



# KIET

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# NEWSLETTER

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## Alumni Section



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### **Getting ready for the future: Building career as Mobile App Developer**

When it comes to the IT industry, there are plenty of career paths to take. But one field that has seen a tremendous rise in popularity, of late, is that of mobile App Development.

Mobile devices have become part of everyone's life—two-thirds of the world's population relates to a mobile device. That is more than 5 billion unique mobile subscribers. This means that using mobile apps for everything from shopping to getting a ride, scheduling appointments, design, playing video games, and more—all on a mobile device—has become commonplace. As a result, the need for mobile app developers has grown many folds.

#### **Why Get Involved in Mobile App Development?**

- The allure of designing something new and fresh.
- The opportunity to be able to reinvent the way mobile technology is used.
- App developers can work anywhere – all they need is access to a strong internet connection and a good SDK.
- Great way to contribute to the world by solving real life problems via mobile apps.
- Steps to Becoming a Mobile App Developer

#### **What basic qualification is needed?**

Most employers these days look for mobile app's developers with at least a bachelor's degree in one of the following disciplines:

- Software Engineering
- Mobile Application Development
- Mobile Computing
- Computer Science
- Any related field of study that is program based.

#### **What's it Like Being a Mobile App Developer?**

With the necessary qualifications and experience, a career in app development can boast an annual salary range between 8 Lac – 20 Lac per annum. Of course, this will depend on your employer and what programs you are using to develop your mobile apps, as well as on the amount of experience you have earned.

Just like your salary, your responsibilities will depend on the employer, how much experience you have in developing apps, and the platform or OS you develop apps for.

#### **Work Profile of a Mobile App Developer**

- Develop, test, and improve mobile apps.
- Ensure the quality and functionality of apps is in line with your clients' requirements.

- Write code for apps for specific operating environments.
- Design and develop the app's interface.
- Communicate ideas and designs with team members.
- Provide support for your app, so that any issues that arise can immediately be dealt with.
- Devise fixes and workarounds for any issues that arise.

### **What is the Outlook for Mobile App Developers?**

The demand for new and innovative mobile apps continues to grow. Because of this rapid growth, there are plenty of opportunities for you to work either as part of a company or on a freelance basis. Finding a suitable position that meets your skill sets now or in the future should not prove difficult meaning a mobile app development career is a good, stable choice to make for your future.

According to many IT recruiters and managers, the demand for mobile app developers far exceeds the supply now. Over the next few years, the market for mobile app developers is expected to grow substantially.

### **How to start the journey to become a Mobile App developer?**

#### **Choose a programming language.**

When creating mobile apps, you can go either with native development or cross-platform development. Native development means writing code using Java or Kotlin for building Android apps or using Swift for building iOS apps. On the other hand, cross-platform development means using React Native, which uses JavaScript; Xamarin which uses C#; or Flutter, which uses Dart for building apps.

#### **Pick a platform among Android or iOS**

Both iOS and Android are great platforms, and none of them is perfect. The platform you choose will depend on preference and the type of market you want to target. No platform is perfect, and you will find great jobs and resources for both platforms.

#### **Various ways to gain practical knowledge.**

Regardless of if you develop apps for Android or iOS, the best way to learn how app development is simply by coding and practicing. Reading is essential, and watching tutorials as well, but they are useless if you do not write code and create apps. Create apps that you would like to have for yourself, they do not have to be complicated, beautiful, or perfect. The purpose is for you to practice and get familiar with the SDKs. As your skills improve, you will naturally add more complexity, make better UX interfaces, and maybe earn money with your apps.

Another great way to learn is by trying recreating existing apps: There are many YouTube channels dedicated to recreating existing apps. The good thing about those channels is that you get to implement the whole app and learn how other people implement certain features.

#### **Stay up to date.**

The beauty about the computing world is that technology advances very fast and what is relevant one year, may become obsolete the next one. The following three sources may help you to stay up to date with the latest technologies and trends of mobile development:

**Official Documentation:** Follow 'Google' and 'Apple' official website, as well as Android Youtube Channels for staying up-to-date with the latest trends, tips, and releases.

**Forums and Blogs:** There are tons of forums and blogs out there. Medium and Reddit are great sources.

**Job Listings:** To know what companies are searching for in mobile developers, start reading the description for mobile development jobs.

