which mattered most.

Business computing started in 1959, COBOL was developed. It was designed from the ground up as the language for businessmen. Its only data types were numbers and strings of text. It also allowed for these to be grouped into arrays and records, so that data could be tracked and organized better. COBOL statements have English-like grammar, making it quite easy to learn. These features were designed to make it easier for the average business to learn and adopt it.

In 1958, John McCarthy created LIST Processing (or LISP) language. It was designed for Artificial Intelligence (AI) research. Because it was designed for a specialized field, the original release of LISP had a unique syntax. LISP programs themselves are written as a set of lists, so that LISP has the unique ability to modify itself, and hence grow on its own. The LISP syntax was known as "Cambridge Polish," as it was very different from standard Boolean logic. LISP remains in use today because its highly specialized and abstract nature.

The ALGOL language was created by a committee for scientific use in 1958. It's major contribution is being the root of the tree that has led to such languages as Pascal, C, C++, and Java. It was also the first language with a formal grammar, known as Backus-Naar Form or BNF. Algol implemented new concepts, like recursive calling of functions, but new version of language, Algol 68, became difficult to use.

Pascal was begun in 1968 by Niklaus Wirth. Its development was mainly out of necessity for a good teaching tool. It was designed in a very orderly approach, it combined many of the best features of the languages in use at the time, COBOL, FORTRAN, and ALGOL. The combination of features, input/output and solid mathematical features, made it a highly successful language. Pascal also improved the "pointer" data type, a very powerful feature of any language that implements it. It also added a CASE statement, that allowed instructions to branch like a tree. It helped the development of dynamic variables, which could be created while a program was being run, through the NEW and DISPOSE commands. However, Pascal did not implement dynamic arrays, or groups of variables, which proved to be needed and led to its downfall.

C was developed in 1972 by Dennis Ritchie at Bell Labs in New Jersey.. Its direct ancestors are B and BCPL, but its similarities to Pascal are quite obvious. All of the features of Pascal, including the new ones such as the CASE statement are available in C. C uses pointers extensively and was built to be fast and powerful at the expense of being hard to read. Unix gives C advanced features as dynamic variables, multitasking, interrupt handling, forking, and strong, low-level, input-output.

In the 1970-1980, a new programming method was being developed known as Object Oriented Programming, or OOP. Bjarne Stroustroup liked this method and developed extensions to C known as "C with Classes." This set of extensions developed into the full-featured language C++, which was released in 1983. Now days, many new language are coming like PHP, Python,etc.

Aashi Rana
CS-15

Forming New Habits

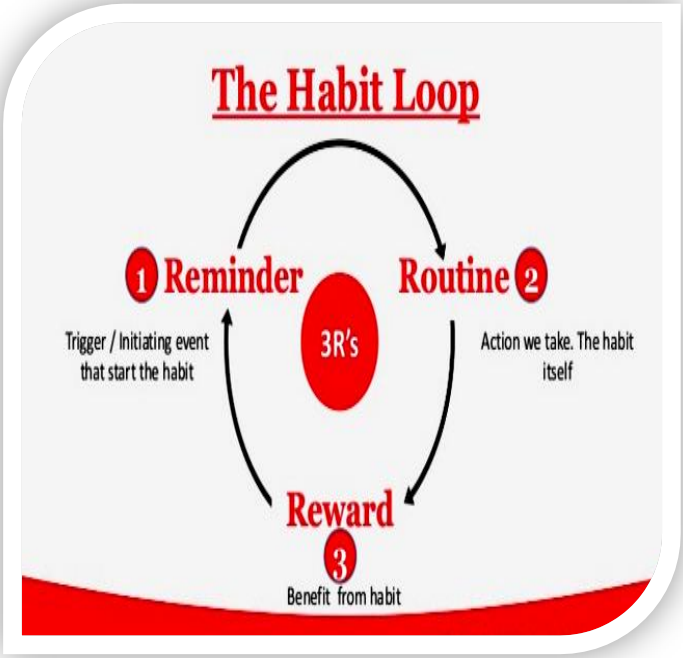
There are three simple steps you can take to build better rituals and make motivation a habit.

