Vol. 5, Issue 1 *Dec. 2017*

SCOPE

Technical Magazine

Electronics & Instrumentation Engineering

Department of Electronics & Instrumentation Engineering

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Warangal - 506 015

(An Autonomous Institute under Kakatiya University, Warangal)

Vol. 5, Issue 1 **Dec. 2017**

SCOPE

Technical Magazine

Electronics & Instrumentation Engineering

Department of Electronics & Instrumentation Engineering
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Warangal-506 015
(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF ELECTRONICS & INSTRUMENTATION ENGINEERING
KAKATIYA INSITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

VISION

To provide quality education in Electronics & Instrumentation Engineering by nurturing the students with strong technical, analytical, practical skills and ethics to make them engineering professionals who cater to the societal needs with a high degree of integrity and social concern.

MISSION

1. To provide progressive and quality educational environment with the help of dedicated faculty and staff by fully utilizing the information technology aiming at continuous teaching and learning process.

2. To produce engineering graduates fit for employability with a competence to design, develop, invent and solve instrumentation engineering problems.

3. To make the students ethically strong by inculcating sense of brotherhood.

4. To make the students research oriented by providing latest technical knowledge and thus cater to the changing needs of industry and commerce.

EDITORIAL BOARD

PREFACE

This magazine summarizes the current state of Electronics and Instrumentation Engineering, providing an arena for the student community to showcase their technical talents in a great way. Keeping in view of the present era of technological revolution in the field of Instrumentation Engineering, the students of E&IE department, KITS Warangal presents you **SCOPE**.

We acknowledge the essential contribution of the reviewers, whose efforts are deeply appreciated.

We feel that such technical magazine is very well required as it helps in updating the knowledge of future engineers.

The Department of E&IE is very much thankful to the Management for their continuous support and encouragement for making the Technical Magazine **SCOPE**.

CONTENTS

CHAPTER 1: SUN TRACKERS

1. Introduction

The dual threats of energy depletion and global warming place the development of methods for harnessing renewable energy resources .Sun Trackers can substantially improve the electricity production of photovoltaic (PV) system. This paper proposes a novel design of a dual axis solar tracking PV system which utilizes the feedback control theory along with a four-quadrant light dependent resistor (LDR) sensor and simple electronic circuits to provide robust system performance.

The proposed system uses a unique dual axis AC motor and stand-alone PV inverter to accomplish solar tracking. The control implementation is a technical innovation that is simple and effective design. In addition, a scaled down laboratory prototype is constructed to verify the feasibility of scheme. The effectiveness of sun tracker is confirmed experimentally. The hardware design consists of light dependent resistor (LDR) based sensing circuit, comparator, Motor driver with a relay. Sun Trackers are widely used in meteorological networks of solar monitoring stations that measure direct, diffuse and global radiation, for inputs to weather forecasting models. Other applications include atmospheric chemistry research, pollution forecasting and materials testing. To conclude the results of this study may serve as valuable references for future solar energy applications.

Solar energy is rapidly gaining notoriety as an important means of expanding renewable energy resources. As such, it is vital that those in engineering fields understand the technologies associated with this area. My project will include the design and construction of a microcontroller-based solar panel tracking system. Solar tracking allows more energy to be produced because the solar array is able to remain aligned to the sun. This system builds upon topics learned in this course. A working system will ultimately be demonstrated to validate the design. Problems and possible improvements will also be presented. Renewable energy

solutions are becoming increasingly popular. Photovoltaic (solar) systems are but one example. Maximizing power output from a solar system is desirable to increase efficiency. In order to maximize power output from the solar panels, one needs to keep the panels aligned with the sun. As such, a means of tracking the sun is required. This is a far more cost effective solution than purchasing additional solar panels. It has been estimated that the yield from solar panels can be increased by 30 to 60 percent by utilizing a tracking system instead of a stationary array [1]. This project develops an automatic tracking system which will keep the solar panels aligned with the sun in order to maximize efficiency.

2. Light Sensor Theory

Light sensors are among the most common sensor type. The simplest optical sensor is a photoresistor which may be a cadmium sulfide (CdS) type or a gallium arsenide (GaAs) type. The next step up in complexity is the photodiode followed by the phototransistor. The sun tracker uses a cadmium sulfide (CdS) photocell for light sensing. This is the least expensive and least complex type of light sensor. The CdS photocell is a passive component whose resistance in inversely proportional to the amount of light intensity directed toward it. To utilize the photocell, it is placed in series with a resistor. A voltage divider is thus formed and the output at the junction is determined by the two resistances. Figure 1 illustrates the photocell circuit. In this project, it was desired for the output voltage to increase as the light intensity increases, so the photocell was placed in the top position.

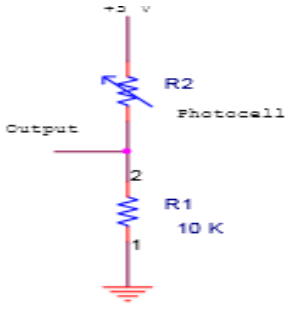


Figure 1 – CdS Photocell Circuit

3. Stepper Motor and Driver Theory

Stepper motors are commonly used for precision positioning control applications. All stepper motors possess five common characteristics which make them ideal for this application. Namely, they are brushless, load independent; have open loop positioning capability, good holding torque, and excellent response characteristics. There are three types of stepper motors: permanent magnet, variable reluctance, and hybrid. The arrangement of windings on the stator is the main distinguishing factor between the three types. Permanent magnet motors may be wound either with unipolar or bipolar windings. The sun tracker uses a unipolar step motor. As such, discussion will be limited to this type of stepper motor. Unipolar motors have two windings with each having a center tap.

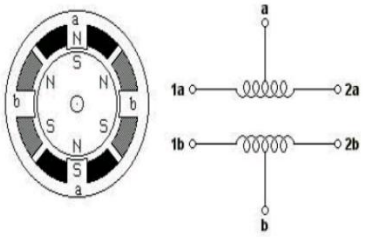


Figure 2 – Unipolar Stepper Motor Coils

.

The center taps are connected to a positive voltage while the coil ends are alternately grounded to cause a reversal of the field direction in that winding. Figure 2 shows a 4-phase motor. The number of phases is equal to two times the number of coils. The motor is rotated by applying power to the windings sequence as shown in Figure 3.

Clockwise Rotation ➡

Index	1a	1b	2a	2b
1	1	0	0	0
2	0	1	0	0
3	0	0	1	0
4	0	0	0	1
5	1	0	0	0
6	0	1	0	0
7	0	0	1	0
8	0	0	0	1

Figure 3 – Standard Drive Sequence Example

4. Design Analysis and Results

Hardware and software portions of the project were separated into stages while developing the overall system. The portions consisted of light detection, motor driving, software tracking, and software enhancements. Building and testing smaller sections of the system made the project more manageable and increased efficiency by decreasing debugging time.

The project performs the required functions envisioned at the proposal phase. However, while satisfied with software operation and simulation, less satisfaction was obtained from two hardware areas. First, there is a potential for problems with motor/photocell movement due to the photocell wires creating binding issues. There are two wires attached to the photocell mounted on the motor shaft. Once the tracker has moved approximately 30 to 45 degrees, the wires place a counter torque on the motor and the motor slips.

