ECHELON

A DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING's MAGAZINE

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INSIDE THIS

Vision of the Department

To become a centre of excellence that grooms globally competent and ethical engineers with the talent for higher learning and research and the capability to think critically of innovative solutions for diverse social needs.

Mission of the Department

To impart quality technical education with strong foundations using superior academic standards and well-equipped infrastructure.

To provide excellent pedagogics through qualified and highly skilled faculty who are trained on a regular basis.

To establish research labs and a centre of excellence that will nurture the technical skills by training them with state of art technology required for the industry.

To inculcate professional and ethical values in the students along with leadership qualities so that they are well equipped to handle the dynamic and diverse challenges they will face as engineers.

Programme Educational Objectives (PEOs)

PEO-1: To exhibit strong fundamental concepts of Computer Science & Engineering along with advanced knowledge on emerging technologies so that they can devise solutions for real time & social issues.

PEO-2: To be employed, to pursue higher studies, to become entrepreneurs and also to have an excellent aptitude for research.

PEO-3: To be technically sound, socially acceptable and ethical professionals with global competence.

PEO-4: To be young leaders with the capability to lead teams with good communication skills and excellence in social awareness.

AGRICULTURAL ROBOT

Agriculture is quickly becoming an exciting high-tech industry, drawing new professionals, new companies and new investors. The technology is developing rapidly, not only advancing the production capabilities of farmers but also advancing robotics and automation technology as we know it.At the heart of this phenomenon is the need for significantly increased production yields.

The UN estimates the world population will rise from 7.3 billion today to 9.7 billion in 2050. The world will need a lot more food, and farmers will face serious pressure to keep up with demand. Agricultural robots are increasing production yields for farmers in various ways. From drones to autonomous tractors to robotic arms, the technology is being deployed in creative and innovative applications. Agricultural robots automate slow, repetitive and dull tasks for farmers, allowing them to focus more on improving overall production yields. Some of the most common robots in agriculture are used for:

- Harvesting and picking
- Weed control
- Autonomous mowing, pruning, seeding, spraying and thinning.
- Phenotyping
- Sorting and packing
- Utility platforms

Harvesting and picking is one of the most popular robotic applications in agriculture due to the accuracy and speed that robots can achieve to improve the size of yields and reduce waste from crops being left in the field. These applications can be difficult to automate, however. For example, a robotic system designed to pick sweet peppers encounters many obstacles. Vision systems have to determine the location and ripeness of the pepper in harsh conditions, including the presence of dust, varying light intensity, temperature swings and movement created by the wind. But it still takes more than advanced vision systems to pick a pepper. A robotic arm has to navigate environments with just as many obstacles to delicately grasp and place a pepper. This process is very different from picking and placing a metal part on an assembly line. The agricultural robotic arm must be flexible in a dynamic environment and accurate enough not to damage the peppers as they're being picked. Harvesting and picking robots are becoming very popular among farmers, but there are dozens of other innovative ways the agricultural industry is deploying robotic automation to improve their production yields. The demand for food is outpacing available farmland and it's up to farmers to close this gap. Agricultural robots are helping them do just that.

Submitted by
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BRAIN MICROCHIPS

Brain implants, often referred to as neural implants, are technological devices that connect directly to a biological brain and usually placed on the surface of the brain, or attached to the brain's cortex. A common purpose of modern brain implants and the focus of much current research is establishing a biomedical prothesis circumventing areas in the brain that have become dysfunctional after a stroke or other hand injuries.

Purpose: Brain implants electrically stimulate, block or record signals from single neurons or group of neurons in the brain. The blocking technique is called " intra - abominal bagal blocking".

Research and application: Research in sensory substitution has made significant progress. Especially in vision, due to the knowledge of the working of the visual system, eye implants have been applied with demonstrated success. In video games planet side and chrome, players can use implants to improve their aim, run faster, and see better along with other enhancements.

Concerns and ethical considerations: The concerns involve vulnerabilities of neural implants to cybercrime or intrusive surveillance as neutral implants could be hacked misused or misdesigned Ethical questions raised include who are good candidates' to receive neural implants and what are good or bad uses of neural implants.