### **Conclusion**

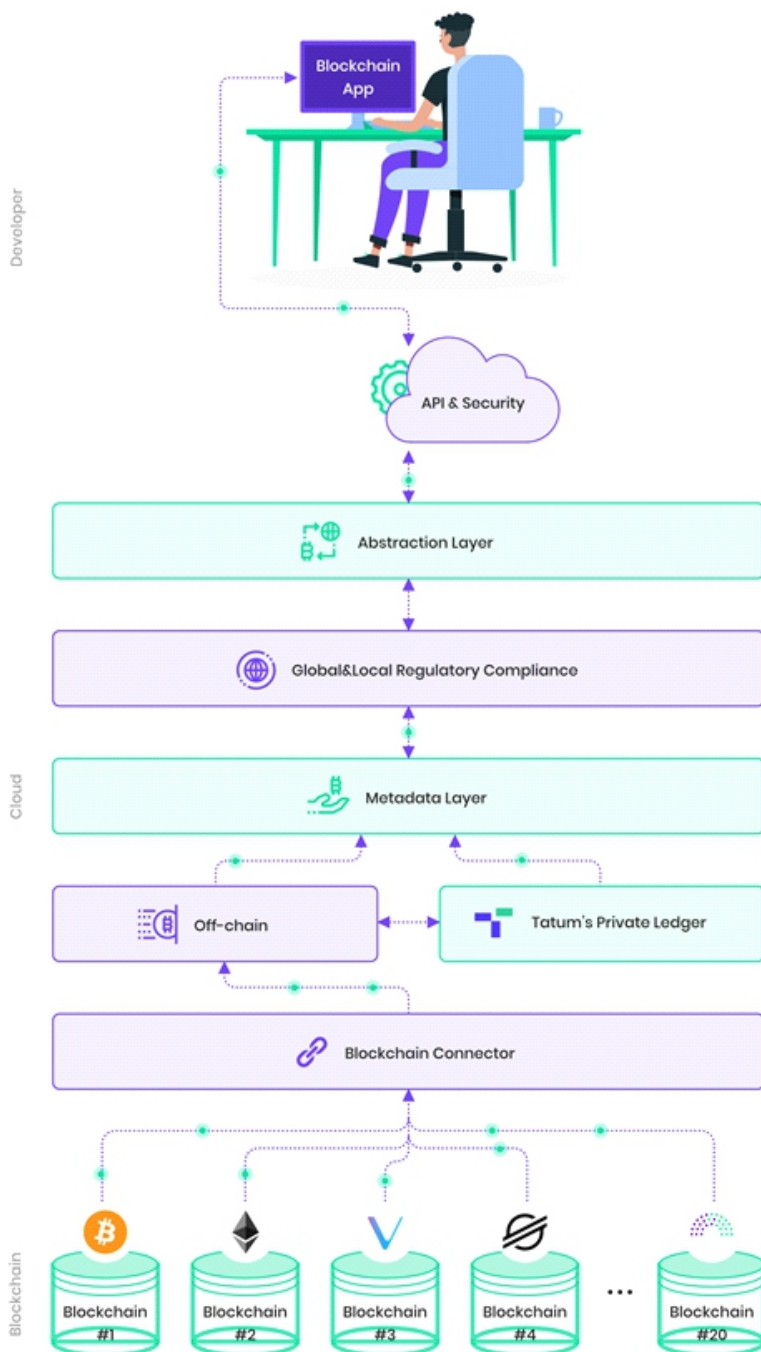
The flexibility this career path offers combined with attractive salaries and also given that there's nothing monotonous being a mobile app developer, this career offers great choice for those who want to expand their areas of expertise as far as they choose.

## Tatum lets you interact with blockchains using API calls

Meet tatum, a blockchain infrastructure start-up that wants to make it much easier to develop your own blockchain-based product. The company operates a platform-as-a-service product so that you don't have to manage your own nodes and learn how to interact with each client.

While blockchain development was quite easy at first, it quickly became much more complicated as new blockchains emerged. There are now dozens of different blockchains. Some examples of popular blockchains are Bitcoin, Ethereum, Stellar, Litecoin, etc.

If you want to interact with a blockchain directly, you have to run a client on a server. This is the easy part, as it basically comes down to spinning up a Linux server, installing a package and running this client. Once you have a node up and running, you can query the blockchain, initiate a transaction and run dapps — decentralized applications based on smart contracts.



What if you want to build a product that supports multiple blockchains and multiple crypto assets? You have to start from scratch again and learn how the client works. Each client has different commands and returns different results.

Some companies have been working on ways to make this easier. For instance, cloud hosting services, such as Amazon Web Services and Microsoft Azure, let you run a managed node so that you don't have to manage the cloud server that runs the client. But they don't support a ton of blockchains and you still have to become a blockchain expert.

Other companies go one step further. They run a node for you and let you interact with the node using API calls. Interacting with the blockchain feels like using the REST API of your favourite SaaS product. For instance, Alchemy or Infura makes it easier to get started with Ethereum development.

Tatum's differentiating factor is that it isn't limited to Ethereum. You can use the exact same API calls to interact with multiple blockchains. When you know how to send assets from one wallet to another using Tatum, you know how to do it across 20 different blockchains. "Blockchain is like the internet in 1997. We're trying to bring the developer experience that

