



A Fast Read on the Latest in Lab Automation

NOV 2007

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This Month's Lab Man Podcast and Blog

Dean Kamen Talks About Technology Education And FIRST

We're all aware that too few new graduates are entering the fields of science and engineering. Dean Kamen, the inventor of the Segway, is doing something about it with his organization FIRST (For Inspiration and Recognition of Science and Technology) to which ALA has donated \$100,000. The Lab Man talks with Kamen about this effort and ALA's support for his program.

[Podcast](#); [Blog](#).



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New Job Opportunities

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Novartis Consumer Health, Inc.

- Process Development Scientist
- Senior Process Development Scientist

Bristol-Myers Squibb Company

- Associate Research Scientist II

and more...



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What's so funny? [Click here](#) for this month's *The New Yorker* cartoon.

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Mapping Everything

Science & Spirit (11/07) Putney, Margaret

From 1999 to 2003, the Human Genome Project mapped human DNA and triggered global collaboration on similar efforts. The Human Genome Project launched its efforts in a number of “sequencing centers” in the United States, Europe, and Asia. These centers relied on automated DNA sequencers and computers to translate the 3 billion codes of human DNA around the clock. The results would be immediately posted online. A commercial entity called Celera Genomics also conducted sequencing work, and the project was completed in 2003. A 10-year, federally funded project was launched in 2000 to map proteins via the Protein Structure Initiative. But whereas DNA sequencing involves four chemical codes, A, T, C, and G, protein structures must be isolated, crystallized, and placed under an x-ray to form an “electron density map.” In 2003, Microsoft co-founder Paul Allen invested \$100 million in a project to locate the genes responsible for brain functions in a mouse. The Allen Brain Atlas was completed in 2006 and the results have been posted online.

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Forensic Technology Widens Net for Drugs of Abuse: The Rise of LC/MS/MS for Toxicology Testing

Forensic Magazine (11/07) Sasaki, Tania A.

Forensic toxicology labs are under increasing pressure to analyze more samples in a shorter time while ensuring accuracy. Labs need to use newer technologies to streamline assessments. For example, analytical techniques should enable researchers to identify minute levels of certain drugs even when they are mixed with large concentration of other drugs. LC/MS/MS is increasingly being used for toxicology screening. It represents a standardized analytic technique that is already widely used for pharmaceutical drug discovery and development. “When used as a screening system, LC/MS/MS may potentially replace immunoassay in the ease of development,” asserts Greg Ohlson, a criminalist at the Arizona Department of Public Safety. Software applications have also made LC/MS/MS easy to use. In contrast, GC/MS requires longer preparation and run times. It has also been determined that each sample on an LC/MS/MS system costs approximately \$2.50 after the initial cost of the system, compared to about \$19.50 for a sample on an LC/UV based system, according to Warren Walsh, senior technologist in charge of the toxicology laboratory at Sick Kids Hospital in Toronto, Canada.

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Codon Devices Awarded \$1.5 Million Grant by National Institute of Standards and Technology

Lab Business Week (11/11/07) P. 685

The National Institute of Standards and Technology has awarded Codon Devices a \$1.5 million grant to develop an integrated microfluidics platform that considerably lessens the cost and difficulty of building complex DNA fragments. The efforts of the constructive biology company will help improve gene synthesis and enhance the use of synthetic biology strategies in biotechnology research. “Funding from this initiative will enable us to develop a new generation of rapid, automated systems for construction of longer, more complex DNA sequences,” says Brian Baynes, founder and president of Codon. “By integrating this technology with our BioFAB Production Platform, we will make these new tools available to our customers and partners and accelerate critical applications such as drug discovery and development of renewable energy systems.”

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BioSystem Development Makes Progress

Wisconsin State Journal (11/06/07) Newman, Judy

BioSystem Development’s AssayMAP system is a more economical and efficient way of conducting drug analyses. The company has received \$600,000 in investments, and Bayer HealthCare’s Global Biologics Development Group has signed-on to be BioSystem’s first customer. The AssayMAP can test small drug samples at a higher accuracy rate than previous methods and produces results in 15 minutes. Company president and CEO Craig Hutchison said the system is slated “to reduce the cost of sample preparation drastically and improve its reliability.” Hutchison said the first version of AssayMAP would be used by Bayer, while BioSystem would continue working with Bayer employees amid further product developments.

