RISE MAGAZINE
Recent Innovations In Sophisticated Electronics
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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DEPARTMENT VISION

To be identified as a reputed technological department by offering quality education in Electronics and Communication Engineering so as to promote higher learning, research, provide professional career and produce creative solutions to social needs.

DEPARTMENT MISSION

Mission1 (M1)	To impart quality technical education in Electronics and Communication Engineering with the best pedagogical atmosphere of the highest quality through modern infrastructure and cutting edge skills.
Mission2 (M2)	To promote the establishment of centre of excellence to foster the spirit of innovation and creativeness among faculty and students.
Mission3 (M3)	To develop leadership qualities and also provide ethical and value based education by encouraging operations focused on social needs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)
After successful completion of the program, the graduates can have the ability to

PEO1	Be cognizant in basic sciences, fundamental engineering stream along with contemporary problem solving, critical analytical skills in electronics and communication engineering and the allied fields.
PEO2	Understand the issues related to design and development; update the knowledge, and skills through continuous learning in the field of Electronics and Communication Engineering.
PEO3	Demonstrate their technical skills, communication skills and research abilities along with leadership skills in professional environment to empower employability, to go for higher education and to become entrepreneurs.
PEO4	Be motivated with high ethical, human values and team work towards development of the society.

PROGRAMME SPECIFIC OUTCOMES (PSOs)
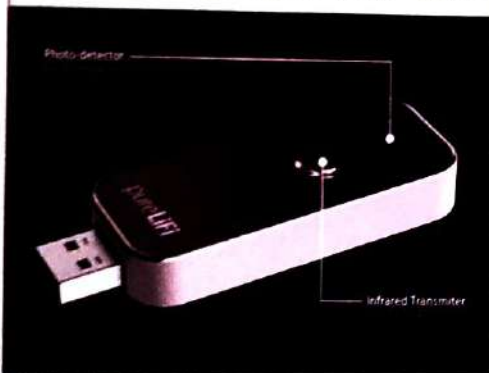**At the end of the program, the student :**

PSO1	Able to gain knowledge in diverse areas of electronics and communication for successful career entrepreneurship and higher studies.
PSO2	An ability to make use of acquired technical knowledge in core subjects to analyze and design process for variety of real time application, along with life skills to arrive appropriate solutions.

THE LiFi

LiFi is a wireless optical networking technology that uses light-emitting diodes (LEDs) for data transmission.

LiFi is designed to use LED light bulbs similar to those currently in use in many energy-conscious homes and offices. However, LiFi bulbs are outfitted with a chip that modulates the light imperceptibly for optical data transmission. LiFi data is transmitted by the LED bulbs and received by photo receptors. LiFi's early developmental models were capable of 150 megabits-per-second (Mbps). Some commercial kits enabling that speed have been released. In the lab, with stronger LEDs and different technology, researchers have enabled 10 gigabits-per-second (Gbps), which is faster than 802.11ad.

Benefits of LiFi:

Higher speeds than Wi-Fi. 10000 times the frequency spectrum of radio.

• More secure because data cannot be intercepted without a clear line of sight.

Prevents piggybacking.

• Eliminates neighboring network interference.

• Unimpeded by radio interference.

• Does not create interference in sensitive electronics, making it better for use in environments like hospitals and aircraft..

By using LiFi in all the lights in and around a building, the technology could enable greater area of coverage than a single WiFi router. Drawbacks to the technology include the need for a clear line of sight, difficulties with mobility and the requirement that lights stay on for operation. LiFi is high speed bidirectional networked and mobile communication of data using light. LiFi comprises of multiple light bulbs that form a wireless network. When an electrical current is applied to a LED light bulb a stream of light (photons) is emitted from the bulb. LED bulbs are semiconductor devices, which means that the brightness of the light flowing through them can be changed at extremely high speeds. This allows us to send a signal by modulating the light at different rates. The signal can then be received by a detector which interprets the changes in light intensity (the signal) as data.