The second issue deals with the photocell. It was discovered that the photocell needs to be shielded such that light can be directed narrowly to its surface. This was done by placing a black vinyl tube around the photocell to create a tunnel and help shield it from light that is not directly in its direct path. This dilemma is discussed further in Section 5.

5. Conclusion

This paper has presented a means of controlling a sun tracking array with an embedded microprocessor system. Specifically, it demonstrates a working software solution for maximizing solar cell output by positioning a solar array at the point of maximum light intensity. This project presents a method of searching for and tracking the sun and resetting itself for a new day. While the project has limitations, particularly in hardware areas discussed in Section 4 and Section 5, this provides an opportunity for expansion of the current project in future year.

#K. ANANYA

(III/IV)

CHAPTER 2: PROJECT SOLI

1.Introduction

Google has its eyes on a future of radar-based technology for hand gestures with wearables, and to a future where you can interact with wearable technology without adding physical controls such as buttons. Your fingers can be the buttons. Earlier this year, Project Soli was announced as an interaction sensor making use of radar technology.

Radar has been used for many things– to track cars, big objects, satellites and planes. We're using it to track micro motions, twitches of human hands, and use that to interact with wearables and other computing devices. Radar has some unique properties; it has very high positional accuracy, according to the video, where the tiniest motions can be sensed.

Soli focuses on the fact that the ability to function is not always the job of the device but rather the movements of the user, specifically, hands and fingers. Soli project relies on a tiny chip with radar like capabilities and it can pick up the slightest of movements.

This technology has the potential to bring in a revolution in how things are driven with human interaction in the tech world. The project is under research by Google ATAP, and it is termed as Project Soli. In this technology, a radar sensor along with a capturing system is made into a small chip and this chip can be connected to any device like Computer, Smartphone, etc. The different functions in these devices like Call, Volume control, Zoom, etc. can be done using specific gesture without having to touch or use another interaction methods.

1. What is Radar?

Radar is an acronym for "radio detection and ranging." A radar system usually operates in the ultra-high-frequency (UHF) or microwave part of the radio-frequency (RF) spectrum, and is used to detect the position and/or movement of objects. Radar can track storm systems, because precipitation reflects electromagnetic fields at certain frequencies. Radar can also render precise maps. Radar systems are widely used in air-traffic control, aircraft navigation, and marine navigation.

2. Principle of Radar

A radar system has a transmitter that emits radio waves called *radar signals* in predetermined directions. When these come into contact with an object they are usually reflected or scattered in many directions. Radar signals are reflected especially well by materials of considerable electrical conductivity—especially by most metals, by seawater and by wet ground. Some of these make the use of radar altimeters possible. The radar signals that are reflected back towards the transmitter are the desirable ones that make radar work. If the object is *moving* either toward or away from the transmitter, there is a slight equivalent change in the frequency of the radio waves, caused by the Doppler effect.

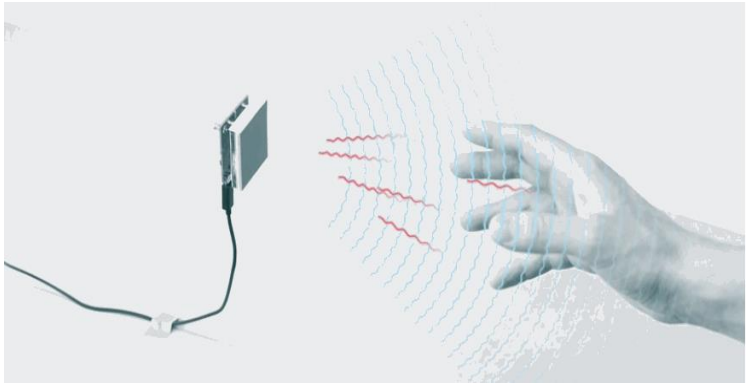
The weak absorption of radio waves by the medium through which it passes is what enables radar sets to detect objects at relatively long ranges—ranges at which other electromagnetic wavelengths, such as visible light, infrared light, and ultraviolet light, are too strongly attenuated. Such weather phenomena as fog, clouds, rain, falling snow, and sleet that block visible light are usually transparent to radio waves. Certain radio frequencies that are absorbed or scattered by water vapour, raindrops, or atmospheric gases (especially oxygen) are avoided in designing radars, except when their detection is intended.

3. What is Gesture Recognition?

Gesture recognition is a topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithms. Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Current focuses in the field include emotion recognition from face and hand gesture recognition. Many approaches have been made using cameras and computer vision algorithms to interpret sign language. However, the identification

and recognition of posture, gait, proxemics, and human behaviors is also the subject of gesture recognition techniques.

Gesture recognition can be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines and humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse. Gesture recognition enables humans to communicate with the machine (HMI) and interact naturally without any mechanical devices. Using the concept of gesture recognition, it is possible to point a finger at the computer screen so that the cursor will move accordingly. This could potentially make conventional input devices such as mouse, keyboards and even touch-screens redundant. Gesture recognition can be conducted with techniques from computer vision and image processing.



4. Conclusion

One of the big problems with wearable devices right now is inputs - there's no simple way to control these devices. Therefore gestures will be used by individuals to carry out certain functions with electronic machines such as Smartphone's and desktops. As Human beings are lazy, they require the work to be done at their fingertips. So as in that case this tiny chip enables the user to control some functions just by using their hand gestures. This is promising technology for the future generations.

#CH. AJIT KUMAR

(IV/IV)

CHAPTER 3: 5 PEN PC TECHNOLOGY

1. Introduction

When writing a quick note, pen and paper are still the most natural to use. The 5 pen pc technology with digital pen and paper makes it possible to get a digital copy of handwritten information, and have it sent to digital devices via Bluetooth.

P-ISM (Pen-style Personal Networking Gadget Package), which is nothing but the new discovery which is under developing stage by NEC Corporation. It is simply a new invention in computer and it is associated with communication field. Surely this will have a great impact on the computer field. In this device you will find Bluetooth as the main inter connecting device between different peripherals.

P-ISM is a gadget package including five functions: a pen-style cellular phone with a handwriting data input function, virtual keyboard, a very small projector, camera scanner, and personal ID key with cashless pass function. P-ISMs are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. This personal gadget in a minimalist pen style enables the ultimate ubiquitous computing.

2. History

The conceptual prototype of the "pen" computer was built in 2003. The prototype device, dubbed the "P-ISM", was a "Pen-style Personal Networking Gadget" created in 2003 by Japanese technology company NEC. The P-ISM was featured at the 2003 ITU Telecom World held in Geneva, Switzerland.

The designer of the 5 Pen Technologies, "Toru Ichihash", said that "In developing this concept the asked himself - "What is the future of IT when it is small?" The pen was a logical choice. He also wanted a product that you could touch and feel. Further the intent is to allow for an office anywhere."

However, although a conceptual prototype of the "pen" computer was built in 2003, such devices are not yet able to consumers.

An article about the device published on the Wave Report website in 2004 explains at ITU Telecom World we got a sample of another view by NEC. It is based on the pen and called P-ISM. This concept is so radical that we went to Tokyo to learn more.

"The design concept uses five different pens to make a computer. One pen is a CPU, one creates a virtual keyboard, another project the visual output and

thus the display and a communicator (a phone). All five pens can rest in a holding block which recharges the batteries and holds the mass storage. Each pen communicates wireless, possibly Bluetooth."