Step 1: A good pre–game routine starts by being so easy that you can't say no to it. You shouldn't need motivation to start your pre–game routine.
The most important part of any task is starting. If you can't get motivated in the beginning, then you'll find that motivation often comes after starting. That's why your pre–game routine needs to be incredibly easy to start.

Step 2: Your routine should get you *moving* toward the end goal. A lack of mental motivation is often linked to a lack of physical movement. Just imagine your physical state when you're feeling depressed, bored, or unmotivated. You're not moving very much. The opposite is also true. If you're physically moving and engaged, then it's far more likely that you'll feel mentally engaged and energized. For example, it's almost impossible to not feel vibrant, awake, and energized when you're dancing.

While your routine should be as easy as possible to start, it should gradually transition into more and more physical movement. Your mind and your motivation will follow your physical movement. It is worth noting that physical movement doesn't have to mean exercise.

Step 3: You need to follow the same pattern every single time. The primary purpose of your pre–game routine is to create a series of events that you always perform before doing a specific task. Your pre–game routine tells your mind, "This is what happens before I do ___."



Eventually, this routine becomes so tied to your performance that by simply doing the routine, you are pulled into a mental state that is primed to perform. You don't need to know how to find motivation, you just need to start your routine.

Shubhra Dubey
EE-15

Faculty Arena

मुझे मंजिल की नहीं रास्तों की तलाश है,
राहगुजर तो मिलते हैं बहुत मुझे एक राजदार की आस है।

मुझे मंजिल की नहीं रास्तों की तलाश है

भागती हुई जिंदगी में दौड़ रहे हैं सभी, पर जहन में जो कुछ आहट पैदा कर सके
मुझे ऐसे कदमों की तलाश है।

मुझे मंजिल की नहीं रास्तों की तलाश है

कामयाब तो सभी हो जाते है दुनिया में, कामयाबी के मायने समझा सके
ऐसे किसी शक्सियत की तलाश है

मुझे मंजिल की नहीं रास्तों की तलाश है

अपनों से तो पूछ लेते हैं सभी हाल ए तसब्बुर,
कोई गैरों का साथ निभा जाए तो कुछ बात है

मुझे मंजिल की नहीं रास्तों की तलाश है

घर से दूर जाकर तो कमाते होंगे सभी
मेरे ऑगन में कोई अशरफियॉ बरसाए तो कुछ बात है

मुझे मंजिल की नहीं रास्तों की तलाश है

बंद आंखों के हों या खुली आंखों के ख्वाब तो टूट जाते हैं सभी,
जिस रात ख्वाबों की सुबह न हो मुझे उन रात की तलाश है।

मुझे मंजिल की नहीं रास्तों की तलाश है।

Sumit Saxena
Assistant Professor
Department of Basic Science

1 x 9 + 2 = 11
12 x 9 + 3 = 111
123 x 9 + 4 = 1111
1234 x 9 + 5 = 11111
12345 x 9 + 6 = 111111
123456 x 9 + 7 = 1111111
1234567 x 9 + 8 = 11111111
12345678 x 9 + 9 = 111111111
123456789 x 9 + 10 = 1111111111

1 x 8 + 1 = 9
12 x 8 + 2 = 98
123 x 8 + 3 = 987
1234 x 8 + 4 = 9876
12345 x 8 + 5 = 98765
123456 x 8 + 6 = 987654
1234567 x 8 + 7 = 9876543
12345678 x 8 + 8 = 98765432
123456789 x 8 + 9 = 987654321

9 x 9 + 7 = 88
98 x 9 + 6 = 888
987 x 9 + 5 = 8888
9876 x 9 + 4 = 88888
98765 x 9 + 3 = 888888
987654 x 9 + 2 = 8888888
9876543 x 9 + 1 = 88888888
98765432 x 9 + 0 = 888888888