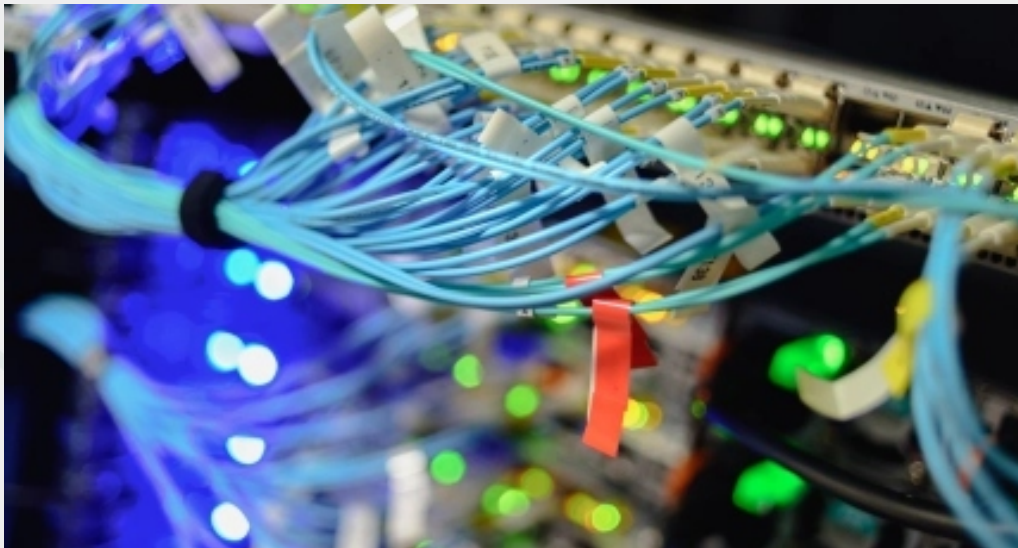
developers have today to the blockchain space," Tatum co-founder and CEO Jiri Kobelka said.

With Tatum, developers can basically code once and deploy everywhere. For instance, if there's a new blockchain that seems more effective for your smart contracts and you want to build the next version of your decentralized app on this new blockchain, you can reuse parts of your code base.

Tatum doesn't want to make a bet on a specific blockchain; the start-up considers itself blockchain agnostic. Developers can build crypto wallets, exchanges, NFT marketplaces, NFT in-game assets, decentralized identity products and more. There are 10,000 developers using Tatum right now, and the start-up can see that more and more people are interested in NFT-related projects, as they represent 60% to 70% of Tatum's usage right now.

Kobelka has a background in banking infrastructure. "I've spent over 15 years in banking as a technical core banking expert," he told me. That's why the team has developed a built-in compliance engine. This way, you can accept customers in different countries and comply with local regulations depending on the location of your customers.

Overall, Tatum opens up blockchain development to a new set of developers who are more familiar with web development and integrations with third-party services that offer API endpoints. And given the current interest in blockchain development, Tatum could become a popular development platform for the next generation of blockchain products.



## **AWS, MeitY start-up hub collaborate to support growth of start-ups in India**

**A**s part of this new collaboration, MeitY Start-up Hub and AWS will work together to identify start-ups with deep technology capabilities, and enable and empower them to build impactful solutions to address the biggest problems facing society in India, the statement said. Amazon Internet Services Pvt Ltd (AISPL) on Friday said it has inked an agreement with MeitY Start-up Hub to promote technology innovation and the sustainable growth of start-ups in India.

AISPL undertakes the resale and marketing of Amazon Web Services (AWS) Cloud services in India.

As part of this new collaboration, MeitY Start-up Hub and AWS will work together to identify start-ups with deep technology capabilities, and enable and empower them to build impactful solutions to address the biggest problems facing society in India, the statement said.

Through the AWS Start-up Ramp programme, start-ups will gain access to AWS Credits, a community of experts, technical training and support covering cloud architecture, cost optimisation, security, and scalability readiness, it added.

MeitY Start-up Hub will facilitate and organise government-backed innovation challenges to help start-ups focused on the public sector scale their solutions. Additionally, the collaboration will mobilise start-ups, and the community of incubators and accelerators to curate and run start-up acceleration programmes with AWS. Initially, the collaboration will focus on start-ups addressing healthcare, agriculture, public safety, transportation, smart cities and citizen engagement.

"MeitY Start-up Hub is excited to collaborate with AWS to help start-ups to further accelerate, scale, and build innovative solutions.

"Mentoring, technical expertise, cloud credits, skill enhancement programming, and other resources provided under this collaboration will be of significant value for start-ups," MeitY Start-up Hub CEO Jeet Vijay said.

Rahul Sharma, President (Public Sector)– AISPL, AWS India and South Asia, said the combination of India's scale, its thriving technology community, and public sector willingness to adopt new technologies to address challenges in society, is a great opportunity for start-ups to create impactful innovations.

"MeitY's focused efforts supporting start-ups operating in social impact areas and building a collaborative innovation ecosystem is commendable, and we are proud to collaborate with the MeitY Start-up Hub towards this goal," he added.



## Google features: control your phone with just your face

The recently-released Google features allows the operation of an Android-powered phone, totally hands-free. American tech giant Google has rolled out two new features for people with speech or physical disabilities. Through the recently-released features, users can now operate their Android-powered smartphones hands-free. 'Project Activate' and 'Camera Switches' let users perform tasks like speaking a custom phrase or navigating using a switch interface, through facial gestures alone.

'Camera Switches' is a feature for the existing Switch Access that now lets users operate Android with just their face. Camera Switches will allow users to set a facial gesture (looking left, right, or up; smiling, raising your eyebrows, or opening your mouth) to a specific action. People can customize how sensitive the trigger for each gesture is to make sure it only happens when you want it to and assign functions like scrolling forward or backward, navigating home or back, or even simple things like long-pressing. Users can also augment it with Switch Access's existing support for physical switches.

Ultimately, the combination sounds like users should be able to use their phone entirely using nothing but their face. No touching, external hardware or fine motor control is required. It will likely take longer to do the same things, though.

