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INSTITUTE OF TECHNOLOGY

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SMART PHONE CONNECTED CONTACT LENSES GIVE NEW MEANING TO 'EYE PHONE'

Apps allow you to link your smart phone to anything like your shoes, to your doorbell and soon you may be able to add your contact lenses to that list. Engineers at the university of Washington have developed an innovative way of communication that would allow medical aids such as contact lenses and brain implants to send the signals to their smart phones. The new tech called "inter scatter communication" works by converting Bluetooth signals into wifi signals. It is based on an existing method of communication called backscatter, which lets devices exchange information by reflecting back existing signals. 'interscatter' works essentially the same way, but the difference is that it allows for intertechnology communication- in other words, it allows Bluetooth signals and wifi signals to talk to each other. This communication would allow devices such as contact lenses to send data to other devices. Until now, such communication is not possible, because sending data using wifi requires too much power for a device like contact lens. The contact lenses are designed with an antenna by the engineers. The Bluetooth signal came from a smart watch. The antenna on the contact lens was able to

manipulate the Bluetooth signal, en code data from the contact lens, and convert it into an wifi signal that could be read by another device. For example, it' s possible to monitor blood sugar levels from a person's tears. Therefore, a connected contact lens could track blood sugar levels and send notifications to a person's phone while his/her blood sugar levels goes down. Interscatter communication could be used to transmit data from brain implants that could one day help with paralysis regain movement. Not all the potential applications are relented to medical devices, however inter scatter communication could also exchange information between credit cards. This, would allow people transfer money between cards simply holding them near their smart phone

Susithra.K (113313106080)
ECE (2013-2017)

3D PRINTED "BIONIC" EAR EXHIBITS ENHANCED AUDITORY SENSING

Researchers at Princeton created a 3D printed "bionic" ear that exhibits enhanced auditory sensing for radio frequency reception, merging biologic and nanoelectronic functionalities via 3D printing. Scientists at Princeton University used off-the-shelf printing tools to create a functional ear that can "hear" radio frequencies far beyond the range of normal human capability. The researchers' primary purpose was to explore an efficient and versatile means to merge electronics with tissue. The scientists used 3D printing of cells and nanoparticles followed by cell culture to combine a small coil antenna with cartilage, creating what they term a bionic ear. "In general, there are mechanical and thermal challenges with interfacing electronic materials with biological materials," said Michael McAlpine, an assistant professor of mechanical and aerospace engineering at Princeton and the lead researcher. "Previously, researchers have suggested some strategies to tailor the electronics so that this merger is less awkward. That typically happens between a 2D sheet of electronics and a surface of the tissue. However, our work suggests a new approach — to build and grow the biology up with the electronics synergistically and in a 3D interwoven format." McAlpine's team has made several advances in recent years involving the use of small-scale medical sensors and antenna. Last year, a research effort led by McAlpine and Naveen Verma, an assistant professor of electrical engineering, and Fio Omenetto of Tufts University, resulted in the development of a "tattoo" made up of a biological sensor and antenna that can be affixed to the surface of a tooth. This project, however, is the team's first effort to create a fully functional organ: one that not only replicates a human ability, but extends it using embedded electronics "The design and implementation of bionic organs and devices that enhance human capabilities, known as cybernetics, has been an area of increasing scientific interest," the researchers wrote in the article which appears in the scholarly journal Nano Letters. "This field has the potential to generate customized replacement parts for the human body, or even create organs containing capabilities beyond what human biology ordinarily provides." Standard tissue engineering involves seeding types of cells, such as those that form ear cartilage, onto a scaffold of a polymer material called a hydrogel. However, the researchers said that this technique has problems replicating complicated three dimensional biological structures. Ear reconstruction "remains one of the most difficult problems in the field of plastic and reconstructive surgery," they wrote. To solve the problem, the team turned to a manufacturing approach called 3D printing. These printers use computer-assisted design to conceive of objects as arrays of thin slices. The printer then deposits layers of a variety of materials – ranging from plastic to cells – to build up a finished product. Proponents say additive manufacturing promises to revolutionize home industries by allowing small teams or individuals to create work that could previously only be done by factories. Creating organs using 3D printers is a recent advance; several groups have reported using the technology for this purpose in the past few months. But this is the first time that researchers have demonstrated that 3D printing is a convenient strategy to interweave tissue with electronics. The technique allowed the researchers to combine the antenna electronics with tissue within the highly complex topology of a human ear. The researchers used an ordinary 3D printer to combine a matrix of hydrogel and calf cells with silver nanoparticles that form an antenna. The calf cells later develop into cartilage. Manu