A Pen-style Personal Networking Gadget Package it seems that information terminals are infinitely getting smaller. However, we will continue to manipulate them without our hands for now. We have visualized the connection between the latest technology and the human, in a form of a pen. P-ISM is a gadget package including five functions: a pen-style cellular phone with a hand writing data input function, virtual keyboard, a very smaller projector, camera scanner, and personal ID key with cashless pass function. P-ISMs are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. This personal gadget in a minimalistic pen style enables the ultimate ubiquitous computing.

3. Components Description:

CPU PEN: The function of the CPU is done by one of the pen. It is also known as computing engine. It consists of dual core processor embedded in it and works with WINDOWS operation system. The central process unit (CPU) is the portion of a computers system that carries out the instructions of a computer program and is the primary element carrying out the computer's function. The central processing unit carries out each instruction of the program in sequence, to perform the basic arithmetical, logical and input/output operation of the system.

Control Unit: The control unit of the CPU contains circuitry that uses electrical signals to direct the entire computer system to carry out, stored program instructions. The control unit does not execute program instructions; rather, it directs other parts of the system to do so. The control unit must communicate with both the arithmetic/ logic unit and memory.

COMMUNICATION PEN: P-ISM's are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. They are connected through Tri-wireless modes (Bluetooth, 802.11 B/G) and terabytes of data, exceeding the capacity of today's hard disks.

VIRTUAL KEYBOARD: The Virtual Laser Keyboard (VKB) is the ULTIMATE new gadget for PC users. The VKB emits laser on to the desk where it looks like the keyboard having QWERTY arrangement of keys i.e. it use a laser beam to generate a full-size perfectly operating laser keyboard that smoothly connects to of PC and most of the hand-held devices. As we type on the laser Projection, it analyses what we are typing according to the co-ordinates of the location.

4. Conclusion

The communication devices are becoming smaller and compact. This is only a example for the start of this new technology. We can expect more such developments in the future, It seems that information terminals are infinitely getting smaller. However, we will continue to manipulate them with our hands for now. We have visualized the connection between the latest technology and the human, in a form of a pen. P-ISM is a gadget package including five functions: a pen-style cellular phone with a handwriting data input function, virtual keyboard, a very small projector, camera scanner, and personal ID key with cashless pass function. P-ISMs are connected with one another through short-range wireless technology.

#B. SHIVANI

(III/IV)

CHAPTER 4: LOW POWER WIRELESS SENSOR NETWORK

1. Introduction

Wireless sensor network (WSN) is an ad-hoc network technology comprising even thousands of autonomic and self-organizing nodes that combine environmental sensing, data processing and wireless networking. The applications of sensor networks range from home and industrial environments to military uses. Unlike the traditional computer networks, a WSN is application oriented and deployed for specific task.

WSNs are data centric, which means the messages are not send to individual nodes but to geographical locations or regions based on data content. A WSN node is typically battery powered and characterized by extremely small size and low cost.

A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environment conditions, such as temperature, sound, pressure etc.

2. WIRELESS SENSOR NETWORK

Wireless sensor networks (WSN), sometimes called wireless sensor and actuatornetworks(WSAN), arespatiallydistributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to other locations. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on.

3. APPLICATIONS OF WIRELESS SENSOR NETWORK

- Industrial control & monitoring
- Health care
- Security & military surveillance
- Environmental sensitivity
- Home automation and consumer electronics

4. HOME AUTOMATION

A WSN is being used to assist people during the assembly of complex composite objects such as do-it-yourself furniture. This saves users from having to study and understand complex instruction manuals, and prevents them from making mistakes.

The furniture parts and tools are equipped with sensor nodes. These nodes are equipped with a variety of different sensors: force sensors (for joints), gyroscope (for screwdrivers), and accelerometers (for hammers).

5. CONCLUSION

To realize the ubiquitous computing in human life a sensor network may be the powerful tool, because they can be deployed at the places where a man cannot reach. However it is negative sides also because the power of sensor node cannot be refreshed. To realize the power control and power saving every layer take care of that. At Physical layer modulation schemes are chosen according to that. At MAC layer contention free(TDMA/FDMA) schemes are used. At Network layer multi hop routing and data centric routing is used. Normally at transport layer UDP protocol is used. At the time when guaranteed delivery is required TCP can also be used. TCP is used in addition to link layer retransmission. Software which is used on application layer also should be power aware software.

#J. MEGHANA

(III/IV)

CHAPTER 5: FACE DETECTION

1. Introduction

In recent years, face recognition has attracted much attention and its research has rapidly expanded by not only engineers but also neuroscientists, since it has many potential applications in computer vision communication and automatic access control system. Especially, face detection is an important part of face recognition as the first step of automatic face recognition. However, face detection is not straightforward because it has lots of variations of image appearance, such as pose variation (front, non-front), occlusion, image orientation, illuminating condition and facial expression.

Many novel methods have been proposed to resolve each variation listed above. For example, the template-matching methods are used for face localization and detection by computing the correlation of an input image to a standard face pattern. The feature invariant approaches are used for feature detection of eyes, mouth, ears, nose, etc. The appearance-based methods are used for face detection with eigenface, neural network, and information theoretical approach.

2. Face recognition system structure:

Face Recognition is a term that includes several sub-problems. There are different classifications of these problems in the bibliography. Some of them will be explained on this section. Finally, a general or unified classification will be proposed.

a) A generic face recognition system:

The input of a face recognition system is always an image or video stream. The output is an identification or verification of the subject or subjects that appear in the image or video. Some approaches define a face recognition system as a three step process - see Figure 1.1. From this point of view, the Face Detection and Feature Extraction phases could run simultaneously.

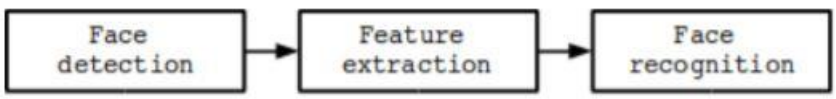


Figure 1.1: A generic face recognition system.

Face detection is defined as the process of extracting faces from scenes. So, the system positively identifies a certain image region as a face. This procedure has many applications like face tracking, pose estimation or compression. The next step -feature extraction- involves obtaining relevant facial features from the data.

3. Face detection problem structure:

Face Detection is a concept that includes many sub-problems. Some systems detect and locate faces at the same time, others first perform a detection routine and then, if positive, they try to locate the face. Then, some tracking algorithms may be needed - see Figure 1.2.

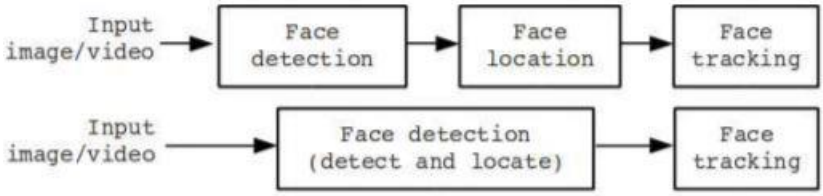


Figure 1.2: Face detection processes.

4. Face tracking:

Many face recognition systems have a video sequence as the input. Those systems may require to be capable of not only detecting but tracking faces. Face tracking is essentially a motion estimation problem. Face tracking can be performed using many different methods, e.g., head tracking, feature tracking, image-based tracking, model-based tracking. These are different ways to classify these algorithms:

Head tracking/Individual feature tracking: The head can be tracked as a whole entity, or certain features tracked individually.