'Project Activate' is Google's other new feature, and it's kind of similar, allowing you to use the same facial gestures that Camera Switches uses, but you'll be able to activate more complicated pre-set actions, like having your phone say a phrase or make a call. It's a standalone app that was just published to the Play Store.

That means rather than toting around a complicated or expensive speech-generating device, you might be able to simply use your phone to trigger a handful of common phrases. That could cover a range from complicated multi-word messages to even just something as simple as having a fast way to say "yes" or "no."

On top of these two new features, Google's also rolling out some changes to its Lookout app for those with impaired vision. In case you aren't familiar, the app lets you point your phone at stuff and have your phone describe it, covering a range from reading physical documents to describing food labels so you can tell jars apart in the pantry.

Now it will also be able to read handwritten documents, including things like post-it notes or birthday cards -- first for Latin-based languages, but others are planned. Currency mode can also now recognise Euros and Rupees.

The new features rely on the smartphone's front-facing camera, which can watch the user's face in real-time. (ANI)



## Newly developed AI tool could transform traditional microscopy

AI and deep learning are already hugely impacting many industries, applications, and scientific fields. A new tool has the potential to revolutionize microscopy for everything from emissions-focused industries to the biomedical realm. Researchers in Sweden have discovered that a new artificial intelligence (AI) tool has the potential to fundamentally change microscopy, thanks to new ways of analysing images. developed by a team at the University of Gothenburg, the AI tool uses neural networks that can learn how to retrieve the exact information sought from an image by looking through huge training data (a large number of images). The researchers say this is akin to technologies and applications with which we largely unknowingly and often interact—for example, services such as Spotify, which find and recommend songs and accompanying photos based on music a user has listened to before.

“We have now developed a tool that makes it possible to utilize the incredible potential of deep learning, with focus on images taken with microscopes,” says the study's lead author Benjamin Midtvedt, a doctoral student in physics at the University of Gothenburg. Traditionally, producing that data has been done manually—this new tool simplifies that process, “so that tens of thousands of images can be generated in an hour instead of a hundred in a month.”

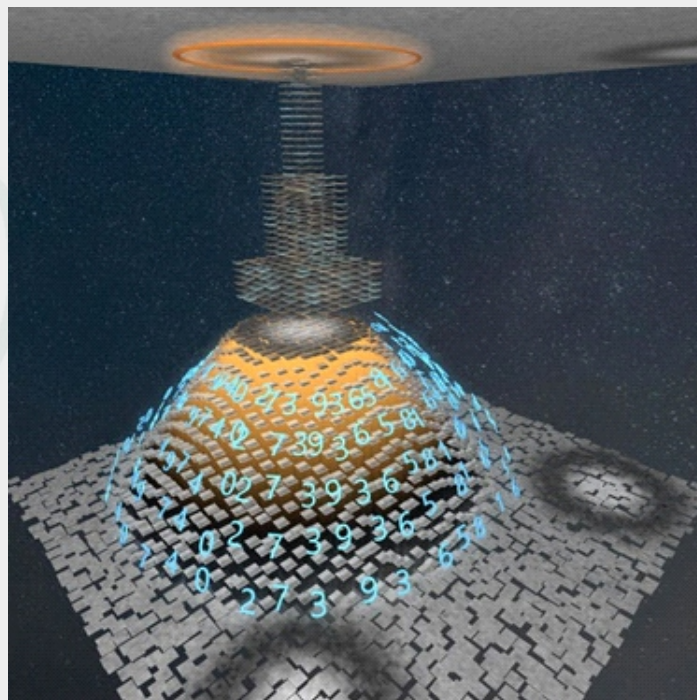
The study focuses specifically on deep learning, which the researchers note that in relation to microscopy, retrieving a large amount of information from data-filled images has been challenging. Deep learning, on the other hand, has proven to be very effective.

“Regardless of the microscopic challenges,” Midtvedt says, “researchers can now more easily conduct analyses, make new discoveries, implement ideas, and break new ground within their fields.”

Users are able to control the size and material characteristics for very small particles with the new deep learning tool, and also easily count and classify cells. In the study, researchers have seen, in real time, unwanted particles in the data and whether they have all been filtered out.

“This makes it possible to quickly extract more details from microscope images without needing to create a complicated analysis with traditional methods,” Midtvedt says. “In addition, the results are reproducible and customized, and specific information can be retrieved for a specific purpose.”

He adds that as his team has already demonstrated the tool's ability to filter out unwanted particles in real time, it has garnered attention from industries that need to purify emissions. Other future applications for the new tool could include those in the biomedical realm, such observation of infected cells or mapping cellular defence mechanisms.





## NASA astronauts aboard ISS to use augmented reality technology to repair tool

NASA is developing an augmented reality (AR) application for astronauts to enable them to inspect and maintain equipment on the International Space Station (ISS) without needing assistance from ground control. This, the agency hopes, will reduce the impact of communication delays between the ISS crew and NASA mission control in Houston, Texas, US. While the communication delay is unnoticeable mostly, NASA says this project will increase the autonomy of astronauts in making quick and informed decisions. This project will primarily benefit the space agency in exploring the Moon and eventually Mars.