Submitted by
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Android Jetpack is a collection of android software components which helps us in building great android apps. Jetpack is a suite of libraries, tools and guidance to help developers write high-quality apps easier. Jetpack comprises the **androidx.*** package libraries, unbundled from the platform APIs. This means that it offers backward compatibility and is updated more frequently than the android platform, making sure we can always have access to latest and greatest versions of jetpack components.

Components: Android jetpack components are collection of libraries that are individually adoptable and built to world together while taking advantage of kotlin language features that make us more productive.

Foundation: Foundation components provide cross-cutting functionality like backward compatibility , testing and ketlin language support .

Architecture: Architecture components help us to design robust, testable and maintainable apps.

Behaviour: Behaviour components help our app integrate with standard android services like notifications, permissions, sharing and the assistants.

UI:UI components provide widgets and helpers to make our app not only easy, but delightful to use.

Submitted by
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SKULLY HELMET

SKULLY FENIX AR is the first motorcycle helmet to integrate a Rearview Camera, Heads-up Display, Turn-by-turn Navigation, Connected Audio and Smart Voice Controls. Skully is an advancement and adaptation from Google Glass technologies, which should currently be the smartest helmet in the world. Skully is a smart helmet, which focuses on minimizing road accidents and distractions by giving the rider a live blindspot camera view connected with GPS and smart awareness system. Skully uses heads-up display, a rear facing camera and can be

controlled by voice commands. Skully uses Android Operating System, with Bluetooth facility and live streaming of music from your smartphones.

BOOSTED SAFETY

- integrated heads-up display
- premium carbon fiber shell
- pinlock visor and clear anti -fog pinlock lens
- emergency quick release straps (eqrs)
- dot certified ece certification underway

FENIX AR: THE MOST INTELLIGENT HELMET HEADS-UP DISPLAY: Look ahead, glance at the Heads-up Display, then look ahead again without refocusing your eyes.

BLIND-SPOT CAMERA:An ultra-wide, glanceable view of the road behind you enhances your overall safety.

SMART VOICE COMMANDS: Simply speak commands to Skully to access the FENIX AR's smart features. Get directions, take calls, increase music volume - all without ever taking your hands off the bars.

TURN-BY-TURN NAVIGATION: Audio and visual navigation when and where you need it. Instant weather reports for you ride.

CONNECTED AUDIO:

Designed from the ground-up to provide superior sound, FENIX AR matches thumping speakers with premium padding to provide crystal clear call quality and dazzling sounding music.

Another tech company, called Borderless, unveiled another smart helmet with 360-degree visibility. The product, called the CrossHelmet, boasts of several features in the smart helmet category. It offers a bifocal head-up display that shows the rider the view behind them from a rear-facing camera. The display is positioned at the top centre of the helmet's wide-view visor, making it similar in look and feel to a car's rear-view mirror.

The CrossHelmet also shows riders the weather, navigation and phone service. The helmet's navigation works with GPS in the rider's smartphone. It also features a noise control system that allows the rider to adjust and filter out noise by frequency using the helmet's corresponding app. So, wind noise and engine noise, which create fatigue, can be easily controlled and reduced. The smart helmet also features group talk capabilities, allowing riders on tour to stay in touch with each other and share their location with other riders. The CrossHelemt is priced at $1,599 (around 1 lakh).

Submitted by
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FOOT STEP POWER GENERATION

In the world of modern technology, newer sources of energy and new methods of power generation are two important area of interest for researchers and engineers.

fed to electrical system consisting of Converter, Battery and Inverter units which can be used for emergency backup power, charging purpose and to run small electrical equipments during load

converter unit. The converter unit comprises of a buck boost converter and a regulator.

The converter unit converts AC to DC voltage and also regulates the voltage to a

A piezoelectric sensor based costly product is available in some developed countries which can generate power from human locomotive force, but it is not suitable for countries where power demand is very high but economy is not highly developed. This can be achieved by power generating slabs, which is used to generate power by establishing anywhere of the walking zone of human. This is done in a low cost process with locally available equipments.

These slabs can easily sustain human weight when people walk along them. With a small deformation of spring, the weight of a human body is converted into electrical energy by rotating a micro-generator with the help of a `rotating shaft' coupled with it. This energy is stored in a rechargeable battery which can be used as a power source to drive loads.

A power generating slab using mechanical parts consisting of Top plane, Rack and Pinion arrangement, Gear mechanism, springs, Shaft and Freewheeling bearing is designed.

