Inventions and Innovations Middle East & Asia

Patented breakthroughs and achievements beyond patents



28 PROFILES • SOURCE-BASED • QR-ENABLED

A companion reference booklet

Compiled by

Dr. John Terkunor Tetteh

© 2026

Inventions and Innovations Middle East & Asia

Patented breakthroughs and achievements beyond patents

Compiled by

Dr. John Terkunor Tetteh

Illustrated biographical edition · 2026

28 profiles across seven chapters
A companion to the African and Europe / United Kingdom volumes

From mathematical manuscripts and water clocks to fibre optics, biomedical tools and advanced materials.

© 2026 Dr. John Terkunor Tetteh
Compilation and editorial material

Research reviewed 6 October 2026.
Cover and profile images are AI-generated illustrative renderings.

REFERENCE BOOKLET

Contents

Reading this booklet	4
Chapter 01 Foundations of discovery	5
Chapter 02 Light, waves and communication	7
Chapter 03 Electronics and digital systems	9
Chapter 04 Medicine and the molecular world	11
Chapter 05 Materials, energy and illumination	13
Chapter 06 Engineering and everyday products	15
Chapter 07 Resources, sensing and public benefit	17
Giving precise credit	19
Research notes	20
Sources and further reading	21
Name index	24
QR and illustration notes	25
Educational support	26

Click a contents entry to open its section.

The profile number is also its principal source number. Additional numbered references support biographical details and shared attribution.

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

REFERENCE BOOKLET

Reading this booklet

This companion presents 28 selected inventors and innovators associated with the Middle East and Asia, including people who carried out important work abroad. It follows the two-column profile format of the African and Europe / United Kingdom volumes.

Scope and geography

Middle East is used here principally for West Asia. The wider selection reaches Central, South, East and Southeast Asia. This is an illustrative selection, not a country-by-country catalogue or a ranking. Birthplaces, historical regions and places of work are distinguished where necessary. Present-day borders are not projected backwards as historic citizenship.

Reading the record

Dates refer to the stated publication, development period, patent grant or product milestone. A research discovery, an engineering programme and a patent are different kinds of achievement. The record label beside each name identifies the type of contribution.

Shared credit matters. Teams, co-authors and earlier work are named where relevant. A patent identifies particular claimed subject matter; it does not establish ownership of an entire technology or a worldwide first.

Personal history and significance

Each profile retains **Personal Life Challenge** and **Legacy and Impact**. Documented personal events are distinguished from professional obstacles. Where private hardship is not established by the selected sources, the entry says so.

Sources and illustrations

Scan or click each profile's QR to open its principal source. Numbered references link to supporting records; additional numbers identify further evidence. The realistic images are representative AI renderings, not archival photographs, patent drawings or verified reconstructions. Specific limitations appear beside each image.

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

CHAPTER 01

Foundations of discovery

Mathematics, optics and mechanical knowledge across centuries.

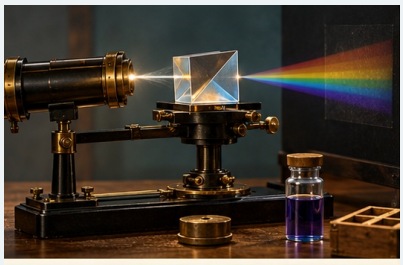
Person, record & QR source	Contribution and significance
01 Muhammad ibn Musa al-Khwarizmi Khwarazm / Baghdad **c. 820** Mathematical method [1] SCAN / CLICK SOURCE [1]  **Illustration focus** A manuscript and instruments evoke mathematical scholarship; the page shown is not an authenticated manuscript. AI-generated illustrative rendering	**A systematic language for algebra** Writing in Arabic in Abbasid Baghdad, al-Khwarizmi organised procedures for solving linear and quadratic equations in his treatise on completion and balancing. His work linked calculation to practical questions, including inheritance and surveying. The word algebra derives from al-jabr in its title. This was a major synthesis and development within a much longer, multicultural history of mathematics. **Personal Life Challenge** The surviving record offers little dependable detail about private hardship. His intellectual task was to explain useful procedures systematically; a personal struggle should not be invented to fill the gaps. **Legacy and Impact** His treatise helped transmit algebraic methods across languages and generations. Recognising his contribution also recognises the scholars, translators and earlier mathematical traditions on which knowledge grows.
02 Ibn al-Haytham Basra, present-day Iraq; Cairo **11th century** Experimental science [2] SCAN / CLICK SOURCE [2]  **Illustration focus** A representative camera-obscura exhibit illustrates optical investigation, not a claim that he invented this particular apparatus. AI-generated illustrative rendering	**Light tested by mathematics and experiment** Ibn al-Haytham examined light through experiments and mathematical reasoning in the Book of Optics and related writings. He designed tests of reflection, refraction and the propagation of light. His work helped make the relationship between observation, hypothesis and demonstration central to optical investigation. He is presented here as a scientific innovator, not as the sole inventor of the camera or of scientific method. **Personal Life Challenge** Later stories about his life are not treated here as securely established personal testimony. What the cited account documents is his demanding programme of testing inherited explanations against evidence. **Legacy and Impact** Translations and later optical scholarship carried his ideas into wider scientific debates. His example shows how questioning an explanation can be as important as making a new instrument.