Usually, astronauts are given instructions from ground control on a PDF file that can be viewed on a computer or tablet. but holding these gadgets in hand while working on machinery in a tight space limits productivity. In a blog post, NASA said the T2 Augmented Reality (T2AR) project helps display instructions in the goggles of astronauts and direct their gaze with 3D cues, showing them the actual work sites. It can also follow verbal instructions to navigate procedures. This eases the process of inspection and maintenance.

The AR technology uses Microsoft's Holo lens with custom-built AR software. In April, astronaut Soichi Noguchi of Japan Aerospace Exploration Agency (JAXA) was tasked with maintenance of a piece of exercise equipment, with the help of the new technology. Two more ISS astronauts used it later, and some more tests are planned.

“AR tools hold the promise of allowing us to pre-package guidance and expertise,” said Bryan Dansberry, ISS associate scientist at Johnson Space Centre. He said the space station is the “perfect platform” to test AR systems and refine these tools.

There has been a renewed focus on exploring the Moon as a stepping stone to reach space farther away from Earth. through the Artemis programme, NASA intends to use new technology for lunar exploration and prepare for human missions to Mars. to make the most of these missions, NASA has developed some new technologies and one of them is augmented reality as the communication delays beyond the Moon are sure to last longer. Artemis aims to land on the Moon's south pole, where no human has gone before, by 2024.



## Chinese gaming firms vow self-regulation, possible use of facial recognition amid crackdown on teen addiction

Over 200 Chinese gaming companies have pledged to regulate their industry to combat gaming addiction, including through the possible use of facial recognition to identify minors, a state-backed gaming association said on Friday, 24 September.

The statement, published by the CGIGC gaming association, which is affiliated to the online game publishing regulator National Press and Publication (NPPA), on its official Wechat account, was signed by 213 companies including Tencent and NetEase.

China has expressed strong concern over growing video game addiction among its youth and the NPPA last month published new rules that forbid under-18s from playing video games for more than three hours a week. Companies and investors worry more actions against the industry could be in store.

The companies also pledged to crack down on content that distort history or promote "effeminate" behaviour and will also work to prevent breaches of these rules, such as the use of foreign gaming platforms, the CGIGC said.

Tencent in July rolled out a facial recognition function dubbed "midnight patrol" that parents can switch on to prevent children from using adult logins to get around the government curfew.



## Computer scientists find a key research algorithm's limits

The most widely used technique for optimizing values of a math function turns out to be a fundamentally difficult computational problem.

Many aspects of modern applied research rely on a crucial algorithm called gradient descent. This is a procedure generally used for finding the largest or smallest values of a particular mathematical function—a process known as optimizing the function. It can be used to calculate anything from the most profitable way to manufacture a product to the best way to assign shifts to workers.

Yet despite this widespread usefulness, researchers have never fully understood which situations the algorithm struggles with most. Now, new work explains it, establishing that gradient descent, at heart, tackles a fundamentally difficult computational problem. The new result places limits on the type of performance researchers can expect from the technique in particular applications.

“There is a kind of worst-case hardness to it that is worth knowing about,” said Paul Goldberg of the University of Oxford, co-author of the work along with John Fearnely and Rahul Savani of the University of Liverpool and Alexandros Hollender of Oxford. The result received a best paper award at the annual Symposium on Theory of Computing.

You can imagine a function as a landscape, where the elevation of the land is equal to the value of the function (the “profit”) at that particular spot. Gradient descent searches for the function's local minimum by looking for the direction of steepest ascent at a given location and searching downhill away from it. The slope of the landscape is called the gradient, hence the name gradient descent.

Gradient descent is an essential tool of modern applied research, but there are many common problems for which it does not work well. But before this research, there was no comprehensive understanding of exactly what makes gradient descent struggle and when—questions another area of computer science known as computational complexity theory helped to answer.

“A lot of the work in gradient descent was not talking with complexity theory,” said Costis Daskalakis of the Massachusetts Institute of Technology.

Computational complexity is the study of the resources, often computation time, required to solve or verify the solutions to different computing problems. Researchers sort problems into different classes, with all problems in the same class sharing some fundamental computational characteristics.

To take an example—one that's relevant to the new paper—imagine a town where there are more people than houses and everyone lives in a house. You're given a phone book with the names and addresses of everyone in town, and you're asked to find two people who live in the same house. You know you can find an answer, because there are more people than houses, but it may take some looking (especially if they don't share a last name).

This question belongs to a complexity class called TFNP, short for “total function nondeterministic polynomial.” It is the collection of all computational problems that are guaranteed to have solutions and whose solutions can be checked for correctness quickly. The researchers focused on the intersection of two subsets of problems within TFNP.

The first subset is called PLS (polynomial local search). This is a collection of problems that involve finding the minimum or maximum value of a function in a particular region. These problems are guaranteed to have answers that can be found through relatively straightforward reasoning.

One problem that falls into the PLS category is the task of planning a route that allows you to visit some fixed number of cities with the shortest travel distance possible given that you can only ever change the trip by switching the order of any pair of consecutive cities in the tour. It's easy to calculate the length of any proposed route and, with a limit on the ways you can tweak the itinerary, it's easy to see which changes shorten the trip. You're guaranteed to eventually find a route you can't improve with an acceptable move—a local minimum.