The intensity modulation cannot be seen by the human eye, and thus communication is just as seamless as other radio systems, allowing the users to be connected where there is LiFi enabled light. Using this technique, data can be transmitted from a LED light bulb at high speeds. Pure LiFi is currently working towards miniaturisation of LiFi technology. Ultimately the end goal is to have LiFi in every mobile device. This means that the technology will be affordable for integration into handsets, tablets and laptops. Ultimately the end consumer will see minimal or no cost associated with LiFi as the goal is to have LiFi embedded in every wireless mobile device.Today companies can speak to pure LiFi about working with us on proof of concept projects and other types of installations.

PRESENTED BY

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SMART WALKING STICK FOR VISUALLY IMPAIRED PEOPLE

Electronic Travel Aids are the devices which are used for mobility. The function of ETA is to provide information to the blind people about road and obstacles. Our smart walk stick is also an ETA which helps the blind people to know about the objects opposite to them, color of the objects, and text reading. In this smart walking stick we use Raspberry pi to control the sensors and camera. The feature of object identification helps the blind people to recognize what kind of object is before them and helps them to move around safely. Text reading helps them by reading out the reading out the texts before them and finally color identification helps them to identify the colors before them. These are all done using technique of digital image processing by using compute vision2. This smart walk stick is light weight to carry around and this helps the blind people to move around as a normal **people**

SYSTEM DESCRIPTION

This smart stick is an electronic walking guide which has four ultrasonic sensors. Out of these four sensors 3 sensors are used for obstacle detection which is placed on the side of the stick. The other sensor is responsible for pothole detection which is placed below the smart stick. These ultrasonic sensors range from 2-250cms. A camera is used for object identification and text identification. A toggle switch is kept which is operated by the user to enable the different features of the smart stick. Finally the output of the stick is through an earpiece.

A. Ultrasonic Sensor :- Ultrasonic sensor is a type of sensor that detects an object using sound waves. Its principle is similar to that of radar or sonar, which generates high frequency sound waves and receives it back. Sensors calculate the distance using the time taken for the reception of the echo signal sending the signals and receiving back the echo signals to determine the distance of an object.

B.Camera:- A camera is used in this smart blind stick for capturing images which is used for object identification and text reading. The image captured in camera is processed using the technology of digital image processing.

C.Ear:- phones Earphones are used as output device which gives the audio output of all the features of smart stick such as object identification, text identification, and pothole .

D.Rasp Berry Pi:-

Low cost high performance computer which can be plugged in TV and monitor and can be used as computer which is very small as credit card. Its CPU is 700Mhz single core ARM1176JZF-S.It has 4 USB ports ▢ It has dual core video core iv multimedia coprocessor Size of its RAM is 512mb It has micro SDHC plot for storage Power rating of raspberry pi is 600mA i.e. 3.0W. It has 17*GPIO plus the same specific functions This raspberry pi works as the computer of the smart walking stick . E.GPIO pins The raspberry pi board has 17 GPIO ins in it. These GPIO pins provide ability to connect directly to electronic devices. The inputs will be like sensors, buttons or other communication with chips or modules using low level protocols SPI and serial UART connections.

STEP 1: Start

STEP 2: Read the GPIO pins

STEP 3: If pin 1 is high go to step 4, if pin 2 is high go to step 7,if pin 3 is high go to step 10 else go to step 2

STEP 4: opens webcam, takes picture and saves the image as "sample.jpeg" and moves it to home/pi/webcam STEP 4: Executes image to text conversion using python and saves the output as "output1.txt"

STEP 5: Moves "output1.txt" to "audio.txt" file and executes text to audio conversion

STEP 6: generates audio output moves to step 2

STEP 7: executes ultrasonic distance measurement using python and Saves the output as "output2.txt"

STEP 8: Moves the text in "output2.txt" to "audio.txt" and executes text to audio conversion

STEP 9: Generates audio output and moves to step 2

It uses 3.3V logic levels. No analog input or output is available in this GPIO

STEP 10: Opens webcam takes picture and save the image as "objsamp.jpeg" and moves it to home/pi/object

STEP 11: Executes object recognition using python and saves the output as "output3.txt"

STEP 12 Moves the text in "output3.txt" to "audio.txt" and executes text to audio conversion

STEP 13: Generates the audio output and moves to step 2

VII. FUNCTIONAL DESCRIPTION

A. Ultra sonic sensor:- The ultrasonic sensor is used to calculate the distance of the object or for pothole detection. These produce elastic waves with frequency greater than 20,000 Hz and exists in solid liquid

and gases. For object identification, the ultrasonic sensor is placed in three sides of the walking stick which sends ultrasounds and calculates the distance For pothole detection, the sensor is placed below the smart walking stick. A distance more than an average distance is set.