Person, record & QR source	Contribution and significance
03 Badi al-Zaman al-Jazari Upper Mesopotamia; present-day Türkiye **Late 12th–early 13th century** Documented mechanical designs [3] SCAN / CLICK SOURCE [3]  **Illustration focus** A conceptual peacock water-clock reconstruction; it is not a verified working replica of the manuscript design. AI-generated illustrative rendering	**Water clocks and ingenious mechanisms** Al-Jazari described elaborate mechanical devices that combined useful functions with performance and display. Surviving manuscript pages record water-powered clocks, including a peacock clock whose moving figures indicated passing time. These records reveal skilled hydraulic and mechanical design. The museum folio cited here is a later copy, dated 1315, rather than a drawing physically made by the inventor. **Personal Life Challenge** The source preserves technical designs more fully than personal experience. No specific private hardship is asserted. Turning controlled water flow into reliable motion was the engineering problem embodied in these mechanisms. **Legacy and Impact** His illustrated treatise preserves a valuable record of medieval engineering knowledge and its communication. It supports precise discussion of individual devices without claiming that all automation began with one person.
04 Maryam Mirzakhani Iran; United States **2000s–2010s** Mathematical research [4] SCAN / CLICK SOURCE [4]  **Illustration focus** An abstract surface model evokes her field; it is not a diagram of a particular theorem. AI-generated illustrative rendering	**New understanding of curved surfaces** Mirzakhani developed powerful results connecting geometry and dynamical systems, especially the study of curved surfaces and the spaces that describe their possible shapes. Her work earned the Fields Medal in 2014. It belongs in the category of intellectual innovation beyond patents: mathematical proofs and methods, rather than a manufactured device. **Personal Life Challenge** Stanford records that she lived with breast cancer and died in 2017, aged 40. Her research and teaching continued to inspire colleagues and students. This documented illness is distinct from speculation about the motivations behind her mathematics. [29] **Legacy and Impact** Her work expanded the tools available to mathematicians. As the first woman awarded a Fields Medal, she also offered a visible example of achievement in a field where women had long been underrepresented.

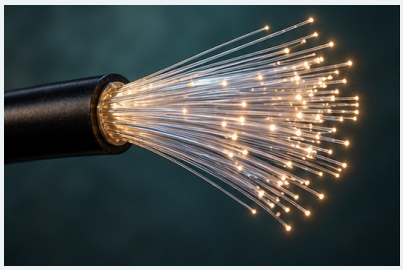
CHAPTER 02

Light, waves and communication

Experiments and instruments that changed how information travels.

Person, record & QR source	Contribution and significance
05 C. V. Raman India **1928** Published discovery [5] SCAN / CLICK SOURCE [5]  **Illustration focus** A representative optical bench and sample vial evoke spectroscopy; the image is not a diagram of Raman scattering. AI-generated illustrative rendering	**Scattered light reveals molecular information** Raman and K. S. Krishnan reported a new type of scattered radiation in 1928. A small fraction of the light interacting with matter changes frequency, reflecting an exchange of energy. The phenomenon became known as the Raman effect. Its later use in spectroscopy allows researchers to investigate molecular composition and structure; the original paper explicitly records both authors. **Personal Life Challenge** Raman initially worked in the Indian Finance Department because a scientific career offered limited prospects. He pursued experiments alongside demanding official duties before moving into full-time academic research. [30] **Legacy and Impact** Raman spectroscopy developed into a widely used analytical technique. The discovery illustrates how careful experiments can create a foundation that later generations transform into practical instruments.
06 Jagadish Chandra Bose Bengal, British India; now Bangladesh / India **1890s** Experimental instruments [6] SCAN / CLICK SOURCE [6]  **Illustration focus** Representative brass microwave apparatus; its arrangement is illustrative rather than an authenticated reconstruction. AI-generated illustrative rendering	**Pioneering millimetre-wave experiments** Bose built apparatus to generate, transmit and detect very short radio waves. His experiments explored reflection, refraction and polarisation, and he investigated crystal detectors. These achievements form an important part of radio science. They should not be simplified into a claim that he alone invented radio, a technology developed through many experimental and engineering contributions. **Personal Life Challenge** Ill health forced him to abandon medical studies in London. He changed direction to physics, studied at Cambridge and later taught and conducted research in Calcutta, now Kolkata. **Legacy and Impact** His work joined instrument making with fundamental investigation. He later applied sensitive measurement to plant physiology and established a research institute, extending his commitment to experimental science.

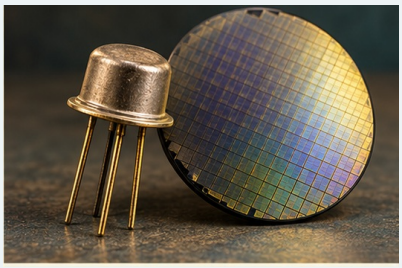
© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

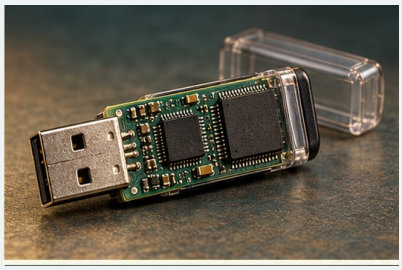
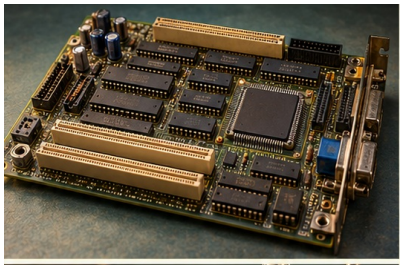
Person, record & QR source	Contribution and significance
07 Charles K. Kao Born in Shanghai; Hong Kong / United Kingdom **1966** Optical communications research [7] SCAN / CLICK SOURCE [7]  **Illustration focus** Modern illuminated fibre strands illustrate an application of the research, not the original 1966 experimental equipment. AI-generated illustrative rendering	**Making glass fibres useful for communication** Kao, working with George Hockham, identified a route towards long-distance optical communication: glass fibres could carry useful signals if losses caused by impurities were sufficiently reduced. Their 1966 work established demanding material targets. Glass-making researchers and telecommunications teams subsequently turned that insight into low-loss fibres and working networks. **Personal Life Challenge** The documented professional obstacle was severe light loss in the available fibres. The challenge was to establish that the limitation could be overcome through materials research. No unverified private hardship is added to this account. **Legacy and Impact** His contribution helped establish the scientific case for optical-fibre telecommunications. It complements, rather than replaces, the credit due to fibre-imaging pioneers, glass specialists and systems engineers.
08 Narinder Singh Kapany India; United Kingdom / United States **1954** Co-authored optical research [8] SCAN / CLICK SOURCE [8]  **Illustration focus** A representative fibre-based viewing instrument illustrates the application; it is not the exact 1954 prototype. AI-generated illustrative rendering	**Flexible fibres for transmitting images** Kapany and Harold Hopkins published A Flexible Fibrescope, using Static Scanning in 1954. Their research advanced image transmission through bundles of glass fibres. Kapany subsequently developed optical technologies in research and industry. His specific achievement in fibre imaging should be distinguished from Kao and Hockham's later work on the material requirements of long-distance communications. **Personal Life Challenge** His career required moves from industry in India and Scotland to doctoral research in London and later to the United States. The institutional account documents that path, but does not establish a particular private hardship. [31] **Legacy and Impact** Fibre imaging helped open new possibilities for viewing inaccessible spaces. His work forms part of a shared history of optics with applications in medicine, inspection and communication.