2D/3D: Two dimensional systems track a face and output an image space where the face is located. Three dimensional systems, on the other hand, perform a 3D modeling of the face. This approach allows to estimate pose or orientation variations.

5. Feature Extraction:

Humans can recognize the faces in whatever the condition they might be. In fact face recognition's main problem is to extract information from photographs. This feature extraction process can be defined as the procedure of extracting relevant information from a face image. This information must be valuable to the later step of identifying the subject with an acceptable error rate. The feature extraction process must be efficient in terms of computing time and memory usage. The output should also be optimized for the classification step.

6. Conclusion

Face Detection using Appearance Based methods and Algorithms based on Neural Network approaches is a very much successful method when compared to the other methods Templates, and algorithms available, Even though we need to train the algorithm with large no of examples in this method which might seem highly impossible by employing training sets and others but by employing machine learning algorithms we can quickly train the Neural Network Algorithm to detect as many faces as possible by giving large data bases as inputs to it and the success ratio in detecting the faces by this approach is far ahead of other techniques employed and much quicker.

#B. SRIRAM KUMAR

(III/IV)

CHAPTER 6: ELECTROMAGNETIC AIRCRAFT LAUNCH SYSTEM

1. Introduction

Almost as soon as man learned how to fly, They wanted to use the aircrafts for defense purposes. Due to the short range of flight of aircrafts they wanted to get the flight airborne from the deck of a ship. But the main leap was reaching take off speed of an aircraft in a short distance.

Reaching take off speed requires a lengthy runway, but the decks of warships are filled with weapons and radar. There is no room for a long take off strip. So there was a need to design a way to reach take off speed in a short distance. And the solution was aircraft catapults.

An aircraft catapult is a device used to launch aircraft from ships, most commonly used on aircraft carriers, as a form of assisted take off. It consists of a track built into the flight deck, below which is a large piston or shuttle that is attached through the track to the nose gear of the aircraft. Different means have been used to propel the catapult, such as weight and derrick, gunpowder, flywheel, air pressure, hydraulic, and steam power. The most widely used at present is steam powered catapults.

The aircrafts are getting heavier day by day (due to new weapons and advanced technologies), to facilitate for the launch of these heavier aircrafts the more efficient way for assisted take off must be designed. The united states navy is investigating the possibility of replacing the present steam catapult system with an electromagnetic launcher.

The electromagnetic aircraft launch system (EMALS) will have many advantages over its predecessor. Many of these advantages will be necessary to meet the requirements of a launch system for the next century.

2. Functions of Components

Energy storage system: The EMALS represents a radically new approach to the launch problem. Although based on Linear Induction Motor, this application requires enormous impulse power and energy, unlike other LIM applications. The EMALS project requires the delivery of substantial amounts of power and energy precisely during 2 to 3 second launch release. The Energy storage subsystem uses rotors of a disk

alternator as a flywheel to kinetically store energy it draws from the ship's power system. An alternator is an electrical generator that converts mechanical energy to electrical energy in the form of alternating current. For reasons of cost and simplicity, most alternators use a rotating magnetic field with a stationary armature. Occasionally, a linear alternator or a rotating armature with a stationary magnetic field is used. In principle, any AC electrical generator can be called an alternator, but usually the term refers to small rotating machines driven by automotive and other internal combustion engines. An alternator that uses a permanent magnet for its magnetic field is called a magneto. Alternators in power stations driven by steam turbines are called turbo-alternators. Large 50 or 60 Hz three phase alternators in power plants generate most of the world's electric power, which is distributed by electric power grids.

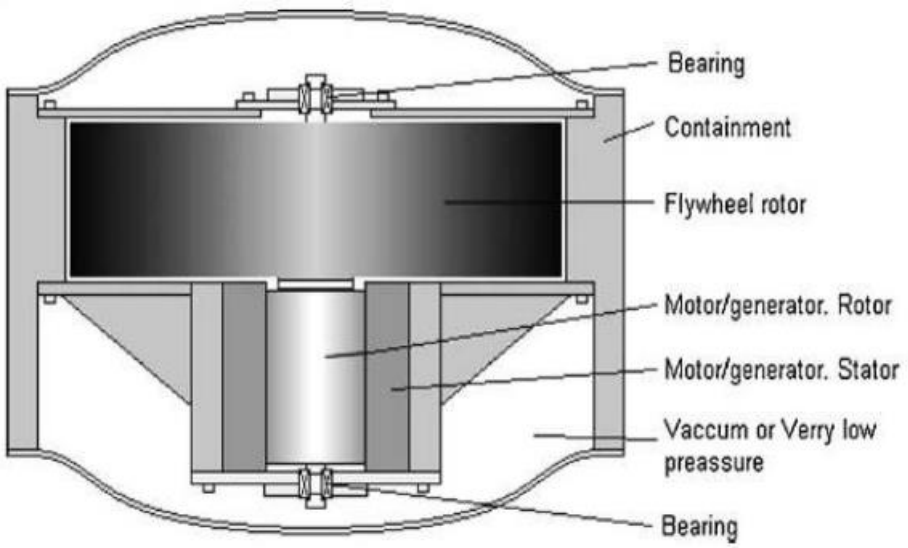


Figure: A schematic of a flywheel attached to a generator

Power Electronics: Power electronics is the application of solid-state electronics to the control and conversion of electric power. It also refers to a subject of research in electronic and electrical engineering which deals with the design, control, computation and integration of nonlinear, time-varying energy-processing electronic systems with fast dynamics. In contrast to electronic systems concerned with transmission and processing of signals and data, in power electronics substantial amounts of electrical energy are processed. An AC-AC convertor known as cyclo-convertor is used in this EMAL system.

System Control: EMALS uses a state-of-the-art system to control the current into the launch motor in real time. More precise end speeds are achievable over a wider range of aircraft types and weights than those of steam catapults. The smooth launch acceleration may extend the lifetime of the aircraft. High reliability and a system architecture with inherent redundancy is achieved by use of commercial-off-the-shelf components where possible. Modularity is emphasized to ease installation, maintenance, and life cycle planning. The applied power is controlled through a closed loop so that the actual launch profile is matched to the requirements of a particular aircraft load and to overall system performance variations; the design uses Hall effect sensors to determine the position of the carriage along the motor rail the magnetic flux strength in the LIM gap is about 1 Tesla.

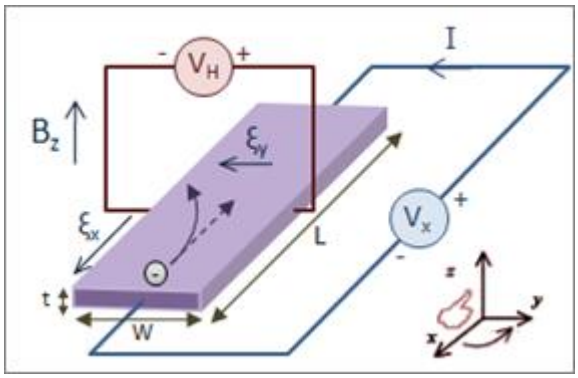


Figure: Hall effect measurement setup

LAUNCH MOTOR: After the power has gone from the disk alternators and through the cyclo-converter, it can then be passed to the launch motor. The launch motor is actually a coil gun. The motor uses the same through at the current steam catapults to allow for back-fitting. A linear motor is an electric motor that has had its stator and rotor "unrolled" so that instead of producing a torque (rotation) it produces a linear force along its length. However, linear motors are not necessarily straight. Characteristically, a linear motor's active section has ends, whereas more conventional motors are arranged as a continuous loop.