PRESENTED BY

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SMART HOME AUTOMATION

Introduction:

Today, technology has become an integrated part of people's lives. It has, and continues to influence many aspects of daily life and has allowed better social interaction, ease of transportation, the ability to indulge in entertainment and media and has helped in the development in medicine. The creation of many devices such as mobile phones and computers have caused many people to rely on technology to communicate with their friends, store information such as pictures, movies, documents, and music . The internet has become a common interface that many devices use in order to simplify the daily life of many people. The Internet has given people the ability to search for information, store their own information in the cloud while also giving them better ways of managing information. From the time of its introduction, the amount of people that use mobile phones and the internet to communicate with other people has increased dramatically to become one of the major means of communication. Smart phones have allowed people to connect to the internet without the need for a computer, while still offering the same functionality but through different means. With the introduction of better hardware and better software, smart phones have become powerful devices and have become an important part of people's daily lives. A major aspect is how the smart phone is able to connect and communicate with other devices. For example, smart phones can be used as a mouse for a computer, or it can connect to the speakers of cars allowing consumers to play their own music. There are many applications of this sort. A field that is recently gaining popularity is home automation which can also use smart phones as information or functionality hubs. Technology Since most of the existing products take advantage of Bluetooth 4.0, an introduction about Bluetooth and it's features and what differs between the versions are presented. A brief introduction about Arduino is also presented. 11 2.2.1 Blue-

tooth 4.0 Bluetooth technology can be found in many devices ranging from smart phones and home entertainment products to watches and medical devices. One popular use is using your phone to connect to the car to listen to music for example. Bluetooth technology is a short-range communication technology which has a low cost and uses low energy . When two devices connect to each other they can "pair" with each other, as long as they are within each other's proximity. Afterwards a link is maintained, even if there is no data flow. A feature of Bluetooth wireless technology is the ability to handle data and voice transmissions simultaneously. It also operates in the unlicensed industrial, scientific and medical (ISM) band at 2.4 to 2.485 GHz, using spread spectrum frequency hopping full duplex signal. Frequency hopping spread spectrum is a transmission technique where the frequency used is changed or switched at random time intervals. This causes the transmission to be more secure; since it is hard to intercept and has minimal interference with other transmissions . Bluetooth 4.0 is the newest iteration of the Bluetooth wireless technology and is already implemented in some smart phones such as the Samsung Galaxy S3 and the Iphone 5. It will also be implemented in many more smart phones in the coming year. The most significant characteristic of Bluetooth 4.0 is energy efficiency, thus providing a much better battery life for devices. Therefore, a new protocol was added to the Bluetooth Core Specification which is the Bluetooth low energy (BLE) . BLE was designed for devices that collect small chunks of information frequently, therefore it is not optimized for file transfer or streaming even though it has a data rate of 1Mbps . This design allows a device to be on a button-cell battery and last for many months. A new feature that was added to Bluetooth v3.0 and 4.0 is the compatibility with NFC, thus allowing devices to "pair" through tapping these devices together . BLE is also known as Bluetooth Smart, and the devices that implement

Bluetooth 4.0 have two distinct variations. They are divided into Bluetooth smart ready devices which are devices that uses the full range of Bluetooth 4.0, and Bluetooth smart devices, which are devices that gather specific information and sends it to Bluetooth smart ready devices. There are also two different wireless radios, the dual mode radios which are in the Bluetooth smart ready devices. These radios support both classic connections and BLE connections. The Bluetooth smart devices have a single mode radio which allows them to only make Bluetooth low energy connections . 2.2.2 Arduino Arduino is a single-board microcontroller board based on Atmel's 8-bit microcontrollers. The hardware is open-source which means that the user is allowed to study and make changes to the hardware. All original design files are also available. The standard Arduino board is the Arduino Uno . It is based on Atmel's ATmega328 microcontroller. The board has 14 digital input/output pins and 6 analog input pins. There are also other models of Arduino boards available with varying sizes, number of I/O pins and functionality . Some of these are the Arduino Mega , which is bigger than the Uno and 12 features 54 digital I/O pins and 16 analog input pins, and LilyPad Arduino , which is designed to be wearable and only has 9 I/O pins. Figure 5: The Arduino Uno board [P5] For more functionality one can attach add-on modules called "shields" to some of the boards. Some of the functionality shields provide are motor controls, GPS, ethernet, Wi-Fi and LCD displays. The shields are connected to the I/O headers on the board and, depending on what pins are used, can often be stacked on top of each other . The Arduino microcontroller is programmed in C/C++ either by using the Arduino IDE or by using a text editor and manually compiling and linking the source code. The IDE is open-source and is written in Java and is thus also cross-platform . The IDE handles the compiling and linking of the source code and uploads the resulting hex file to the board