CHAPTER 03

Electronics and digital systems

Small devices, readable codes and practical computer architecture.

Person, record & QR source	Contribution and significance
09 Dawon Kahng Korea; United States **1960 announcement** Patent US 3,102,230 [9] SCAN / CLICK SOURCE [9]  **Illustration focus** A representative transistor and wafer evoke semiconductor development; the image does not depict a verified patent embodiment. AI-generated illustrative rendering	**The practical MOS field-effect transistor** At Bell Laboratories, Kahng and Mohamed Atalla developed a working metal-oxide-semiconductor field-effect transistor, or MOSFET. Atalla's silicon-surface work was essential to the device. A gate voltage controls electrical conduction, making the transistor useful for switching and amplification. Kahng's cited patent is one part of this collaborative history. **Personal Life Challenge** Their announced device was not immediately welcomed by Bell Laboratories or the wider semiconductor industry. This is a documented professional obstacle; the source does not establish a separate private-life hardship. **Legacy and Impact** MOS technology became fundamental to integrated electronics. Crediting both Kahng and Atalla makes the achievement more accurate and connects this volume with the African-born inventor's contribution.
10 Masahiro Hara Japan **1994** Team-developed code [10] SCAN / CLICK SOURCE [10]  **Illustration focus** A scanner and labelled component evoke the original industrial setting. The functional QR beside this profile opens the source. AI-generated illustrative rendering	**QR Code: fast reading in two dimensions** Hara led development of the QR Code at DENSO. The design addressed a factory problem: reading more information quickly and reliably than existing linear barcodes allowed. Distinctive corner patterns helped scanners locate the code. Colleagues, including Motoaki Watabe, contributed to its development, and wider adoption depended on an ecosystem of readers and applications. [32] **Personal Life Challenge** In a first-person interview, Hara recalled being mocked at school for his Osaka accent after moving to Tokyo. Making models became a source of enjoyment and confidence. He later had to teach himself software as his engineering role changed. **Legacy and Impact** The code moved far beyond vehicle production into services and everyday information access. This booklet's own source QR codes are one example of that continuing utility.

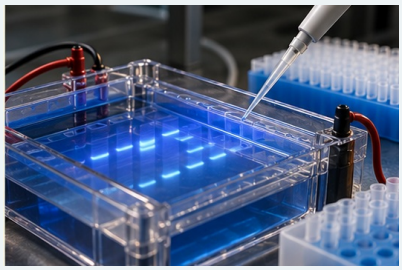
Person, record & QR source	Contribution and significance
11 Dov Moran Israel **2000 patent grant** Co-patent US 6,148,354 [11] SCAN / CLICK SOURCE [11]  **Illustration focus** A representative early flash drive and circuit board, not a photograph of the patented prototype. AI-generated illustrative rendering	**A USB-based flash-disk architecture** Moran, Amir Ban and Oron Ogdan are named inventors on a patent for a universal serial bus-based PC flash disk. M-Systems developed the DiskOnKey product as part of its flash-storage work. The contribution combined portable solid-state storage with a practical computer interface. This profile credits the named team and does not assign invention of USB itself to Moran. [33] **Personal Life Challenge** The patent documents a technical problem and shared inventorship, not private hardship. The accompanying oral history records the company's development journey; this entry avoids turning a business narrative into an unsupported personal-life story. **Legacy and Impact** Portable flash storage made transferring files more convenient. The case demonstrates why a recognisable founder's name should not obscure colleagues named in the technical record.
12 Diosdado "Dado" Banatao Philippines; United States **1980s onward** Computer architecture and products [12] SCAN / CLICK SOURCE [12]  **Illustration focus** A representative PC motherboard shows the setting for chipset innovation; it is not an attributed original Banatao design. AI-generated illustrative rendering	**PC chipsets and graphics acceleration** Banatao pioneered important PC-chipset and graphics-acceleration architectures. Bringing functions into efficient chip designs helped computers become faster and more practical to manufacture. The University of California's CITRIS account recognises both his engineering achievements and his leadership of semiconductor companies. This is a contribution to the development of personal computing, not a claim that he invented the whole computer. **Personal Life Challenge** The cited institutional tribute concentrates on his professional work, mentoring and public service. It does not document a specific private hardship, so none is asserted here. **Legacy and Impact** His influence extended from hardware to support for engineers and entrepreneurs. Through CITRIS and the Banatao Institute, he promoted research intended to turn technical capability into public benefit.

CHAPTER 04

Medicine and the molecular world

Experimental discoveries and engineering that expanded biomedical knowledge.