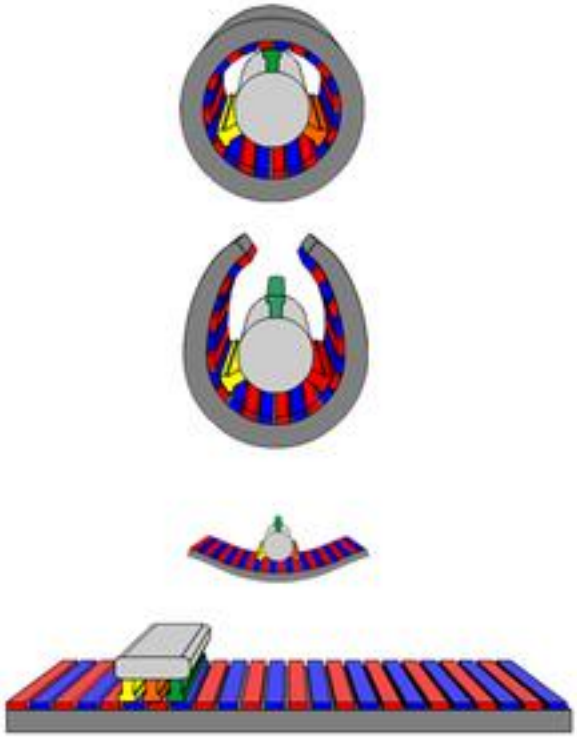


Figure: A 19traightened version of a motor

3. ADVANTAGES

- EMAL system weighs less and occupies less space.
- It requires less man power to operate.
- The maintenance cost is less.EMALS can control the launch speed with greater precision.
- Can launch an aircraft every 45 seconds.

4. DISADVANTAGES

- Requires high amount of electricity
- Dissipates a considerable amount of heat

5. CONCLUSION

For more than 50 years, the steam-powered catapult has been the assist system designed into aircraft carriers to launch an aircraft. Although the steam catapult system has worked well and is well understood, a new generation of navy designs is striving to simultaneously meet goals of lower operating cost, reduced crew requirements and

greater flexibility and improved performance as the present system has been refined to its technical end and has some inherent limitations that are more likely to overcome. The electromagnetic aircraft launch system is a good replacement to the steam catapults, as it overcomes almost all the drawbacks of the steam catapults. Because of the many advantages provided by EMALS the navies of all countries including India are showing interest in this technology. It is a promising technology for the future defense systems.

#HIMANSHU AMBATI

(IV/IV)

CHAPTER 7: VIRTUAL REALITY

1. INTRODUCTION

Virtual Reality can be defined as an environment which is simulated by a computer system. The environment can mimic the "real" world, or it can be a simulation of a completely imaginary world. The term Virtual (or Artificial) Reality is attributed to Myron Krueger, an American computer artist in the 1970s. It has been recorded as far back as 1938 however, by the French artist Antonin Arnaud, who coined the phrase while discussing his theatre shows. The first virtual reality equipment, which attempted to physically realize the concept, was developed by Morton Heilig in the 1950s. He created the Sensorama machine, which contained a moving seat, along with 3-D moving images, smell, sound, and even wind. This is demonstrated in the image below.

In the 1960s, further work in the field was done by Ivan Sutherland. In 1968, he developed a headset which allowed the wearer to "interact" with virtual objects, using wire frame graphics. Virtual Reality entered the public consciousness in the 1980s and 90s. It was featured in popular. Culture, including films such as Tron, The Lawnmower Man, The Matrix, and the Holodeck in Star Trek, The Next Generation. The Holodeck is a fictional example of True Immersive Virtual Reality, which is one of the levels or methods of Virtual Reality.

2. LEVELS OF VR

There are five levels, or methods of Virtual Reality.

Simulation Based: This level is typically used for training purposes. If the equipment is available, almost any scenario can be simulated, which eliminates any inherent dangers. Learner drivers will be able to experience any type of driving conditions without having to be near a car or a road. Flight simulators can allow pilots to experience and prepare for situations that cannot be implemented in real world training. Medical training can allow trainee surgeons to simulate operations without fear of mistakes.

Avatar Based: This allows the user to control a visual representation of himself within the virtual environment, in this instance a virtual world such as Second Life.

Projector Based: This method takes real life images, and projects them to mimic the environment. CAVE (CAVE Automatic Virtual Environment) is an example of this. In a CAVE, the user is surrounded by projected images within a 10'x10'x9' cube, which provides the illusion of immersion.

Desktop Based: This method is found on a desktop computer, where the virtual environment is generated without any special hardware or other processes. The illusion of immersion is provided by responsive computer generated characters and actions that can be taken by the user.

True Immersive Virtual Reality: This is purely hypothetical at this time. As mentioned earlier, this is represented in films such as The Matrix, where the human brain is directly linked to a computer generated simulation, or the Holodeck from Star Trek, where the user can select a scenario they would like to interact with.

3. CURRENT USES

Virtual Reality is currently in use in a wide variety of different forms. This report will look at some of these forms.

3.1. Medical Training

Historically, medical training and specifically surgery training has been accomplished by students learning by watching more experienced surgeons perform. This approach is a satisfactory one, but does have its own inherent problems; the

sporadic nature of having a patient to operate on, the quality of the surgeons teaching skills. One of the main ways that virtual reality is used in this context is that of training for laparoscopy surgery, also known as keyhole surgery. This technique employs a camera on the end of a rod, which is used to view the surgery on a magnified view screen. This makes the incision smaller, which has obvious benefits for the patient. This process lends itself well to simulated training, as the operation already uses a display screen for the surgeon to view the magnified procedure they are carrying out. The simulation involves the trainee surgeon using surgical instruments as normal, and the operation being simulated onscreen. According to Sophie Leisby, a trainee surgeon, the simulation is very real, the instruments act as they would in a real life situation, and when a vessel is accidentally cut in the simulation, it bleeds, and in the example shown, the surgeon failed the situation. This illustrates the benefits of virtual training; if the trainee surgeon had made this mistake in a real operation it is likely the patient would have experienced severe problems as a result. In the example given from Denmark, each trainee has to attain a certain score in the simulation before they will be considered for real life surgery.

This video follows Sofie Leisby, a trainee surgeon, through laparoscopic surgery—from practising in VR to a real life procedure.

This is obviously a very useful tool in training surgeons. Previous methods, such as practicing on cadavers offer valuable experience of interacting with a real human body. Interacting with a live patient is obviously a different matter however. Virtual Reality training offers trainees the opportunity to interact with material very close to what they would experience in a real operation. The use of such technologies as haptic feedback can only enhance their training further. Care needs to be taken though, to guard against complacency, and detachment from the dangers present in the operations that are being performed. This is an issue with Virtual Reality as a whole, not just with surgical training. There is a danger that the user will become desensitized to the consequences of mistakes. After all, if you die while playing a computer game, you simply respawn at your last save point. Using Virtual Reality to train people in anything runs the risk of this becoming a natural reaction.