Mannoor, a graduate student in McAlpine's lab and the paper's lead author, said that additive manufacturing opens new ways to think about the integration of electronics with biological tissue and makes possible the creation of true bionic organs in form and function. He said that it may be possible to integrate sensors into a variety of biological tissues, for example, to monitor stress on a patient's knee meniscus. David Gracias, an associate professor at Johns Hopkins and co-author on the publication, said that bridging the divide between biology and electronics represents a formidable challenge that needs to be overcome to enable the creation of smart prostheses and implants. "Biological structures are soft and squishy, composed mostly of water and organic molecules, while conventional electronic devices are hard and dry, composed mainly of metals, semiconductors and inorganic dielectrics," he said. "The differences in physical and chemical properties between these two material classes could not be any more pronounced." The finished ear consists of a coiled antenna inside a cartilage structure. Two wires lead from the base of the ear and wind around a helical "cochlea" – the part of the ear that senses sound – which can connect to electrodes. Although McAlpine cautions that further work and extensive testing would need to be done before the technology could be used on a patient, he said the ear in principle could be used to restore or enhance human hearing. He said electrical signals produced by the ear could be connected to a patient's nerve endings, similar to a hearing aid. The current system receives radio waves, but he said the research team plans to incorporate other materials, such as pressure-sensitive electronic sensors, to enable the ear to register acoustic sounds. In addition to McAlpine, Verma, Mannoor and Gracias the research team includes: Winston Soboyejo, a professor of mechanical and aerospace engineering at Princeton; Karen Malatesta, a faculty fellow in molecular biology at Princeton; Yong Lin Kong, a graduate student in mechanical and aerospace engineering at Princeton; and Teena James, a graduate student in chemical and biomolecular engineering at Johns Hopkins. The team also included Ziwen Jiang, a high school student at the Peddie School in Hightstown who participated as part of an outreach program for young researchers in McAlpine's lab. "Ziwen Jiang is one of the most spectacular high school students I have ever seen," McAlpine said. "We would not have been able to complete this project without him, particularly in his skill at mastering CAD designs of the bionic ears." Support for the project was provided by the Defense Advanced Research Projects Agency, the Air Force Office of Scientific Research, NIH, and the Grand Challenges Program at Princeton University

Merlin.S (11314106043)
ECE (2014-2018)

TOP 5 REASONS TO STUDY ENGINEERING

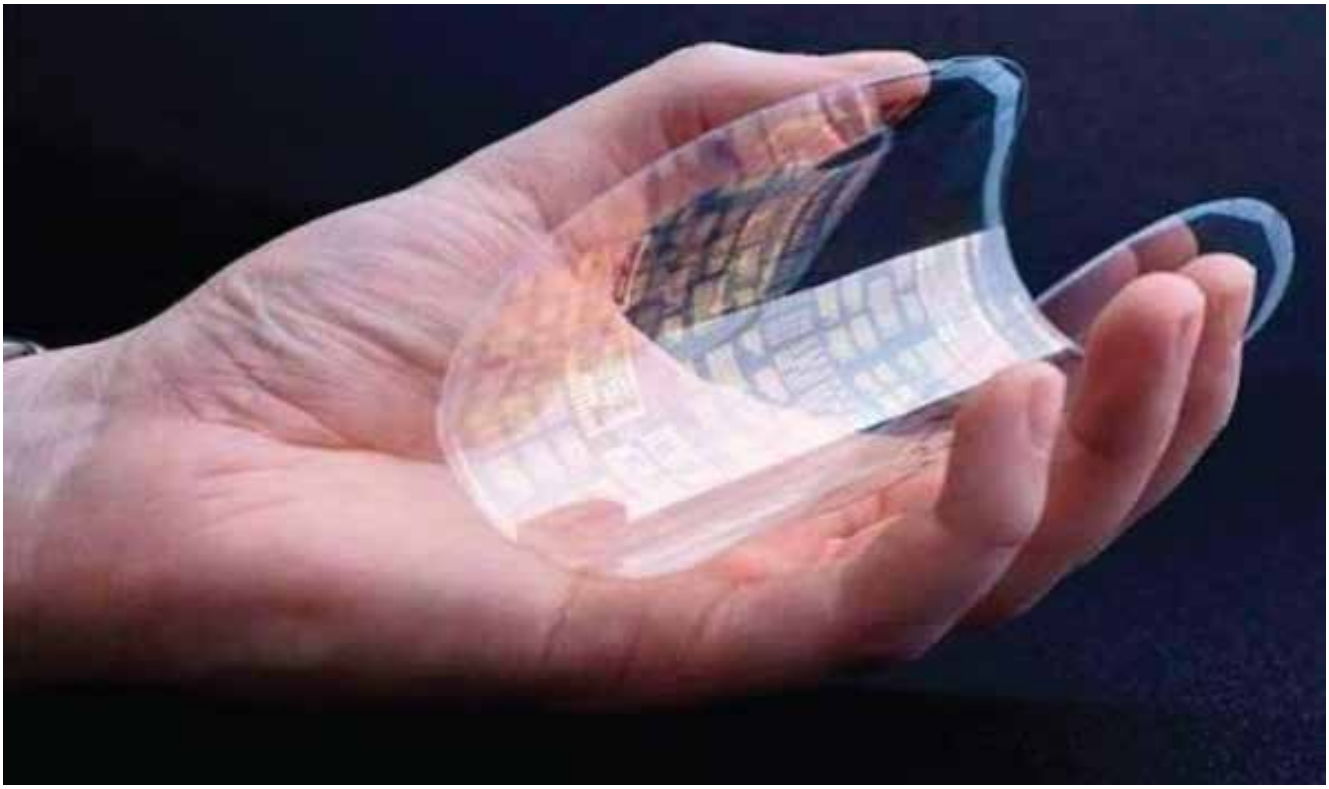
1. Studying engineering brings prestige
2. It sets you up for professional success
3. You'll be ready for any problem
4. It brings financial security
5. You get a chance to improve the world