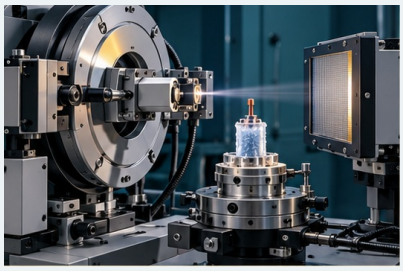
Person, record & QR source	Contribution and significance
13 Tu Youyou China **1970s** Drug-discovery research [13] SCAN / CLICK SOURCE [13]  **Illustration focus** Artemisia leaves and laboratory vessels represent drug-discovery work, not a preparation guide. AI-generated illustrative rendering	**Artemisinin and malaria research** Tu and her research team investigated traditional medical literature and Artemisia annua in the search for antimalarial compounds. A revised, lower-temperature extraction approach helped preserve activity and led to artemisinin research. Her contribution combined historical knowledge with experimental chemistry and testing; it was part of a large collaborative research programme. **Personal Life Challenge** Tuberculosis interrupted her schooling at sixteen and required two years of treatment and recovery before she resumed her education. Her autobiographical account records this directly. **Legacy and Impact** Artemisinin and its derivatives became central to important antimalarial medicines. Tu's story illustrates the value of testing promising ideas rigorously. The historical account is not a recommendation to use the plant itself or to self-treat malaria.
14 Har Gobind Khorana Born in Punjab, now Pakistan; United States **1960s–1970s** Biochemical methods [14] SCAN / CLICK SOURCE [14]  **Illustration focus** Laboratory glassware represents nucleic-acid chemistry; it is not a molecular model or an original apparatus. AI-generated illustrative rendering	**Reading the genetic code through synthesis** Khorana and colleagues used chemically constructed nucleic-acid sequences to investigate how genetic information directs protein production. He shared the 1968 Nobel Prize with Robert Holley and Marshall Nirenberg. His group also pioneered synthetic-gene work. These were collaborative biochemical achievements, not the invention of DNA itself. **Personal Life Challenge** He grew up in a poor rural family whose father strongly supported education. After years abroad, he also described feeling without a settled home; his wife Esther helped him find continuity and purpose. **Legacy and Impact** His experiments helped establish the relationship between nucleotide sequences and proteins. Synthetic approaches gave later researchers powerful ways to investigate genes, while his teaching trained further generations of scientists.

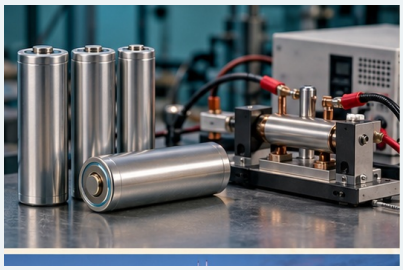
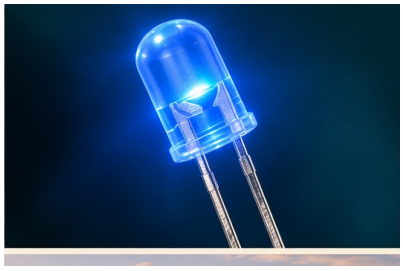
Person, record & QR source	Contribution and significance
15 Aziz Sancar Türkiye; United States **1970s–1980s** Molecular biology research [15] SCAN / CLICK SOURCE [15]  **Illustration focus** A representative molecular-biology bench evokes experimental DNA research, not a depiction of a specific repair pathway. AI-generated illustrative rendering	**Explaining how cells repair damaged DNA** Sancar investigated mechanisms that repair damaged DNA, including nucleotide excision repair. His experiments clarified how enzymes recognise damage and remove an affected segment so that the DNA can be restored. He shared the 2015 Chemistry Nobel Prize with Tomas Lindahl and Paul Modrich, whose work addressed other essential repair mechanisms. **Personal Life Challenge** After his doctorate, three laboratories rejected his applications. He took a laboratory-technician position at Yale and continued developing his research career. The account is documented in a scientific profile based on interviews. [34] **Legacy and Impact** This research strengthened understanding of genome maintenance and the consequences of repair failure. It provides foundations for biomedical research rather than a claim that one scientist invented a universal cancer treatment.
16 Gavriel Iddan Israel **2001 product release** Medical-device development [16] SCAN / CLICK SOURCE [16]  **Illustration focus** A representative capsule camera and receiver. This is illustrative, not a verified product photograph or clinical instruction. AI-generated illustrative rendering	**A camera small enough to swallow** Iddan helped pioneer wireless capsule endoscopy: a small camera, illumination, power supply and transmitter housed in a swallowable capsule. Work by Given Imaging and clinical collaborators helped bring the system into practice. The original capsule-endoscopy publication named Iddan, Gavriel Meron, Arkady Glukhovsky and Paul Swain. [35] **Personal Life Challenge** The documented challenge was professional: combining imaging, power and transmission in a very small device. The cited sources do not establish a particular private hardship, so none is added. **Legacy and Impact** The system expanded ways of examining parts of the digestive tract that had been difficult to view. Its significance rests on both miniaturisation and collaboration between engineering and medicine; different procedures still serve different clinical purposes.

CHAPTER 05

Materials, energy and illumination

Structures and devices that enable new capabilities.

Person, record & QR source	Contribution and significance
17 Ada Yonath Jerusalem; Israel **Late 1970s–2000s** Structural biology methods [17] SCAN / CLICK SOURCE [17]  **Illustration focus** A representative crystallography setting evokes the research; it is not an atomic structure model. AI-generated illustrative rendering	**Revealing the ribosome's structure** Yonath pursued crystallographic study of the ribosome, the cellular machinery that builds proteins. Her work on crystals and low-temperature methods helped make structural investigation possible. She shared the 2009 Chemistry Nobel Prize with Venkatraman Ramakrishnan and Thomas Steitz. The achievement revealed structure and function; it did not invent the ribosome. [36] **Personal Life Challenge** Her family had little money, and her father died when she was eleven. She worked at cleaning, childcare and tutoring while continuing her education. The Nobel account documents both these responsibilities and the family's encouragement of her curiosity. **Legacy and Impact** Understanding ribosome structure helped explain how antibiotics interact with it and opened paths for further research. The achievement shows the long-term value of persevering with a difficult experimental method.
18 Omar M. Yaghi Jordan-born; Palestinian family; United States **1990s onward** Reticular chemistry [18] SCAN / CLICK SOURCE [18]  **Illustration focus** A material sample and water-collection apparatus illustrate possible applications, not a performance claim for a specific device. AI-generated illustrative rendering	**Building porous materials by design** Yaghi advanced the design and synthesis of metal-organic frameworks, combining metal-containing units with organic linkers into porous structures. His group's work demonstrated robust frameworks with permanent porosity. These materials can be tailored for research on gas capture, storage and water harvesting. He shared the 2025 Chemistry Nobel Prize with Susumu Kitagawa and Richard Robson. [37] **Personal Life Challenge** Born in Amman to Palestinian refugee parents, he moved to the United States at fifteen to study. Berkeley records that he arrived with limited English and first took language, mathematics and science courses before transferring to university. [37] **Legacy and Impact** The work expanded chemists' ability to design materials around a desired structure. Environmental applications are promising areas of development; their performance depends on the material and the complete engineered system.