The second subset of problems is PPAD (polynomial parity arguments on directed graphs). These problems have solutions that emerge from a more complicated process called Brouwer's fixed point theorem. The theorem says that for any continuous function, there is guaranteed to be one point that the function leaves unchanged—a fixed point, as it's known. This is true in daily life. If you stir a glass of water, the theorem guarantees that there absolutely must be one particle of water that will end up in the same place it started from.

The intersection of the PLS and PPAD classes itself forms a class of problems known as PLS int PPAD. It contains many natural problems relevant to complexity researchers. However, until now, researchers were unable to find a natural problem that's complete for PLS int PPAD—meaning that it is an example of the hardest possible problems that fall within the class.

Prior to this paper, the only known PLS int PPAD-complete problem was a rather artificial construction—a problem sometimes called “Either-Solution.” This problem glued together a complete problem from PLS and a complete problem from PPAD, forming something a researcher would be unlikely to encounter outside this context. In the new paper, the researchers proved that gradient descent is as hard as Either-Solution, making gradient descent itself PLS int PPAD-complete.

None of this means that gradient descent will always struggle. In fact, it's just as fast and effective as ever for most uses.

“There's a slightly humorous stereotype about computational complexity that says what we often end up doing is taking a problem that is solved a lot of the time in practice and proving that it's actually very difficult,” said Goldberg.

But the result does mean applied researchers shouldn't expect gradient descent to provide precise solutions for some problems where precision is important.

The question of precision speaks to the central concern of computational complexity—the evaluation of resource requirements. There is a fundamental link between precision and speed in many complexity questions. For an algorithm to be considered efficient, you must be able to increase the precision of a solution without paying a correspondingly high price in the amount of time it takes to find that solution. The new result means that for applications which require very precise solutions, gradient descent might not be a workable approach.

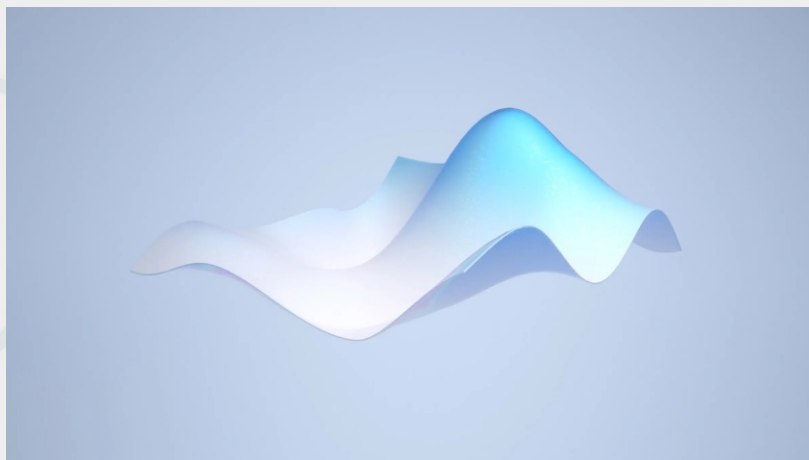
For example, gradient descent is often used in machine learning in ways that don't require extreme precision. But a machine learning researcher might want to double the precision of an experiment. In that case, the new result implies that they might have to quadruple the running time of their gradient descent algorithm. That's not ideal, but it is not a deal breaker.

But for other applications, like in numerical analysis, researchers might need to square their precision. To achieve such an improvement, they might have to square the running time of gradient descent, making the calculation completely intractable.

“[It] puts the brakes on what [they] can possibly shoot for,” said Daskalakis.

They must, and in practice do, compromise somewhere. They either accept a less precise solution, limit themselves to slightly easier problems, or find a way to manage an unwieldy runtime.

But this is not to say a fast algorithm for gradient descent doesn't exist. It might. But the result does mean that any such algorithm would immediately imply the existence of fast algorithms for all other problems in PLS int PPAD—a much higher bar than merely finding a fast algorithm for gradient descent itself.



## Indian researchers develop raspberry pi-based portable blood test device to improve rural healthcare

**B**lood tests are vital for diagnosis and monitoring a number of diseases. In many rural areas, people have to travel a significant distance to reach the nearest health care facility to get their blood samples tested. Sometimes, this results in a delay in detecting serious diseases. But if two Indian researchers have their way, this roadblock in improving the health index of rural India would soon be a thing of the past. They have designed a simple and affordable device that can be transported to remote areas for blood analysis.

The device uses a Raspberry Pi computer and all it needs is a source of electricity. It has been designed by Sangeeta Palekar, a researcher at Shri Ramdeobaba College of Engineering and Management in Nagpur, and her colleague Jayu Kalambe.

Currently, most existing laboratory devices use light to test blood samples. When light passes through a blood sample, its intensity changes depending on the concentration of that sample. This helps analyse the number of red blood cells or glucose levels present in the blood.