JAVITHA.J,
ECE (2013-2017)

CAN GRAPHENE TAKE US FROM HERE TO ETERNITY.....?

Until now the hardest known material is DIAMOND which is an allotrope of carbon. The known traditional lightest material is STRYOFOAM.A material which is 100 times stronger and lightest than stryofoam is GRAPHENE. Graphene is also an allotrope of carbon which has honeycomb,2-Dimensional structure, indefinitely large aromatic molecule the ultimate case of family of polycyclic aromatic hydrocarbons. One of the interesting properties of graphene has paved the way for this high-tech invention to use graphene in the field of optical electronics.

OPTICAL ELECTRONICS



One particular area in which we will soon begin to see graphene used on a commercial scale is that in optoelectronics; specifically touchscreens, liquid crystal displays (LCD) and organic light emitting diodes (OLEDs). For a material to be able to be used in optoelectronic applications, it must be able to transmit more than 90% of light and also offer electrical conductive properties exceeding 1 x 106 Ω1m1 and therefore low electrical resistance. Graphene is an almost completely transparent material and is able to optically transmit up to 97.7% of light. It is also highly conductive, as we have previously mentioned and so it would work very well in optoelectronic applications such as LCD touchscreens for smartphones, tablet and desktop computers and televisions.

Currently the most widely used material is indium tin oxide (ITO), and the development of manufacture of ITO over the last few decades time has resulted in a material that is able to perform very well in this application. However, recent tests have shown that graphene is potentially able to match the properties of ITO, even in current (relatively under-developed) states. Also, it has recently been shown that the optical absorption of graphene can be changed by adjusting the Fermi level. While this does not sound like much of an improvement over ITO, graphene displays additional properties which can enable very clever technology to be developed in optoelectronics by replacing the ITO with graphene. The fact that high quality graphene has a very high tensile strength, and is flexible (with a bending radius of less than the required 5-10mm for rollable e-paper), makes it almost inevitable that it will soon become utilized in these aforementioned applications.In terms of potential real-world electronic applications we can eventually expect to see such devices as graphene based e-paper with the ability to display interactive and updatable information and flexible electronic devices including portable computers and televisions

SMART WATCH
(CHARGE ITSELF USING HEAT FROM YOUR SKIN)

I actually like tracking my steps, but I'm not wearing my Fitbit right now because I've forgotten to charge it too many times over the past couple of months, blowing my step average and my motivation to quantify myself. Thermoelectric devices harvest energy using a temperature difference between their two sides to generate a voltage.

Matrix launched what it calls a thermoelectric-powered smart watch—and I call a fitness tracker—on Indiegogo today. The US $100 gadget—which has a step counter, calories-expended counter, a sleep monitor, and yes, a watch that tells time—is a little too clunky for me, and will likely only appeal to the "gotta have the cool gadget" early adopter who can show off the self-powering feature to his friends. But that's probably okay. Because, while I'm sure Matrix would love to sell a bunch of these gadgets, that's really not its main goal. The company really just wants to convince other gadget makers to embrace its thermoelectric technology.