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Handheld Devices for Automating Maintenance of Laboratory Instrumentation Available From Techs4Biz

Ferret.com (11/06/07)

Automation is an important tool in the management of laboratory inspections, maintenance, and service activities. Automation enables such things as equipment tracking, scheduling, service management, and management of parts and inventories. PDAs (personal digital assistants) and other handheld devices can automate laboratory equipment maintenance and replace paper work orders. Most of these devices usually operate on the Palm Operating System (PalmOne) or Pocket PC (Microsoft); both platforms are suitable for handling lab inspection and service software. Typically, handhelds provide data that exists in paper form or on the desktop. This can include monthly inspection reports, equipment and activities lists, tracking employees, creating corrective work orders, and asset tracking/audit. However, handhelds should be accompanied by desktop or server applications to maximize utilization and return on investment. These applications include scheduling, tracking, management functions and reports, and analysis tools. When selecting software for a PDA, it is important to determine what is needed, who will use the system, and assess the features offered by different vendors. Selection should be based on value and best fit.

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Electrovac Group Goes Nano

Nanowerk.com (11/05/2007)

The Electrovac Group has a second production facility up and running for Electrovac Nanofibers. The highly automated facility near Vienna, Austria, offers an innovative approach to continuous synthesis in that it makes use of an optimized Chemical Vapor Deposition process and low costs of investments. For several years, the compound material producer in Austria has run a batch process production for Electrovac Nanofibers. The pilot plant will help boost annual production to more than 10 metric tons. "The investment in the new plant is an important step towards industrial CNF applications," says Reinhard Kriegbaum, head of sales and marketing for nanotechnology in the Electrovac Group. "It makes Electrovac one of the leading manufacturers of carbon nanofibers and underlines Electrovac's reputation as an innovation-oriented company." Research into optimizing the production process and procedures will also be a focus of the new facility.

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Automated Pipetting Makes Most of Real-Time PCR

Laboratory Talk (UK) (11/02/07)

The use of an Eppendorf automated pipetting system for real-time PCR set-up to analyze DNA can help save staff time, reduce PCR reagent costs, and speed up the completion of projects. LGC recently conducted a DTI-funded contract research project in the personal care/clinical sector. "This large-scale study involved detecting indicator microbes and generating high quality quantitative data, in order to make comparisons between real-time PCR and standard microbiological techniques," reveals Gavin Nixon, a senior researcher in LGC's bioanalysis team. The use of manual plates was impractical, and the team eventually selected Eppendorf's EPmotion 5075 LH, based on its flexibility, pipetting accuracy at extremely small volumes, and very user-friendly software. "Significantly, the advantages of automation are combined with increased reproducibility of results and high quality data output - which is vital for the services LGC delivers." LGC was able to integrate the EPmotion system into assay set-up processes, reducing the expected screening study time. Its real-time PCR instrument also exhibited high-throughput capabilities.

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Fettling Robot 'Feels' Its Way Around Castings

Manufacturing Talk (11/01/07)

RobotWare Machining FC promises to increase the productivity and quality of robot automation. Designed for use with ABB robots, the new software product is capable of grinding and finishing castings while maintaining constant pressure between the tool and work surface. FC Pressure and FC SpeedChange are the key features of RobotWare Machining FC, which also lowers programming time, offers a shorter cycle time, and helps lengthen tool life. While FC Pressure oversees a robot's grinding, polishing and buffing of castings, FC SpeedChange allows a robot to deburr or deflash part line and surfaces of castings at a controlled speed, and slow down when encountering excessive burr. Foundry finishing has often been a labor-intensive process with inconsistent product quality. When a position-controlled robot encountered problems along the programmed path, the servomechanism increased power until maximum torque, which caused a collision with excess material, the robot to stop, tools to break, and damage to the work piece. "The new RobotWare Machining FC function removes the bottleneck and greatly increases process efficiency, saving time, raising overall consistency and boosting product quality," says Andreas Eriksson, Product Manager Foundry, ABB Robotics.

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Cells Caught in a 'Tractor Beam'

DrugResearcher.com (UK) (11/01/07) Wilkinson, Matt

Researchers at the Massachusetts Institute of Technology (MIT) have created a "tractor beam" that lets them move specific cells on a microchip surface. The discovery may eventually help biological devices become more powerful. In a demonstration, MIT researchers Matthew Lang and David Appleyard moved atoms to form the letters MIT using 16 living E. coli cells. Such optical traps have already been used for such things as assessing colloid phase transitions, measuring biological motor motility, and controlling microfluidic flows. But merging the technique with microchip materials has been difficult. The new research, described in the journal *Lab on a Chip*, has successfully resolved the problem of employing light trapping methods that use a laser light to control the objects. The researchers opted to use infrared lasers instead of visible light to control the cells because silicon is transparent to infrared light. Lang asserts that the system represents "one of the world's smallest microtools" that can be used for "building on a chip." Appleyard suggests that the technology may facilitate such research as assessing how neurons communicate.