Another use of Virtual Reality in the medical world is that of treating phobias. This article lists the types of phobia which can be treated using Virtual Reality. These include fear of spiders, flight, driving, and claustrophobia among others. This kind of treatment, known as “exposure therapy”, refers to the practice of exposing a patient to the very thing that they have a phobia of. Obviously Virtual Reality has the potential to play a significant role in this kind of treatment, as the patient can be exposed to the stimuli in a virtual manner, which means they are more likely to participate in the treatment. A lot depends on the individual patient however. The first article states that the study carried out was inconclusive; that certain patients responded well to the virtual treatment, but others did not. Another factor is how severe the phobia is, and how relevant the virtual nature of the treatment is to the patient. A lot would depend on the patient being able to suspend their knowledge of the virtual environment, simulated flight very different to the

real thing, especially if one has a related phobia. The research carried out for this report could not locate many recent references to this practice, most dated from the 1990s. It can be assumed from this that this was not followed up on as being a viable treatment for phobias. Possibly as the technology improves and becomes more sophisticated it will be revisited in the future.

3.2. Other Training

Virtual reality can be used in many other disciplines as a safe alternative to in-the-field training. One such example is that of coal mine. The example shown offers a variety of simulated coal mine environments, and users can take part in courses that will train them in the different situations that could arise in an environment such as this. Again this allows trainees to experience the real life dangers to both themselves, and expensive equipment without placing themselves in physical danger.

A very relevant point made by this company is that this is a "High impact experience for maximum learning and retention". Learning is always most successful when the student has a memorable experience to look back on, and will learn and retain far more from actually *doing* the tasks they are learning than from reading about them. Virtual Reality offers students such as these the opportunity to experience firsthand the realities of the job they are training for, something that may not have been possible before the advent of this technology.

3.3. Conferencing

Another environment in which virtual reality is currently employed is in conferencing. There are areas where this approach has many benefits over its real life equivalent. The primary factor is that of attendance and travel, if great distances have to be travelled to attend a conference, this obviously costs time and money to achieve. Using Virtual conferencing, attendees can view and interact in proceedings without

leaving their office or home. One of the main proponents of this facility is the virtual world Second Life, which offers businesses the facility to hold meetings, conferences. The idea is that each participant has an avatar, who sits at the virtual table (or similar), and contributes with the meeting through Text using audio technology to chat in real time with their colleagues. One interesting innovation mentioned is the “Frustration Orb”. This allows attendees to click it anonymously if they are unhappy with the direction of the meeting. The more clicks it receives, the orb turns red, intimating that the group are unhappy. This illustrates features of Virtual Conferencing that would enhance the experience. The ideas used behind this can be expanded to cover a wide range of scenarios. Education is an example; distance learning, or programs such as the Open University would benefit hugely from having virtual lectures. Such facilities already exist in various forms; the example referenced here is from the Twente University in The Netherlands.

3.4. Military

Virtual Reality has been around for a long time in military training, before the term was coined. In the 1920s and 30s, primitive flight simulators were employed to train pilots. Sawed off “coffins” were placed on a pedestal, with realistic instruments placed inside. The darkness inside, the movement and the instruments made this an effective method of training pilots to fly at night. Later on, more sophisticated flight simulators were used, not just for military training. Cockpits surrounded by projected images to simulate flight can train all pilots, not just military. For military purposes though, this approach offers a way to train for and develop tactical situations, without risking expensive equipment and personnel in the field.

3.5. Augment Reality

When looking at Virtual Reality, Augmented Reality must be discussed at least briefly. This refers to the combining of the real and virtual worlds. Common examples of this that are seen are in televised sports, such as the puck in ice hockey being augmented to allow viewers to follow it onscreen, or advertising in cricket and football, where logos are displayed on the field of play when viewed on a television. Augmented reality was defined in 1997 by Ronald Azuma; he says that Augmented Reality allows the user to see the real world with virtual components superimposed on top of it, supplementing reality rather than replacing it. This is of course very different in scope to Virtual Reality, but it can be seen as a stage in the development of the concept, and its acceptance in the wider world. The step up from real world images supplemented by augmented reality, to fully immersive virtual reality is a large one, but it can be seen as a step in that direction.

4. FUTURE

As can be seen from the preceding report, the technology behind Virtual Reality continues to be developed, and, impressive as some of it is at this time, we are still some way off from having systems that will provide fully immersive virtual reality. It can be mimicked however. As discussed earlier, the hardware underpinning Virtual Reality is steadily moving forwards, with the military and medical professions two of the industries that are taking advantage of the ever more sophisticated equipment. In the

home, progress has been slower, largely down to the cost of equipment, but this may change in the next few years, as Microsoft push their Project Natal, and their competitors will undoubtedly attempt to develop rival technologies. One recent innovation has come from the use of Nintendo's DSi gaming console. The remit of this report was specific in its "not gaming" direction, but this technology has wider implications for user interaction with 3D environments, and has been included. The technology uses the front facing camera present on the new model of Nintendo's DS console, the DSi. It employs face tracking software, which will analyse the position of the viewers face and eyes, and the images displayed on screen react in accordance to this. A 3D image is then given depth, and if the DSi is tilted, or the viewer moves his head back, the depth of the image changes, mimicking the real life perspective of the objects [28]. It is difficult to explain this properly, as it is a very visual effect. The link below at Fig 8 leads to a video demonstration.

5. CONCLUSION

A society in which the ability to access virtual reality was hindered by the pressing supporters of the anti-VR movement, would be a tremendous downfall and a signal to our own ignorance in times of technological advancement. Virtual Reality is arguably the next footstep towards a modern/post-modern era of development. The potential ground breaking effects that loom behind these machines is uncanny. With

the ability to save lives, act as a medium for business development and confrontations, and provide its users with endless hours of entertainment, learning, and discovery, the world should be pushing for an increased presence of this product, just the same as it did in the 1990's. This time around, our technology will have come far enough to support the needs for these devices and will begin implementing virtual reality within homes, medical centers, and offices.

#D. NAVYA RAO
(III/IV)

CHAPTER 8: IRIS SCANNING

1. INTRODUCTION

In today's information age it is not difficult to collect data about an individual and use that information to exercise control over the individual. Individuals generally do not want others to have personal information about them unless they decide to reveal it. With the rapid development of technology, it is more difficult to maintain the levels of privacy citizens knew in the past. In this context, data security has become an inevitable feature. Conventional methods of identification based on possession of ID cards or exclusive knowledge like social security number or a password are not altogether reliable. ID cards can be almost lost, forged or misplaced: passwords can be forgotten. Such that an unauthorized user may be able to break into an account with little effort. So it is need to ensure denial of access to classified data by unauthorized persons. Biometric technology has now become a viable alternative to traditional identification systems because of its tremendous accuracy and speed. Biometric system automatically verifies or recognizes the identity of a living person based on physiological or behavioral characteristics. Since the persons to be identified should be physically present at the point of identification, biometric techniques gives high security for the sensitive information stored in mainframes or to avoid fraudulent use of ATMs. This paper explores the concept of Iris recognition which is one of the most popular biometric techniques. This technology finds applications in diverse fields.

2. BIOMETRICS - FUTURE OF IDENTITY

Biometric dates back to ancient Egyptians who measured people to identify them. Biometric devices have three primary components.

1. Automated mechanism that scans and captures a digital or analog image of a living personal characteristic
2. Compression, processing, storage and comparison of image with a stored data.
3. Interfaces with application systems.