Person, record & QR source	Contribution and significance
19 Akira Yoshino Japan **1985** Battery development [19] SCAN / CLICK SOURCE [19]  **Illustration focus** Modern rechargeable cells and a test fixture illustrate the technology family, not Yoshino's original prototype. AI-generated illustrative rendering	**A practical rechargeable lithium-ion design** Yoshino developed a battery using a carbon-based petroleum-coke anode able to host lithium ions. Building on earlier advances, including John Goodenough's cathode work, the design avoided a metallic-lithium anode and helped establish a commercially viable lithium-ion battery. He shared the 2019 Chemistry Nobel Prize with Goodenough and M. Stanley Whittingham. [38] **Personal Life Challenge** The central documented obstacle was the engineering balance between useful energy storage and safer electrode materials. No specific private hardship is established by the source used for this entry. **Legacy and Impact** Rechargeable lithium-ion technology became important to portable electronics and electric vehicles. Its development depended on successive materials discoveries, cell engineering and later manufacturing improvements across many teams.
20 Shuji Nakamura Japan; United States **Early 1990s** Semiconductor-device development [20] SCAN / CLICK SOURCE [20]  **Illustration focus** A representative glowing blue diode illustrates the device class; it is not a photograph of the first successful chip. AI-generated illustrative rendering	**Efficient blue light-emitting diodes** Nakamura made crucial advances in gallium-nitride-based blue LEDs. Efficient blue light made new combinations for bright, energy-saving white lighting possible. His work was recognised in the 2014 Physics Nobel Prize alongside Isamu Akasaki and Hiroshi Amano, whose related contributions are essential to the history. [39] **Personal Life Challenge** His Nobel biography recalls disappointing university entrance results and a change from ambitions in theoretical physics or mathematics towards engineering. His eventual path relied heavily on practical skill and sustained experimentation. **Legacy and Impact** Blue LEDs helped transform lighting and display technology. The achievement illustrates how improvements to semiconductor materials and fabrication can enable products used on an enormous scale.

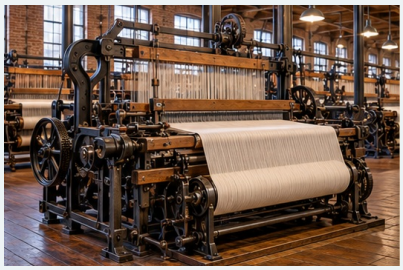
CHAPTER 06

Engineering and everyday products

Buildings, aircraft, machinery and food-processing innovation.

Person, record & QR source	Contribution and significance
21 Fazlur Rahman Khan Born in present-day Bangladesh; United States **1960s–1970s** Structural engineering [21] SCAN / CLICK SOURCE [21]  **Illustration focus** A representative Chicago skyline highlights the application of bundled-tube engineering; it is not a construction drawing. AI-generated illustrative rendering	**Tube structures for tall buildings** Working at Skidmore, Owings & Merrill, Khan developed influential tubular structural systems for high-rise buildings. Framed, braced and bundled arrangements improved how tall structures resisted forces. His engineering, in collaboration with architects and project teams, helped realise buildings such as the John Hancock Center and Sears Tower, now Willis Tower. **Personal Life Challenge** The cited practice history documents his professional contribution rather than a private-life hardship. The design challenge was to combine structural efficiency with usable space and architectural ambition. **Legacy and Impact** His methods changed the possibilities of tall-building design. The legacy belongs to engineering practice as well as to landmark skylines, demonstrating the value of close collaboration between structural engineers and architects.
22 B. J. Habibie Indonesia; Germany **1995 first flight** Aircraft programme leadership [22] SCAN / CLICK SOURCE [22]  **Illustration focus** A representative regional turboprop evokes the N-250 programme; it is not an authenticated image of that aircraft. AI-generated illustrative rendering	**Developing the N-250 turboprop** Habibie led Indonesia's ambitious aircraft-development programme at IPTN. The N-250 incorporated features including fly-by-wire control and an advanced cockpit; its first prototype flew on 10 August 1995. It was the work of an engineering organisation and its partners, not a one-person aircraft invention. The prototype later became a museum exhibit. **Personal Life Challenge** The evidence used here documents the professional demands of taking a national aircraft programme from design and fabrication to flight. It does not establish a specific private hardship, so that is not inferred. **Legacy and Impact** The programme became an important symbol of Indonesian technological capability and engineering education. Its first-flight date is commemorated as National Technology Awakening Day. A prototype milestone should be distinguished from sustained commercial production.