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Its Toaster-Sized Blood Testing Device Gives Doctors Quick Results

Investor's Business Daily (11/01/07) P. A6 ; Harlin, Kevin

The U.S. Food and Drug Administration has approved the use of Abaxis Inc.'s blood-analysis machines for cholesterol tests and 15 other common blood tests. The machines are as small as toasters and use chemical-coated plastic discs to test pinprick-sized blood samples and return the results in about 12 minutes. Veterinarians account for \$500 million in annual sales, but the Union City, Calif.-based company believes pending approvals for other blood tests--including sodium and potassium levels--could result in yearly sales of about \$4.4 billion to hospitals and doctor's offices. The need for quick, user-friendly blood tests might spark sales among walk-in clinics in such drugstores as CVS Caremark and Walgreens as well, says SunTrust Robinson Humphrey analyst Jonathan Block. Abaxis hit some roadblocks in production due to faulty parts from suppliers, but officials say they have new vendors and should be recovered by March.

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Genomic Alterations 2.0

Scientist (10/07) Vol. 21 , No. 10 , P. 89 ; Phillips, Melissa Lee

New technology has been developed to detect the presence of copynumber variations (CNVs) in DNA, cancer cells and congenital diseases. CNVs are differences in the number of copies of an individual gene in a genomic region. The leading technology used is comparative genomic hybridization arrays, which involve hybridizing two different color genomes, then measuring the dominant color to determine if the test genome contains an insertion or deletion. Bacterial artificial chromosome arrays can also be used to search the entire genome for CNVs. Researchers are still debating which type of array is the best to use, however most agree that prices are too high for the technology right now. A single array can cost between \$300 and \$1,000, far too expensive for researchers to screen a large number of samples to look for variants. While prices are slowly falling, there are still several problems with CNV detection. In order to gain the best results, experts say that labs should take steps to improve sample preparation, run samples through two types of arrays to ensure accuracy and test equipment using a standard sample that has been analyzed several times. Experts also warn labs to take steps to back up data and work with software engineers to develop a sufficient series of algorithms.

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New System Would Use Rotating Magnetic Field to Detect Pathogens

Science Daily (10/30/07)

Researchers from Purdue and Duke universities have designed a method for differentiating pathogens by using a magnetic field that separates particles. The technique involves marking magnetic particles with antibodies that are attracted to particular pathogens and mixed with patient blood samples. The particles are then immersed in a liquid placed in a container with a microchip containing metal disks. The container is surrounded by a rotating magnetic field, where different-sized particles are separated according to their rotating frequencies. Compared to the solid phase immunoassays technique used for diagnostic purposes, the rotating magnetic technique can be used to both isolate and detect pathogens with a significantly higher detection rate.

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US Lacks Testing Labs in Event of Dirty Bomb

Boston Globe (10/26/07) Sullivan, Eileen

According to a recent report released the House Committee on Science and Technology, the United States has a shortage of laboratories equipped to test people for radiation if a "dirty bomb" was detonated. A dirty bomb is an explosive that contains radioactive material capable of contaminating a small area. However if a dirty bomb was detonated in a dense metropolitan area, over 100,000 people could be potentially exposed, and it could take four years to test all of them. There are only a few labs in the country capable of doing the necessary tests, and those are only able to detect six of the 13 most likely isotopes that would be used in such an attack. The Environmental Protection Agency estimated that it could complete the testing within two years, but committee members said that even this would be too long to wait for results.

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Dirty Science: Soil Forensics Digs Into New Techniques

Science (10/19/07) Vol. 318 , No. 5849 , P. 386 ; Zala, Krista

In Australia and other countries, new automated techniques have made soil analysis more robust. These innovations are enabling researchers to get results from smaller soil samples. In addition, researchers are relying on new methods of microscopy to analyze plant waxes and microbial DNA. Lorna Dawson at the Macaulay Institute in Aberdeen, United Kingdom, is spearheading an effort to standardize older methods and test new ones. The SoilFit project also seeks to create a database of soil fingerprints across the United Kingdom. Duncan Pirrie of the University of Exeter in the United Kingdom conceived of an idea a few years ago to use an automated scanning electron microscope to assess soils. The Centre for Australian Forensic Soil Science has developed the QEMSCAN microscope that can identify mineral compositions in just 10 mg of soil. The tool, originally created for mining applications, can analyze in just 60 minutes what usually takes a person days. Jacqui Horswell at the Institute of Environmental Science and Research in New Zealand says that using a new technique that cuts DNA at certain target sequences and analyzes them, researchers can profile the majority of bacteria in 200 mg of soil. A DNA signature is created for the organisms in the soil.