A biometric system can be divided into two stages: the enrolment module and the identification module. The enrolment module is responsible for training the system to identity a given person. During an enrolment stage, a biometric sensor scans the

person's physiognomy to create a digital representation. A feature extractor processes the representation to generate a more compact and expressive representation called a template. For an iris image these include the various visible characteristics of the iris such as contraction, Furrows, pits, rings etc. The template for each user is stored in a biometric system database. The identification module is responsible for recognizing the person. During the identification stage, the biometric sensor captures the characteristics of the person to be identified and converts it into the same digital format as the template. The resulting template is fed to the feature matcher, which compares it against the stored template to determine whether the two templates match.

The identification can be in the form of verification, authenticating a claimed identity or recognition, determining the identity of a person from a database of known persons. In a verification system, when the captured characteristic and the stored template of the claimed identity are the same, the system concludes that the claimed identity is correct. In a recognition system, when the captured characteristic and one of the stored templates are the same, the system identifies the person with matching template.

2.1 TOPOLOGY OF IDENTIFICATION METHODS

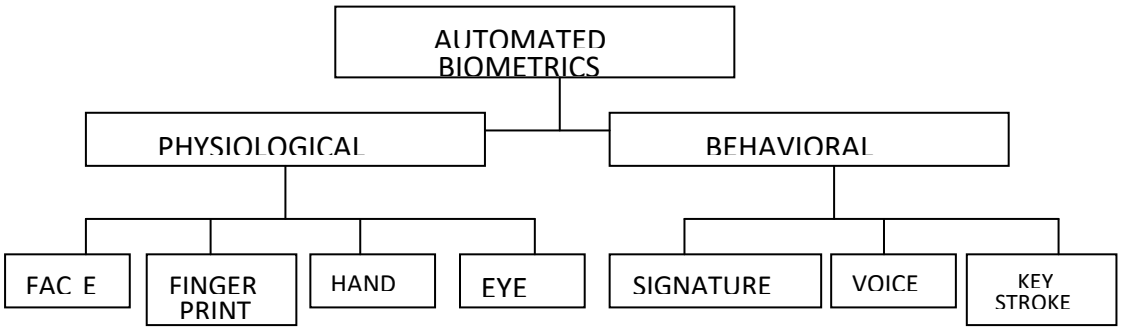


FIGURE. TOPOLOGY OF IDENTIFICATION METHODS

Biometrics encompasses both physiological and behavioral characteristics. A physiological characteristic is a relatively stable physical feature such as finger print, iris pattern, retina pattern or a Facial feature. A behavioral trait in identification is a person's signature, keyboard typing pattern or a speech pattern. The degree of interpersonal variation is smaller in a physical characteristic than in a behavioral one. For example, the person's iris pattern is same always but the signature is influenced by physiological characteristics.

2.2 Disadvantages

Even though conventional methods of identification are indeed inadequate, the biometric technology is not as pervasive and wide spread as many of us expect it to be. One of the primary reasons is performance. Issues affecting performance include accuracy, cost, integrity etc.

2.3 Accuracy

Even if a legitimate biometric characteristic is presented to a biometric system, correct authentication cannot be guaranteed. This could be because of sensor noise, limitations of processing methods, and the variability in both biometric characteristic as well as its presentation.

2.4 Cost

Cost is tied to accuracy; many applications like logging on to a pc are sensitive to additional cost of including biometric technology.

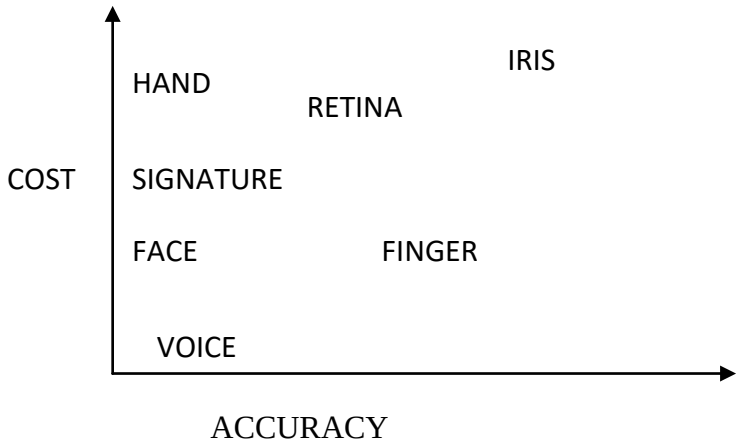


FIGURE. COMPARISON BETWEEN COST AND ACCURACY

3. IRIS RECOGNITION

Iris identification technology is a tremendously accurate biometric. Iris recognition leverages the unique features of the human iris to provide an unmatched identification technology. So accurate are the algorithms used in iris recognition that the entire planet could be enrolled in an iris database with only a small chance of false acceptance or false rejection. The technology addresses the FTE (Failure to Enroll) problems which lessen the effectiveness of other biometrics. Only the iris recognition

technology can be used effectively and efficiently in large scale identification implementations. The tremendous accuracy of iris recognition allows it, in many ways, to stand apart from other biometric technologies.

4. ANATOMY, PHYSIOLOGY AND DEVELOPMENT OF THE IRIS

The word IRIS dates from classical times (a rainbow). The iris is a Protective internal organ of the eye. It is easily visible from yards away as a colored disk, behind the clear protective window of the cornea, surrounded by the white tissue of the eve. It is the only internal organ of the body normally visible externally. It is a thin diaphragm stretching across the anterior portion of the eye and supported by lens. This support gives it the shape of a truncated cone in three dimensions. At its base the eye is attached to the eye's ciliary body. At the opposite end it opens into a pupil. The cornea and the aqueous humor in front of the iris protect it from scratches and dirt, the iris is installed in its own casing. It is a multi layered structure. It has a pigmented layer, which forms a coloring that surrounds the pupil of the eye. One feature of this pupil is that it dilates or contracts in accordance with variation in light intensity.

The human iris begins to form during the third month of gestation. The structures creating its distinctive pattern are completed by the eighth month of gestation hut pigmentation continues in the first years after birth. The layers of the iris have both ectodermic and embryological origin, consisting of: a darkly pigmented epithelium, pupillary dilator and sphincter muscles, heavily vascularized stroma and an anterior layer chromataphores with a genetically determined density of melanin pigment granules. The combined effect is a visible pattern displaying various distinct features such as arching ligaments, crypts, ridges and zigzag collaratte. Iris color is determined mainly by the density of the stroma and its melanin content, with blue irises resulting from an absence of pigment: long wavelengths are penetrates and is absorbed by the

pigment epithelium, while shorter wavelengths are reflected and scattered by the stroma. The heritability and ethnographic diversity of iris color have long been studied. But until the present research, little attention had been paid to the achromatic pattern complexity and textural variability of the iris among individuals. A permanent visible characteristic of an iris is the trabecular mesh work, a tissue which gives the appearance of dividing the iris in a radial fashion. Other visible characteristics include the collagenous tissue of the stroma, ciliary processes, contraction furrows, crypts, rings, a corona and pupillary frill coloration and sometimes freckle. The striated anterior layer covering the trabecular mesh work creates the predominant texture with visible light.

FIGURE. A TYPICAL IRIS

5. IRIS AS A POWERFUL IDENTIFER

Iris is the focus of a relatively new means of biometric identification. The iris is called the living password because of its unique, random features. It is always with you and can not be stolen or faked. The iris of each eye is absolutely unique. The probability that any two irises could be alike is one in 10 to 78^{th} power — the entire human population of the earth is roughly 5.8 billion. So no two irises are alike in their details, even among identical twins. Even the left and right irises of a single person seem to be highly distinct. Every iris has a highly detailed and unique texture that

remains stable over decades of life. Because of the texture, physiological nature and random generation of an iris artificial duplication is virtually impossible.