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

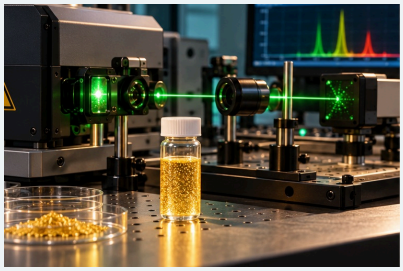
Person, record & QR source	Contribution and significance
23 Sakichi Toyoda Japan **1924 Type G loom** Textile-machinery innovation [23] SCAN / CLICK SOURCE [23]  **Illustration focus** A representative automatic loom in a factory setting; the rendering does not authenticate a particular Type G configuration. AI-generated illustrative rendering	**Automatic loom improvements** Toyoda's work improved powered weaving through mechanisms that reduced stoppages and responded to broken threads. The Type G automatic loom became an important part of this development, with a shuttle-change system that allowed continued operation. These were improvements within a long history of weaving machinery, not the invention of weaving or the loom itself. [40] **Personal Life Challenge** The corporate history documents repeated technical development and the need to make automatic weaving dependable. A particular private-life hardship is not established in the sources selected for this entry. **Legacy and Impact** Loom development contributed to the industrial foundation from which the Toyota group grew. Automatic responses to faults also influenced its manufacturing philosophy, connecting machine design with quality control.
24 Momofuku Ando Taiwan-born; Japan **1958; 1971** Food-process and product innovation [24] SCAN / CLICK SOURCE [24]  **Illustration focus** Dried noodles and a prepared cup illustrate the food format; no particular brand or historic package is reproduced. AI-generated illustrative rendering	**Instant noodles and the cup format** Ando developed a flash-frying method that dried cooked noodles while leaving a structure that could absorb hot water quickly. Chicken Ramen launched in 1958. Later work combined noodles, packaging and manufacturing methods in Cup Noodles, introduced in 1971. The achievement concerned processing and convenience, not the invention of noodles. **Personal Life Challenge** In 1957, a credit union of which he was a director failed, and he lost nearly all his property. Nissin's account describes his subsequent experiments in a small backyard shed. **Legacy and Impact** His innovations helped create a global convenience-food industry. They show how an established food can be transformed through preservation, preparation and packaging design, with subsequent products adapted to different markets.

CHAPTER 07

Resources, sensing and public benefit

Applying scientific knowledge to local needs and wider challenges.

Person, record & QR source	Contribution and significance
25 Maria Ylagan Orosa Philippines **1920s–1940s** Food technology [25] SCAN / CLICK SOURCE [25]  **Illustration focus** Bananas, sauce bottles and preserved foods evoke her field; they are representative products, not original recipes or archival objects. AI-generated illustrative rendering	**Local ingredients, preservation and nutrition** Orosa developed food products and preservation methods using Philippine ingredients, including banana ketchup and the soybean preparation Soyalac. Her work linked laboratory knowledge with household and community needs. The significance lies in practical food technology and nutrition, rather than a claim that she invented food preservation as a whole. **Personal Life Challenge** During the Japanese occupation, she helped supply food to people in need and to prisoners. She was killed during the fighting in Manila in 1945. Her wartime service and death are documented in the historical account. **Legacy and Impact** She is remembered for connecting scientific expertise with humanitarian action and local food resources. Her work illustrates how useful innovation can emerge in kitchens, processing facilities and community programmes as well as in large industrial laboratories.
26 Arturo Pineda Alcaraz Philippines **1950s–1970s** Applied geothermal development [26] SCAN / CLICK SOURCE [26]  **Illustration focus** A representative geothermal installation in a volcanic landscape, not a photograph of a named plant. AI-generated illustrative rendering	**Turning underground heat into electricity** Alcaraz helped establish Philippine geothermal development, bringing together volcanology, resource investigation and electricity generation. His leadership supported projects at Tiwi and Mac-Ban and the training of specialists. The achievement was the practical development of national resources with teams and international expertise, rather than invention of geothermal energy. **Personal Life Challenge** The award record emphasises perseverance in public service. Wet-steam resources presented a difficult technical problem, requiring knowledge and equipment suited to local conditions. No separate private hardship is asserted. **Legacy and Impact** His work helped establish geothermal electricity as a significant Philippine energy resource and strengthened technical capacity. The case shows that adapting and implementing technology can be a major form of innovation.

Person, record & QR source	Contribution and significance
27 Tuan Vo-Dinh Vietnam; Switzerland / United States **1980s onward** Optical sensing and biosensors [27] SCAN / CLICK SOURCE [27]  **Illustration focus** A representative optical biosensing bench; the image is not a validated clinical device or an experimental result. AI-generated illustrative rendering	**Light-based tools for detecting molecules** Vo-Dinh developed optical sensing methods and devices, including work using surface-enhanced Raman scattering. His group's molecular probes investigate nucleic-acid biomarkers, while other projects address environmental monitoring and biomedical imaging. This profile covers a programme of instrument and method innovation, not one universal diagnostic machine. **Personal Life Challenge** Institutional records describe education in Switzerland and research in the United States following his Vietnamese origins. They do not establish a specific private hardship; migration alone is not treated as proof of adversity. [41] **Legacy and Impact** His work connects photonics with analytical chemistry and biomedical research. It illustrates the route from a physical measurement principle to specialised sensors, while clinical research findings still require appropriate validation before routine use.
28 Jackie Yi-Ru Ying Taiwan-born; Singapore / United States **2014 research report** Team-developed nanoprobes [28] SCAN / CLICK SOURCE [28]  **Illustration focus** A representative nanoprobe laboratory. Coloured samples are illustrative and do not reproduce the actual test's result scale. AI-generated illustrative rendering	**Nanomaterials for genetic testing** Ying and collaborators in Singapore, Taiwan and Japan developed gold-nanoparticle probes for identifying small genetic variations. The reported system used changes in colour and binding behaviour to distinguish sequences. A*STAR described a patented test developed around warfarin-related genetic variations, with further work needed for other applications. **Personal Life Challenge** In a first-person interview, Ying explained that professional responsibilities took up much of her time and that she tried to spend as much of her spare time as possible with her daughter. Her account reveals the personal demands of combining a research career with family life. [42] **Legacy and Impact** The work shows how materials chemistry can contribute to practical biological tests. Her broader research and institution-building helped connect nanoscience with biomedical and catalytic applications.

REFERENCE BOOKLET

Giving precise credit

Recognition is stronger when it identifies the contribution accurately. These examples preserve shared credit and distinguish devices from discoveries.