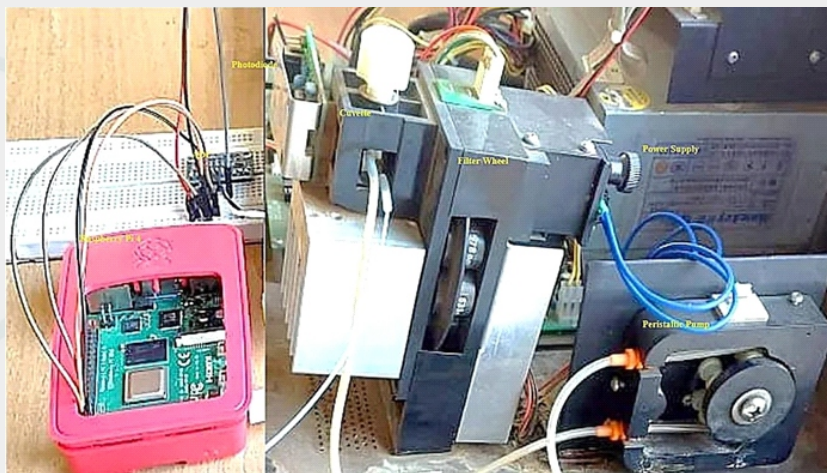
The new analyser by Palekar and her colleague takes a similar approach. Their device has an automated fluid dispenser that adds a controlled amount of reagent into the blood sample and light is then passed through it. A tiny Raspberry Pi computer then analyses the data. The researchers say their device can be modified to test any biochemical substances in the blood. Their research has been published in the Institute of Electrical and Electronics Engineers (IEEE) Sensors Journal.

Talking to the IEEE Spectrum magazine, Palekar said she understands how important a blood test can be in detecting diseases. “Routine blood tests can help track and eliminate the threat of many potential diseases,” she said.

Palekar also said that there are several benefits of their design — automation, low cost, portability, and an easy interface.

Overall, she adds, their design “is an attractive solution” for low resource areas.

The two researchers are now focussed on expanding the types of blood tests that can be done, for example, proteins, cholesterol, triglyceride, and albumin levels.



## Cisco talos warns of hacking campaign on India's govt, military personnel

Cisco Talos, the threat intelligence unit of Cisco, has recently discovered a cyber-attack campaign that targets government employees and military personnel in India. In a recent blog post, Cisco Talos has published its findings on how Armor Piercer distributes malicious documents to deliver Remote Access Trojans (RATs) and gain access to highly confidential information related to government and defence agencies.

The lures used in this campaign are predominantly around operational documents pertaining to “Kavach”, a two-factor authentication (2FA) app operated by India's National Informatics Centre (NIC) and used by government employees to access their emails. It utilizes compromised websites and fake domains to host malicious payloads, another tactic similar to Transparent Tribe, it said.

The earliest instance of this campaign was observed in December 2020, utilizing malicious MS Office documents, known as maldocs, disguised as security advisories, meeting schedules, software installation guides, etc.

As with all advanced threats that are rapidly becoming more sophisticated, this campaign was found to be using multiple techniques and evolved to obfuscate itself and remain in the victim's environment, evading standard detection techniques – it continues to operate even today.

Armour Piercer illustrates another instance of a highly motivated threat actor using a set of RAT families to infect their victims. These RATs are packed with many out-of-the-box features to gain complete control over the infected systems. The use of RATs makes it challenging to track down the threat actors behind it. In addition, since July 2021, Talos researchers have observed the deployment of file enumerators alongside RATs, indicating that the attackers are expanding their arsenal to target their victims.

This is just one example of the rapidly expanding threat landscape that is simultaneously becoming far more complex. In response, every company across sectors is rethinking their cybersecurity posture. Commenting on how organizations can strengthen their threat detection and response, Vishak Raman, Director, Security Business, Cisco India and SAARC, shares, “Operation Armor Piercer is a grim reminder of the vulnerabilities still existing in our cybersecurity posture.

To ensure end-to-end security of India's most precious assets and information, government and defence agencies must implement a layered defence strategy that enables comprehensive visibility and coverage across all endpoints, accelerates response by leveraging automation and orchestration to enrich data, and reduces massive data sets into actionable insights through AI/ML and data analytics. Essentially, security must not be bolted on, rather built into every system and process to ensure infallible protection of people and assets.”

According to Cisco Talos researchers, this campaign has been ongoing since the end of 2020 and continues to operate today. Use of RATs makes it difficult to attribute and to track down threat actors behind it. Since July 2021, Talos researchers have observed deployment of file enumerators alongside RATs. This indicates that the attackers are expanding their arsenal to target their victims: defence and government personnel in India.

So, how can organizations protect themselves from such threat campaigns?

Unfortunately, there is no 'one solution' to defend against modern cyber threats. Layered defence with the following characteristics helps to apply a highly effective cyber defence strategy, say researchers. as they outline three long term strategies:

1. **Expand visibility** – Comprehensive coverage across attack surface – Endpoint, Email, Web, Network, Cloud, Data & Apps is necessary

2. **Reduce data** – Apply AI/ML analytics to reduce massive data sets to actionable insights

3. **Accelerate response** – Utilize automation and orchestration to enrich data, apply context across threat defence tools, avoiding silos.

There are however some tactical steps that companies should consider.

1. **Continuous monitoring using an EDR** – Prevent, Detect and Respond to threats using suitable Endpoint Detection and Response tools. Utilize Managed EDR and Threat Hunting services to augment for skill set gaps in-house. Choose to use automated actions to contain threats as and when discovered using relevant playbooks.