"We see ourselves as a thermal energy harvesting company," Anne Ruminski, Matrix's head of engineering told me, not a watch company. "We would like to see the technology be applied to other wearables, medical devices, and smart sensors."

Boukai and Tham started working together on the technology in 2003, as graduate students at Cal Tech. They officially formed as Silicium Energy in Ann Arbor, Michigan, in 2011, moving their operations to Silicon Valley in 2013. Silicium changed its name to Matrix this year.Ruminski says the time is right for putting thermoelectrics into wearables. "We were surprised that, when we looked at applications for the technology, that everybody working with it was focused on putting it into cars, which isn't feasible now. We were surprised nobody had put it into a watch." Smart watches makes sense, because "the devices going into smart watches today use far less power than even just a couple of years ago."She would particularly love to see the technology migrate quickly into hearing aids. "A close relative wears hearing aids," she says, "and it's a pain for her to change the tiny batteries so often."The technology, Ruminski believes, is especially suited for implantables that sit just under the skin, like pacemakers. "They don't require much power, and there is enough of a temperature gradient at the surface of the skin so it would work."The company has filed patents in thermoelectrics and heat management. Figuring out how to shed heat so the cold side of the system doesn't get too warm was a challenge, Ruminski says.

Gowri.N (113316106023)
ECE (2016-2020)

In An Effort To Help Achieve Your Childhood Dreams Of Career-path Fulfillment, Here Are Seven Ways To Help Land A Dream Job At Your Dream Company

1. Be a Stalker
Modern companies have a wide digital footprint. Use the corporate website, recruiting boards or recent news stories to load up on valuable insights on your ideal employer candidate. As a threshold move, this research will provide valuable insight on corporate culture, hiring and recruiting methods and any upcoming events or major changes that could lead to a hiring binge.

2. Network, Network, Network
Networking is a job-seeker's best friend. This is especially true when you've narrowed your sights on one specific employer. Check out your professional networking contacts ans see if anyone has connections, however remote, with the company of your dreams. Use these, or make new ones, to help get a foot in the door. Don't forget to attend those industry events, meetings, dinners and more to facilitate the get-to-know-you operation.

3. Peruse Social Media
Social media is more than just a platform for funny cat-meme's. Checking out a company's social media profiles can help identify potential job opportunities or individuals in charge of critical hiring decisions. Facebook, LinkedIn, Instagram and more are all valuable platforms for company communication so be sure to check them out.

4. Job Fairs are Still a Thing
While most of us think of job fairs as an outdated mode of recruiting from som bygone era, many top employers still use these events to recruit for open positions. Set up google alerts, read articles and otherwise put that research (see 1-3 above) to good use by identifying likely events that your dream company may be attending. Since job fairs are geared especially towards hiring, these are an excellent, targetted method for getting in front of hiring managers or other career decision makers. Show up early, dress to impress and bring a copy of your most recent resume to take advantage of this potential opportunity.

5. Avoid Negativity
If and when you do manage to get in front of a hiring manager, networking connection or company representative, be sure to avoid speaking negatively about your current employer. A job is a job, after all. Even if you are employed in a less than ideal position, you will want to avoid appearing unprofessional or displaying other traits that may have you coming off as a poor employment choice. Be upbeat and express interest in the company you're interested in, stressing that the reason you're considering switching jobs is that this is your dream position.

6. Follow the Rules
While we all know the value of stepping outside the lines sometimes in life, when it comes to landing a job with your dream company it's best to stick to structures and preferred formats, at least until you get your foot in the door. Review the company's preferred hiring practices and any resume submission, application or other requirements. Be sure that any communication you send it is strictly in line with company expectations to avoid having your resume kicked out of consideration due to a formality.

7. Use the Resources at Hand
From job boards like Simply Hired to forums, websites, news articles and more, there are a wealth of resources today to help savvy job-seekers land the job of their dreams. Set up regular Google alerts, allow those automatic notifications and keep on top of the most recent openings. Applying quickly with your dream company can often make the difference between missing an opportunity and finally landing that job offer.

Follow our advice when it comes to researching, maintaining a positive attitude, networking and more and before you know it you'll have landed that dream job and will be well on your way to career happily ever after.

Geo Johnson
ECE (2014-2017)

Innovation Is Our Tradition
Come Join With Us

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