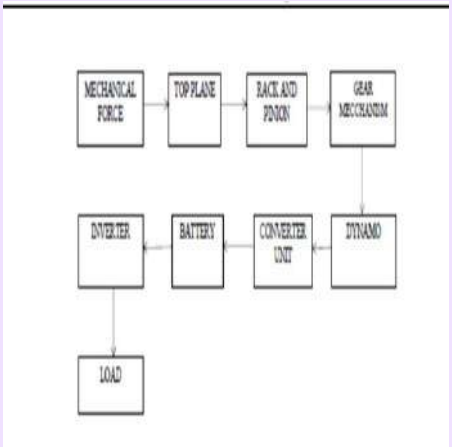
The power from dynamo is

shedding conditions.

Keywords - Electrical energy, mechanical energy, power generating slabs, conversion circuits, load shedding.

BLOCK DIAGRAM

When a person walks over the slab the top plane is displaced in the downward direction. This linear mechanical force is converted into rotational motion with the help of a rack and



pinion mechanism and gear mechanism.

This rotational mechanical force is then converted into electrical energy by means of a dynamo (DC motor). This electrical energy is then given to a

predetermined value. Next comes the battery which is used to store the energy which is used in the further stages.

The output of a battery is then given to an inverter which converts DC to AC. The output from inverter is used to operate the light loads

Submitted by
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SAVING THE RAIN FOREST WITH OLD CELL PHONES

Rainforest connection is saving the rainforest with something sitting in your desk drawer! Rainforests have some of the most complicated soundscapes on the planet. In this dense noise of insects, primates, birds and everything else that moves in the forest, How can you detect the sounds of illegal logging?

The old cell phones you have hanging around and collecting dust may have the answer .

So, how exactly does one go about saving the rainforest with old cell phones?

After a visit to the rainforest of Borneo, Physicist and Engineer

Topher White was struck by the sounds of the forest. In particular, the noises he couldn't hear.

While on a walk, White and others came across an illegal logger sawing down a tree just a few hundred meters away from a ranger station. This incident set White thinking that perhaps the best way to save the Earth's precious rainforest is to listen to its loggers and poachers. And the innovation he came up with uses old cell phones to do this!

If you are having a drawer filled with full of your old cell phones are an enormous contributor to the waste stream and greenhouse gas emissions, yet we rarely hear about how these kinds of technologies are becoming more sustainable. We have greener cleaning products, even recycled toilet paper, but so little of our time is spent thinking about the impact the technologies we use every day have on the planet.

Luckily, there are people who are aware of this problem and are finding innovative ways to change the way we use, think about, and recycle our technology. The organization rainforest connection that uses old cell phones to help protect the rainforest.

What we do with our old cell phones

We just take an old cell phone and connect it with some microprocessors along with solar panels take it to an forest area and place at the top of the tree for signals place an small size tower.

This can secure upto 1 km from its position. As if anyone are going to cut the trees in that 1km region it will send some alert information to an mobile that may be in far distance also.

Submtted by

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SMART VOTING SYSTEM THROUGH FACE RECOGNITION

Now a days in India, two types of method are used for voting. The first method is secret ballot paper, in which lots of paper are used and second method is EVM (Electronic Voting Machine) which is used since 2003. We have to propose a method or way for online voting that is more secure than the existing system. Face detection and recognition concept is proposed and used to identify the exact person. There are three levels of verification were used for the voters in our proposed system. The first one is Unique id number verification, second level of verification is election commission id or voter card number, if your election commission id number is correct then you have to go for third level of security which is the main security level where the system recognize the face of the real voter from the current database of face images given by the election commission. If the captured image is matched with the respective image of the voter in the database, then a voter can cast their vote in the election, as you have to know that in existing system is not much more secure because in existing system security level is only voter card so any one can give other person vote with voter card.