2. **Email Security** – Email is the no.1 threat vector to-date; an attack vector most threat campaigns use for spear-phishing its victims and to deliver malicious payloads. Utilize an email security solution agnostic to mail delivery solutions combined with advanced threat and phishing protection capabilities.

3. Use an Adaptive MFA to protect email accounts from account compromise/takeover. Extend this capability across enterprise to enable zero trust access control across organizations application footprint.

4. **DNS & Web Security** – All things on the Internet starts with Recursive DNS; The first layer of defence for cyber security attacks. Cascade DNS Security capability with Web Security to prevent access to CnC call-backs, Phishing and Malware domains, scanning for malicious downloads etc. Monitor shadow IT usage and scan for malware in clouds beyond on-prem DC.

5. **Security Analytics and Network Detection & Response** – Detect insider threats using ML-based behaviour anomaly detection tools. Identify and contain zero-day threats and malware in encrypted payloads missed by other layered defence tools

6. **XDR** – Too many alerts and alarms leads to alert fatigue. Choose a right XDR tool that integrates well with above security control points seamlessly, delivering visibility, threat investigation and automated response from a unified platform.



## A universal system for decoding any type of data sent across a network

Very piece of data that travels over the internet -- from paragraphs in an email to 3D graphics in a virtual reality environment -- can be altered by the noise it encounters along the way, such as electromagnetic interference from a microwave or Bluetooth device. The data are coded so that when they arrive at their destination, a decoding algorithm can undo the negative effects of that noise and retrieve the original data.

Since the 1950s, most error-correcting codes and decoding algorithms have been designed together. Each code had a structure that corresponded with a particular, highly complex decoding algorithm, which often required the use of dedicated hardware.

Researchers at MIT, Boston University, and Maynooth University in Ireland have now created the first silicon chip that is able to decode any code, regardless of its structure, with maximum accuracy, using a universal decoding algorithm called Guessing Random Additive Noise Decoding (GRAND). By eliminating the need for multiple, computationally complex decoders, GRAND enables increased efficiency that could have applications in augmented and virtual reality, gaming, 5G networks, and connected devices that rely on processing a high volume of data with minimal delay.

The research at MIT is led by Muriel Médard, the Cecil H. and Ida Green Professor in the Department of Electrical Engineering and Computer Science, and was co-authored by Amit Solomon and Wei Ann, both graduate students at MIT; Rabia Tugce Yazicigil, assistant professor of electrical and computer engineering at Boston University; Arslan Riaz and Vaibhav Bansal, both graduate students at Boston University; Ken R. Duffy, director of the Hamilton Institute at the National University of Ireland at Maynooth; and Kevin Galligan, a Maynooth graduate student. The research will be presented at the European Solid-States Device Research and Circuits Conference next week.

### Focus on noise

One way to think of these codes is as redundant hashes (in this case, a series of 1s and 0s) added to the end of the original data. The rules for the creation of that hash are stored in a specific codebook.

As the encoded data travel over a network, they are affected by noise, or energy that disrupts the signal, which is often generated by other electronic devices. When that coded data and the noise that affected them arrive at their destination, the decoding algorithm consults its codebook and uses the structure of the hash to guess what the stored information is.

Instead, GRAND works by guessing the noise that affected the message, and uses the noise pattern to deduce the original information. GRAND generates a series of noise sequences in the order they are likely to occur, subtracts them from the received data, and

checks to see if the resulting codeword is in a codebook.

While the noise appears random in nature, it has a probabilistic structure that allows the algorithm to guess what it might be.

"In a way, it is similar to troubleshooting. If someone brings their car into the shop, the mechanic doesn't start by mapping the entire car to blueprints. Instead, they start by asking, 'What is the most likely thing to go wrong?' Maybe it just needs gas. If that doesn't work, what's next? Maybe the battery is dead?" Médard says.

### Novel hardware

The GRAND chip uses a three-tiered structure, starting with the simplest possible solutions in the first stage and working up to longer and more complex noise patterns in the two subsequent stages. Each stage operates independently, which increases the throughput of the system and saves power.

The device is also designed to switch seamlessly between two codebooks. It contains two static random-access memory chips, one that can crack codewords, while the other loads a new codebook and then switches to decoding without any downtime.

The researchers tested the GRAND chip and found it could effectively decode any moderate redundancy code up to 128 bits in length, with only about a microsecond of latency.

Médard and her collaborators had previously demonstrated the success of the algorithm, but this new work showcases the effectiveness and efficiency of GRAND in hardware for the first time.

Developing hardware for the novel decoding algorithm required the researchers to first toss aside their preconceived notions, Médard says.

"We couldn't go out and reuse things that had already been done. This was like a complete whiteboard. We had to really think about every single component from scratch. It was a journey of reconsideration. And I think when we do our next chip, there will be things with this first chip that we'll realize we did out of habit or assumption that we can do better," she says.

### A chip for the future

Since GRAND only uses codebooks for verification, the chip not only works with legacy codes but could also be used with codes that haven't even been introduced yet.

In the lead-up to 5G implementation, regulators and communications companies struggled to find consensus as to which codes should be used in the new network. Regulators ultimately chose to use two types of traditional codes for 5G infrastructure in different situations. Using GRAND could eliminate the need for that rigid standardization in the future, Médard says.

The GRAND chip could even open the field of coding to a wave of innovation.