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Security:-
All of the locks mentioned in section 2.1 use the built-in security of Bluetooth when using their respective application to unlock the door. All of them, except Kevo, claim to use the same secure communications protocols and data storage security as online banking services which is AES-128 encryption Kevo claims that they use "military grade" encryption All of Lockitrons traffic goes through HTTPS and thus uses TLS (Transport Layer Security) which is a set of cryptographic protocols that provide communication security over the Internet. As mentioned earlier, devices that use Bluetooth can pair with each other, thus a link is created between them. To secure the link level, four entities are used; the Bluetooth device address which is unique for each Bluetooth device, private authentication and encryption keys, both 13 which are 8 to 128 bits in length, and finally a

random number which changes frequently. These entities are used to generate a key or Personal Identification Number (PIN) which is then used between the devices to connect or transfer data .A 4-digit PIN is usually sufficient for most services, but for higher security services, a larger digit code can be used, since a PIN can vary between 1-16 octets. There are three modes of security for Bluetooth, the first mode is non secure, the second mode is a service level security, the third level is a link level security . The second level can be used to pair with devices such as a headset, while the third level can be used to send/receive data between two mobile devices . A difference between regular/ classic Bluetooth and BLE is in the generation of a Long-Term Key (LTK) instead of a link key. Both these keys perform the same task but instead of both devices generating the same key, the way LTK is established is different. One device determines the LTK and sends it to the other device during pairing systems)

Conclusion:-
Throughout the project many problems arose that could not be solved during the designated time period. Two major issues relate to the ability to detect whether the door is locked/unlocked. These issues arise either when using a key or using the turning knob. Such an action is independent of the motor, therefore the system is unable to recognize that the door is unlocked if done with a key.

Another case would be that the maximum rotation of the locking pin, where the time interval specified may not be enough to lock/unlock the door using the motor. These issues could be solved with the use a sensor With more time and resources, it is possible to solve the problems encountered throughout this project turning the prototype into an actual product. ,

Design by

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Nano Leaf

History:

Nanoleaf was founded in 2012 by three friends and University of Toronto engineering graduates Gimmy Chu, Christian Yan and Tom Rodinger. They were each working in different industries after graduation while creating Nanoleaf on the side. After a year, the three quit their jobs to develop the company full-time. In January 2013, Nanoleaf launched their first product on Kickstarter.The crowdfunding campaign for NanoLight (later renamed Nanoleaf One) received $250,000 from the crowdfunding site, with an initial goal of $20,000. Following the success of this campaign, Nanoleaf received funding from Horizons Ventures, an investment company owned by Li Ka Shing and Silicon Valley venture capital .The compafirm Kleiner Perkinsny also opened their first offices in Shenzhen, China and Hong Kong.

Their second Kickstarter campaign for the Nanoleaf Bloom in July 2014 was similarly well received. The campaign generated $200000 in

funding with a goal of $20,000. Nanoleaf opened their Headquarters in Toronto, Canada in January 2015. In 2017, the company launched into Europe and Australia. Their European office opened in Paris, France in April 2018.