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Small Firm Signs Big Deal

London Free Press (10/19/07) Daniszewski, Hank

Merck Serono, a subsidiary of German drug-maker, Merck KGaA, has a new high-tech strategy to optimize its research and development process. Merck Serono has partnered with Critical Outcome Technologies Inc. (COTI), a small IT company based in Canada. As part of the deal, Merck purchased COTI's innovative CHEMSAS computer platform. CHEMSAS is designed to streamline the drug discovery process by determining the most promising chemical combinations to fight certain diseases. Usually this stage of development takes about two years; however, the CHEMSAS system would shorten that time by between three and five months. Together, Merck and COTI hope to find between four and six new cancer-fighting candidates using the CHEMSAS system.

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Study: Nanodiamonds Deliver Chemo Drugs

United Press International (10/15/07)

A new nanomaterial, known as nanodiamonds, may offer doctors a new drug-delivery option. According to researchers at Northwestern University, nanodiamonds were shown to deliver chemotherapy drugs without the inflammation caused by traditional methods. Researchers suggest the nanodiamonds may also be useful in treating conditions, such as tuberculosis or viral infections. The study is published in the journal Nano Letters.

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Lab-On-a-Chip Enables Cell-Free Protein Synthesis

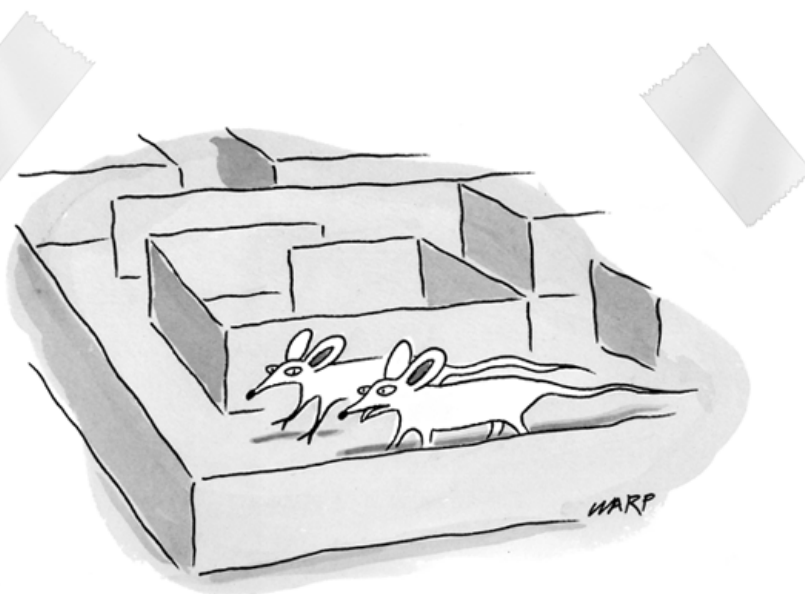
DrugResearcher.com (UK) (10/11/07) Wilkinson, Matt

University of Florida researchers have developed a method using in vitro transcription and translation (IVT) techniques for creating microfluidic device enabling cell-free protein synthesis. High protein yields are necessary to analyzing genomic functions and their roles, though recovering proteins can be a difficult task following cell lysis. In *Biotechnology Progress* journal, researchers describe the method of using microfluidic channels to cause high-throughput (HT), cell-free protein synthesis via removing byproducts and sustaining nutrient supply. Using the IVT method, researchers were able to avoid the problem of executing recombinant protein production in host cells via HT. The concept of cell-free protein synthesis lab-on-a-chip was used, testing the production of green fluorescent protein, chloramphenicol acetyl-transferase, and luciferase. The device increased productivity between five and 10 times normal yield, while the presence of a positive hydrostatic flow was directly proportional to producing high yields. Researchers noted that the device could be integrated with detection functions, whereby enzyme inhibition assessments could be conducted for drug screening analyses.

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"Actually, I prefer crossword puzzles in the morning."