Eigen Face Algorithm:

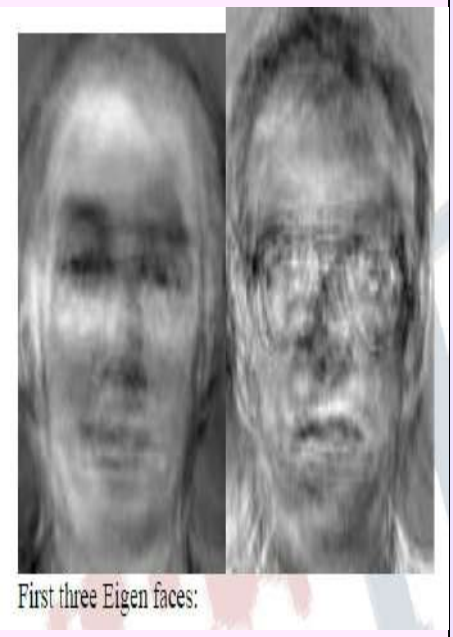
The main concept of Eigen Face algorithm is to follow the appearance –based approach to face recognition. It is used to capture the variation in a collection of face images and this information is use to encode the particular images of individual faces. Then the encoded images of individual faces are compared with the collection of face images in a holistic manner. The Eigen faces itself form a basis set of all images used to construct the covariance matrix. The formed smaller set of basis images are used to represent the original training images which produces dimension reduction. By comparing how faces are represented by the basis set, the classification can be achieved. Face Images are projected into a feature space ("Face Space") that best encodes the variation among known face images. The face space is defined by the "Eigen faces", which are the eigenvectors of the set of faces.

Level 2

Smart Voting System Support through Face Recognition doesn't fully show the all the equipment that are to be connected to raspberry pi, but covers all major functional units. The IR frames are connected over mirror but still they work fine because it's a coordinate based touch detection by the IR sensors placed at the side of frames and doesn't require the frame to be directly having contact with monitor behind mirror. The microphone is connected via sound card on USB port of Pi. The camera can be connected to USB port or the Pi camera can be connected to camera slot on Pi. The 8-channel relay is connected to GPIO pins on Pi for controlling the home appliances. To access the internet the Pi is connected to home Wi-Fi network. The programming of the Pi for displaying the UI on the screen is done using Python, the total description of how coding is implemented is described in Section 3 of the document.

Working of Eigen face algorithm: Steps in Face Recognition

- Initialization: Acquire the training set and calculate Eigen faces (using PCA projections) which define Eigen space.
- When a new face is encountered, calculate its weight.
- Determine if the image is face.
- If yes, classify the weight pattern as known or unknown.
- Learning, if the same unknown face is seen several times incorporate it into known faces.using Principal Component Analysis.
- Eigen face follows the Principal Component Analysis approach, in which face space forms a cluster in image space.



First three Eigen faces:

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AIR ALLY

AirAlly has a 10000 mAh storing capacity and charge device at 10W wireless and 18W PD charging. this power bank best suitable for Apple devices and charge faster than Apple Charger. All in one wireless charging power bank: AirAlly 4 in one that can get rid of carrying so many chargers. AirAlly design to charge your phone, watch, earbuds/ AirPods wirelessly and tablet or iPad with the help of USB cable at once.

DESIGN:

Powerband dimension is 175mm*62mm*26mm and weight is 250 gram and the upper side of power bank has a compartment for an Airpods charging case and then Power button on the front. In middle scuff-free rubber ring and in this place you can put your phone for charge wirelessly and below the power bank a circle present, that area you put your watch.

Submitted by
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Autonomous Driving

An autonomous car is a vehicle that can guide itself without human conduction. this kind of vehicle has become a concrete reality and may pave the way for future systems where computers take over the art of driving. An autonomous car is also known as a driverless car, robot car, self-driving car or autonomous vehicle. Driverless cars, including Google's autonomous car design, have logged thousands of hours on American roads, but they are not yet commercially available on a large scale.

Autonomous cars use various kinds of technologies. They can be built with GPS sensing knowledge to help with navigation. They may use sensors and other equipment to avoid collisions. they also have the ability to use a range of technology known as augmented reality, where a vehicle displays information to drivers in new and innovative ways. Some suggests that significant autonomous car production could cause problems with existing auto insurance and traffic controls used for human-controlled cars. significant research on autonomous vehicles is underway, not only in the U.S., but also in Europe and other parts of the world. According to some in the industry, it is only a matter of time before these kinds of advances allow us to outsource our daily commute to a computer.

At the same time, mass transit theories like Elon Musk's "hyperloop" design contemplate a future world where more guided transport takes place in public transit systems, rather than with individual car-like vehicles. They are different levels of driving automation. A level 3 vehicle is capable of taking full control and operating during select parts of a journey when certain operating conditions are met.

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