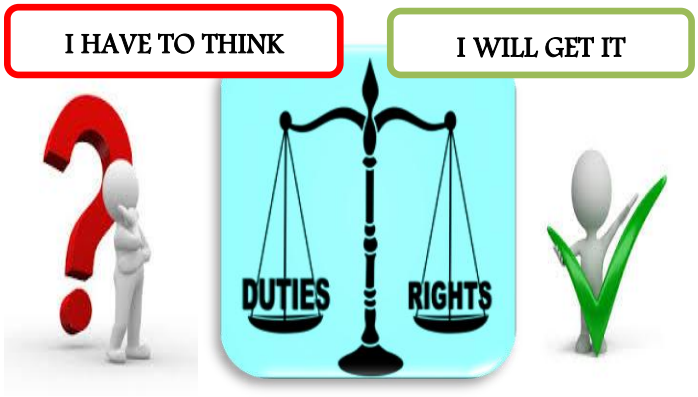
1 x 1 = 1
11 x 11 = 121
111 x 111 = 12321
1111 x 1111 = 1234321
11111 x 11111 = 123454321
111111 x 111111 = 12345654321
1111111 x 1111111 = 1234567654321
11111111 x 11111111 = 123456787654321
111111111 x 111111111 = 12345678987654321

Shailesh Saxena
HOD CS/IT

Duties Vs Rights

Every time, we talk about our rights. We never talk about our duties. We forget that rights can be enjoyed only in presence of duties. We forget about that we can enjoy our rights if the others allow us to do so.

What is Duty? We think DUTY as burden. If it is a burden that we are not supposed to carry, then we must not talk about RIGHTS. If we are not ready to talk about duties, then we must forget our rights. Rights are not the monopoly of a single human being. Without performing duties, balance can't be maintained.



Why do we fire our neurons like this? Even we know that RIGHT of one is the DUTY of other. It is rightly said by Pope Francis that we all have the duty to do good.

According to me,"Duty is about moral courage to do the right things."

It has been truly said that student life is the seed time of life. It is a period during which one will reap later what one sows now. If his/her time is wasted in futilities, a student will have to lament forever. Education is not just skill needed to get money and influence, it is also a means to learn and inculcate values and character that lead to changes in personal as well as social lives for betterment of life in general and for making the world a beautiful place to live. Stephen Covey rightly points out that for success in career, we need personality attributes but for success in life we need character attributes. Nothing could open our eyes more than the letter that *Abraham Lincoln* wrote to the headmaster of his son in this regard:

In school teach him, it is far more honorable to fall than to cheat.
Teach him to have faith in his own ideas, even if everyone tells him he is wrong.
Teach him to be gentle with gentle people and tough with tough.
Try to give my son the strength not to follow the crowd when everyone getting on the bandwagon.
Teach him to listen to all men; but teach him also to filter all he hears on a screen of truth, and take only the good that comes through.
Teach him if you can, how to laugh when he is sad… teach him there is no shame in tears.
Teach him to scoff at cynics and to beware of too much sweetness.
Teach him to sell his brawn and brain to highest bidder, but never to put a price on his heart and soul.
Teach him to close his ears to howling mob and stand and fight if thinks he is right.
Treat him gently but do not cuddle him because only the test of fire makes fine steel.
Let him have the courage to be impatient… let him have the patience to be brave.
Teach him always to have sublime faith in himself, because then he will have faith in humankind.

Hence it is the duty of parents as well as of teachers to cultivate moral courage in them. Education without values is of no use. Because no values no duties and finally no rights.

Ratna Awasthi
Assistant Professor
Department of Computer Science

Riddles

Riddle 1

What 4-letter word can be written forward, backward or upside down, and can still be read from left to right?

Riddle 2

A woman is sitting in her hotel room when there is a knock at the door. She opened the door to see a man whom she had never seen before. He said "oh I'm sorry, I have made a mistake, I thought this was my room." He then went down the corridor and in the elevator. The woman went back into her room and phoned security. What made the woman so suspicious of the man?

Riddle 3

What can travel around the world while staying in a corner?

Riddle 4

What is black and white and read all over?