Broad claim	Precise contribution
“Al-Khwarizmi invented all algebra.”	He systematised and developed influential algebraic methods within a much longer mathematical history. Profile 01 · [1]
“Ibn al-Haytham invented the camera.”	His optical research linked mathematics and experiment. This entry makes no sole-inventor claim for the camera. Profile 02 · [2]
“One person invented fibre optics.”	Kapany and Hopkins advanced fibre imaging; Kao and Hockham addressed low-loss communication. Other teams developed materials and systems. Profiles 07–08 · [7–8] [31]
“Kahng alone invented the MOSFET.”	Kahng’s work with Mohamed Atalla produced the practical device. Atalla’s surface research was essential. Profile 09 · [9]
“Moran invented USB.”	Ban, Moran and Ogdan co-patented a USB-based flash-disk architecture. USB itself is a different technology. Profile 11 · [11]
“Tu invented a traditional plant cure.”	Tu and her team extracted and investigated an active compound through a research programme; the plant and the medicine are not interchangeable. Profile 13 · [13]
“Iddan alone made capsule endoscopy.”	Iddan’s engineering contribution belongs with co-authors, clinical collaborators and the product-development team. Profile 16 · [16] [35]
“Yoshino invented every lithium battery.”	His carbon-anode design built on earlier work. Whittingham, Goodenough and Yoshino shared the 2019 Nobel Prize. Profile 19 · [19] [38]
“Nakamura alone invented blue LEDs.”	Efficient blue LEDs emerged through contributions by Akasaki, Amano and Nakamura and their research teams. Profile 20 · [20] [39]
“Alcaraz invented geothermal energy.”	He led important Philippine geothermal development and helped build specialist capability. Profile 26 · [26]

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

REFERENCE BOOKLET

Research notes

Selection and evidence

This edition uses original scientific papers and patents alongside records from museums, universities, award organisations, government institutions and the organisations involved in the work. The 28 profiles illustrate several kinds of innovation across a large region; they are not intended to exhaust its history.

References [1–28] are the principal sources for the corresponding profile numbers. References [29–42] provide additional biographical or technical evidence. A source QR opens the principal record; clickable citations provide the additional route where used.

How priority claims are handled

The text favours a specific contribution over a sweeping “invented everything” claim. Publication, patent grant, prototype, product release and commercial adoption are different milestones. An award may recognise a discovery or research programme without establishing a patent or settling every historical priority question.

Reading institutional accounts critically

Company histories and institutional tributes are useful records, but may use promotional language. This booklet narrows their wording where necessary and names co-authors and collaborators. Historical manuscript copies document transmitted designs; their copying date is not automatically the invention date.

People, movement and shared knowledge

The place labels identify connections rather than exclusive national ownership. Research performed in Europe or America may appear here where the person’s origins or substantial professional connection belongs to this volume. The same technology can connect more than one booklet.

Editorial limits

The Personal Life Challenge sections do not infer discrimination, poverty or private distress from a person’s identity or birthplace. The Legacy and Impact sections explain significance, while emerging biomedical or environmental applications are distinguished from established products. This is an educational historical reference, not a technical construction or treatment manual.

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

REFERENCE BOOKLET

Sources and further reading

Linked source register · references 1–14 · reviewed 6 October 2026

[1] Library of Congress — The Compendious Book on Calculation by Completion and Balancing
loc.gov · Click title to open

[2] UNESCO Courier — Ibn al-Haytham's scientific method
courier.unesco.org · Click title to open

[3] The Metropolitan Museum of Art — Design for the Water Clock of the Peacocks
metmuseum.org · Click title to open

[4] Stanford University — Maryam Mirzakhani wins Fields Medal
news.stanford.edu · Click title to open

[5] Raman & Krishnan — A New Type of Secondary Radiation, Nature (1928)
nature.com · Click title to open

[6] IEEE / Engineering and Technology History Wiki — Jagadish Chandra Bose
ethw.org · Click title to open

[7] Charles K. Kao — Nobel Lecture: Sand from centuries past; Send future voices fast (2009)
nobelprize.org · Click title to open

[8] Hopkins & Kapany — A Flexible Fibrescope, using Static Scanning, Nature (1954)
nature.com · Click title to open

[9] National Inventors Hall of Fame — Dawon Kahng
invent.org · Click title to open

[10] DENSO — Interview with Masahiro Hara: Believing in a Faint Light (2024)
denso.com · Click title to open

[11] US 6,148,354 — Ban, Moran & Ogdan: Architecture for a USB-based PC flash disk
patents.google.com · Click title to open

[12] University of California, CITRIS — In Memoriam: Dado Banatao (2026)
citris-uc.org · Click title to open

[13] Nobel Foundation — Tu Youyou: Biographical
nobelprize.org · Click title to open

[14] MIT — Gobind Khorana, professor emeritus, dies at 89 (2011)
news.mit.edu · Click title to open

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

REFERENCE BOOKLET

Sources and further reading

Linked source register · references 15–28 · reviewed 6 October 2026

[15] Nobel Foundation — Aziz Sancar: Facts
nobelprize.org · Click title to open

[16] European Patent Office — Gavriel Iddan: pill-sized cameras
epo.org · Click title to open

[17] Nobel Foundation — Women who changed science: Ada Yonath
nobelprize.org · Click title to open

[18] University of California, Berkeley — Omar M. Yaghi: research profile
vcresearch.berkeley.edu · Click title to open

[19] Nobel Foundation — Akira Yoshino: Facts
nobelprize.org · Click title to open

[20] Nobel Foundation — Shuji Nakamura: Biographical
nobelprize.org · Click title to open

[21] Skidmore, Owings & Merrill — Our Legacy: Fazlur Khan and tube structures
som.com · Click title to open

[22] Indonesia Baik — The N-250 Gatotkaca’s journey to the museum
indonesiabaik.id · Click title to open

[23] Toyota Motor Corporation — Type G Automatic Loom donated to Britain’s Science Museum (2000)
global.toyota · Click title to open

[24] Nissin Foods — Our Founder: Momofuku Ando
nissin.com · Click title to open

[25] U.S. National Park Service — Maria Ylagan Orosa
nps.gov · Click title to open

[26] Ramon Magsaysay Award Foundation — Arturo Pineda Alcaraz (1982)
rmaward.asia · Click title to open