Technology

Nanoleaf utilizes patented technology that aims for energy efficiency and a sustainable manufacturing process. The Smarter Series (Nanoleaf Light Panels and Canvas) are made with LED chips on a printed circuit board and feature a diffuser on a flat surface. They are modular LED lights with smart capabilities including App and voice control. Each Light Panel connects together with linkers (SD card-like connector chips), while power flows through them from the Controller (via power outlet). The Light Panels and Canvas are sold in 'Smarter Kits' which include 9 pieces, with extras available in three-packs. The Nanoleaf Light Panels were introduced at the 2016 Consumer Electronics show The company's light bulbs are also made up of small LEDs on a folded circuit board and feature an origami-like design. The technology eliminates the need of a heat sink, keeping the bulb cool to the touch while reducing the amount of energy used during manufacturing. Nanoleaf bulbs also have overheat protection which allows the bulb to dim itself if it gets too hot, reducing the possibility of damage and increasing its potential life span. The bulbs are also shatter-resistant

Products:

Nanoleaf One

The Nanoleaf One was the company's first product, released on Kickstarter in 2013 (formerly named the NanoLight). The product claims to be the world's most energy efficient light bulb and uses patented technology with custom packaged LED chips.

Nanoleaf Bloom

The company's second product, the Nanoleaf Bloom, was introduced in 2014 to make dimmable lighting more accessible. The Nanoleaf Bloom eliminates the need for a dimmer switch with the bulb's built-in dimming technology.Originally offered in Black, White and Arctic Leaf colors, the Bloom was later released with different designs in-

cluding patterns with the Moomin character, hearts and maple leaves.

Nanoleaf Gem

Marketed as an LED bulb for designers, the Nanoleaf Gem was released on Earth Day in 2015.The Gem was the company's first dimmable glass bulb and remains their best selling light bulb to date.

Nanoleaf Ivy Smarter Kit

Launched at the end of 2015, the Nanoleaf Ivy Smarter Kit is a voice-controlled lighting system.[18][19] It is the company's first product with smart home automation and works with Siri voice control.[20] The company lists it as the world's most en-

NANO LEAF

The company lists it as the wocontrolled lighting system It is the company's first product with smart home automation and works with Siri voice control. The company lists it as the world's most energy efficient smart bulbs.

Nanoleaf Rhythm Edition Light Panels

The Nanoleaf Light Panels are modular LED smart lights with color changing abilities. The Light Panels are color customizable with the Nanoleaf Smarter Series App. They can also be controlled using voice control and with the manual controller. The Light Panels are the company's first color changing product and has drawn attention from the design & lifestyle community, making its television debut on The Ellen Degeneres Show and on CTV National in Canada .

The first Light Panels upgrade, the Rhythm Module, was introduced in October 2017. The Rhythm is an add-on sound module that lets the Light Panels react to music in real-in Canada The Nanoleaf Light Panels initially launched into the MoMA Design Store in NYC during October 2016. It was then sold nationwide in Best Buy stores across US and Canada starting November 2016. Apple Stores also began retailing the Nanol eaf

Light Panels globally in March 2017.The Canvas has a built-in music visualizer and square shape compared to the Light Panels' triangular form. It also features a textured marble-like style and edge-lit design.

Nanoleaf Canvas

Launched in December 2018, the Nano leaf Canvas is a touch-controlled modular LED smart light. The Canvas has a built-in music visualizer and square shape compared

-pared to the Light Panels' triangularform. It also features a textured marble-like style and edge-lit design time. The Nano leaf Remote, a physical controller for the Light Panels, launched in June 2018.

LiFi can operate in daylight and even in direct sunlight conditions, as the modulated light can still be detected. LiFi relies on detecting the fast changes in light intensity and not on the absolute or slowly varying levels caused by natural disruptions in daylight or sunlight. LiFi technology modulates the light at very high rates and sunlight is constant light and therefore can be filtered out at the receiver.

Our team at pure LiFi has tested our receivers outdoors under 77,000Lux of sunlight.

supply of clean energy.

Applications: Security waves used by Li-Fi, lights cannot penetrate through walls and doors. This makes it more secure and makes it easier to control access to a network. As long as transparent materials like windows are covered, access to a Li-Fi channel is limited to devices inside the room.

Underwater application

Most remotely operated underwater vehicles (ROVs) are controlled by wired connections. The length of their cabling places a hard limit on their operational range, and other potential factors such as the cable's weight and fragility may be restrictive. Since light can travel through water, Li-Fi based communications could offer much greater mobility. Li-Fi's utility is limited by the distance light can penetrate water. Significant amounts of light do not penetrate further than 200 meters. Past 1000 meters, no light penetrates.

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