[27] Duke University — Tuan Vo-Dinh: research and selected works
scholars.duke.edu · Click title to open

[28] A*STAR Research — Colorful nanoprobes make a simple test (2014)
research.a-star.edu.sg · Click title to open

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

REFERENCE BOOKLET

Sources and further reading

Linked source register · references 29–42 · reviewed 6 October 2026

[29] Stanford University — Remembering Maryam Mirzakhani (2017)
news.stanford.edu · Click title to open

[30] Nobel Foundation — C. V. Raman: Biographical
nobelprize.org · Click title to open

[31] Imperial College London — Fibre optics pioneer celebrated (2023)
imperial.ac.uk · Click title to open

[32] DENSO — From Manufacturing Tool to Modern Life Staple
denso.com · Click title to open

[33] Computer History Museum — Dov Moran and Aryeh Mergi oral history
computerhistory.org · Click title to open

[34] PNAS — Profile of Aziz Sancar (2005)
pmc.ncbi.nlm.nih.gov · Click title to open

[35] Iddan, Meron, Glukhovsky & Swain — Wireless capsule endoscopy, Nature (2000)
pubmed.ncbi.nlm.nih.gov · Click title to open

[36] Nobel Foundation — Chemistry Prize 2009: press release
nobelprize.org · Click title to open

[37] UC Berkeley — Omar Yaghi shares 2025 Nobel Prize in Chemistry
news.berkeley.edu · Click title to open

[38] Nobel Foundation — Chemistry Prize 2019: popular information
nobelprize.org · Click title to open

[39] Nobel Foundation — Physics Prize 2014: press release
nobelprize.org · Click title to open

[40] Toyota — The Birth of Jidoka
toyota-global.com · Click title to open

[41] Oak Ridge National Laboratory — Lowndes, Stephenson and Vo-Dinh named Corporate Fellows
ornl.gov · Click title to open

[42] Royal Society of Chemistry — Interview with Jackie Ying (2014)
pubs.rsc.org · Click title to open

REFERENCE BOOKLET

Name index

Alphabetical by displayed name. Click an entry to open its profile page.

Ada Yonath · 17 / p. 13

Akira Yoshino · 19 / p. 14

Arturo Pineda Alcaraz · 26 / p. 17

Aziz Sancar · 15 / p. 12

B. J. Habibie · 22 / p. 15

Badi al-Zaman al-Jazari · 03 / p. 6

C. V. Raman · 05 / p. 7

Charles K. Kao · 07 / p. 8

Dawon Kahng · 09 / p. 9

Diosdado “Dado” Banatao · 12 / p. 10

Dov Moran · 11 / p. 10

Fazlur Rahman Khan · 21 / p. 15

Gavriel Iddan · 16 / p. 12

Har Gobind Khorana · 14 / p. 11

Ibn al-Haytham · 02 / p. 5

Jackie Yi-Ru Ying · 28 / p. 18

Jagadish Chandra Bose · 06 / p. 7

Maria Ylagan Orosa · 25 / p. 17

Maryam Mirzakhani · 04 / p. 6

Masahiro Hara · 10 / p. 9

Momofuku Ando · 24 / p. 16

Muhammad ibn Musa al-Khwarizmi · 01 / p. 5

Narinder Singh Kapany · 08 / p. 8

Omar M. Yaghi · 18 / p. 13

Sakichi Toyoda · 23 / p. 16

Shuji Nakamura · 20 / p. 14

Tu Youyou · 13 / p. 11

Tuan Vo-Dinh · 27 / p. 18

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

REFERENCE BOOKLET

QR and illustration notes

A research trail beside every profile

Each of the 28 profiles has a black-and-white QR code and a clickable link to its principal source. The code is functional information, generated separately from the artwork. Allow the complete white border to remain visible when printing. For small print or a difficult scan, click the QR in the PDF or use the linked source register.

What the images show

The cover and interior images were created as realistic AI-assisted illustrations for this edition. They portray representative apparatus, product families, historical settings or applications. They are not photographs of the people profiled, evidence of a patent's exact configuration, or authentication of a particular historical object.

Historical clocks, optical instruments and mathematical objects are conceptual renderings. Laboratory scenes do not encode experimental results or validated molecular structures. The aircraft, buildings and modern devices illustrate the field; the adjacent captions explain the specific scope.

Why this distinction matters

The written source record establishes attribution. An appealing image cannot establish who invented a device, when it was made or whether it works as depicted. The source links invite readers to inspect original papers, patent specifications and institutional collections.

Using the companion series

Read these profiles alongside the African and Europe / United Kingdom volumes to see how ideas, people and materials move between regions. The shared cover hierarchy, two-column layout and biographical sections make the volumes usable together while each keeps its own visual identity.

Further enquiry

Choose one profile and compare the principal source with its additional references. Identify the exact contribution, the collaborators, the milestone date and one claim that the evidence does not justify. This exercise turns recognition into careful historical enquiry.

© 2026 Dr. John Terkunor Tetteh | j.tetteh@diknow.com | www.diknow.com

THIS BOOKLET IS FREE

FREE TO DOWNLOAD • FREE TO READ • FREE TO SHARE FOR PERMITTED EDUCATIONAL USE

This publication is made freely available for educational and informational purposes.

No payment or contribution is required to download, read or share this booklet for permitted personal and educational purposes.

If you have found the publication valuable and would like to support the research, verification, preparation and production of future DiKnow educational publications, voluntary support is welcome.

SUPPORT FUTURE EDUCATIONAL PUBLICATIONS

Visit:

www.diknow.com/educational-support

- ✓ Download this booklet FREE
- ✓ Discover other free educational publications
- ✓ Make an optional voluntary contribution
- ✓ Find current verified DiKnow payment details

No contribution is required to access any free publication.

OR SCAN

Scan to open the official Educational Support page

diknow.com/educational-support

DiKnow Technologies

www.diknow.com | j.tetteh@diknow.com

© 2026 Dr. Terkunor Tetteh / DiKnow Technologies