The properties of the iris that enhance its suitability for use in high confidence identification system are those following.

1. Extremely data rich physical structure about 400 identifying features
2. Genetic independence no two eyes are the same.
3. Stability over time.
4. Its inherent isolation and protection from the external environment.
5. The impossibility of surgically modifying it without unacceptable risk to vision.
6. Its physiological response to light, which provides one of several natural tests against artifice.
7. The ease of registering its image at some distance forms a subject without physical contact. unobtrusively and perhaps inconspicuously
8. It intrinsic polar geometry which imparts a natural co-ordinate system and an origin of co-ordinates
9. The high levels of randomness in it pattern inter subject variability spanning 244 degrees of freedom - and an entropy of 32 bits square million of iris tissue.

6. SCIENCE BEHIND THE TECHNOLOGY

The design and implementation of a system for automated iris recognition can be subdivided in to 3.

1. image acquisition
2. iris localization and
3. Pattern matching

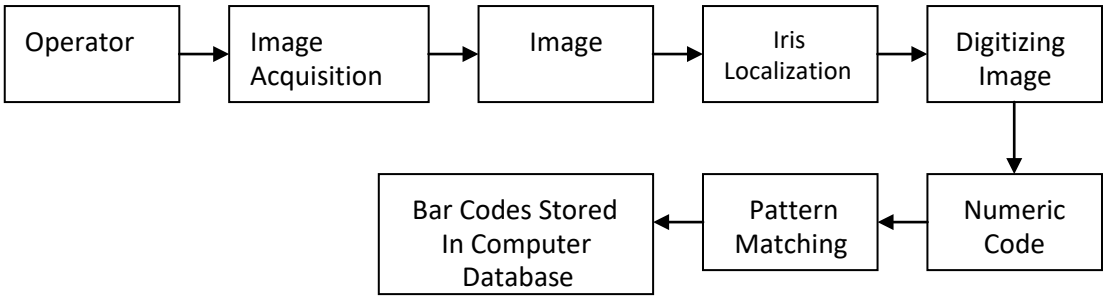


FIGURE. BLOCK DIAGRAM OF IRIS RECOGNITION

7. APPLICATIONS

Iris-based identification and verification technology has gained acceptance in a number of different areas. Application of iris recognition technology can he limited only by imagination. The important applications are those following:

- **ATM's and iris recognition:** in U.S many banks incorporated iris recognition technology into ATM's for the purpose of controlling access to one's bank accounts. After enrolling once (a "30 second" process), the customer need only approach the ATM, follow the instruction to look at the camera, and be recognized within 2-4 seconds. The benefits of such a system are that the customer who chooses to use bank's ATM with iris recognition will have a quicker, more secure transaction.
- **Tracking Prisoner Movement:** The exceptionally high levels of accuracy provided by iris recognition technology broadens its applicability in high risk, high-security installations. Iris scan has implemented their devices with great success in prisons in Pennsylvania and Florida. By this any prison transfer or release is authorized through biometric identification. Such devices greatly ease logistical and staffing problems.

Applications of this type are well suited to iris recognition technology. First, being fairly large, iris recognition physical security devices are easily integrated into the

mountable, sturdy apparatuses needed or access control, the technology's phenomenal accuracy can be relied upon to prevent unauthorized release or transfer and to identify repeat offenders re-entering prison under a different identity.

- Computer login: The iris as a living password.
- National Border Controls: The iris as a living password.
- Telephone call charging without cash, cards or PIN numbers.
- Ticket less air travel.
- Premises access control (home, office, laboratory etc.).
- Driving licenses and other personal certificates.
- Entitlements and benefits authentication.
- Forensics, birth certificates, tracking missing or wanted person

8. CONCLUSION

The technical performance capability of the iris recognition process far surpasses that of any biometric technology now available. Iridian process is defined for rapid exhaustive search for very large databases: distinctive capability required for authentication today. The extremely low probabilities of getting a false match enable the iris recognition algorithms to search through extremely large databases, even of a national or planetary scale. As iris technology grows less expensive, it could very likely unseat a large portion of the biometric industry, e-commerce included; its technological superiority has already allowed it to make significant inroads into identification and security venues which had been dominated by other biometrics. Iris-based biometric technology has always been an exceptionally accurate one, and it may soon grow much more prominent.

#P. NIKHITHA REDDY

(III/IV)

CHAPTER 9: DRIVERLESS CAR

1. INTRODUCTION

A Self driving car is a vehicle that is capable of sensing its environment and navigating without human input.They are also called by many different names like Drivelass cars,Autonomous etc. Autonomous cars can detect surroundings using a variety of techniques such as radar, lidar, GPS and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage. Autonomous cars have control systems that are capable of analyzing sensory data to distinguish between different cars on the road, which is very useful in planning a path to the desired destination. The car would be able to sense its environment and make steering and speed changes as necessary. This scenario would require all of the automotive technologies mentioned above: lane detection to aid in passing slower vehicles or exiting a highway; obstacle detection to locate other cars, pedestrians, animals, etc.; adaptive cruise control to maintain a safe speed; collision avoidance to avoid hitting obstacles in the road way; and lateral control to maintain the cars position on the roadway.

2. HISTORY OF SELF DRIVING CARS

Experiments have been conducted on automating cars since at least the 1920s; promising trials took place in the 1950s and work has proceeded since then. The first self-sufficient and truly autonomous cars appeared in the 1980s, with Carnegie Mellon University's Navlab and ALV projects in 1984 and Mercedes-Benz and Bundeswehr University Munich's Eureka Prometheus Project in 1987. Since then, numerous major companies and research organizations have developed working prototype autonomous

vehicles including Mercedes-Benz, General Motors, Continental Automotive Systems, Autoliv Inc., Bosch, Nissan, Toyota, Audi, Volvo, Vislab from University of Parma, Oxford University and Google. In July 2013, Vislab demonstrated BRAiVE, a vehicle that moved autonomously on a mixed traffic route open to public traffic. As of 2013, four U.S. states have passed laws permitting autonomous cars: Nevada, Florida, California, and Michigan.In Europe, cities in Belgium, France, Italy and the UK are planning to operate transport systems for driverless cars and Germany, the Netherlands, and Spain have allowed testing robotic cars in traffic.

3. WHY SELF DRIVING CARS ?

The evolution of the car:

Why it matters ?

As cars grow more intelligent and more aware of their surroundings, consumers will expect increasingly sophisticated safety, security and convenience features and functions. These can only be delivered through the development of nextgeneration ADAS technology. Successfully realizing the enormous opportunities of these automotive innovations has the potential to not only change driving—but also to transform society.

- Prevent the majority of all traffic accidents— Approximately 90 percent of accidents are driver error.
- Lower the death rate for children under the age of 12—Traffic accidents are the leading cause of death among children.
- Decrease overall traffic deaths—About 1.3 million people a year are killed in car accidents.

4. FUTURE SCOPE

The transition to an automated transportation structure will greatly prevent many problems caused by the traffic. Implementation of autonomous cars will allow the vehicles to be able to use the roads more efficiently, thus saving space and time.With having automated cars, narrow lanes will no longer be a problem and most traffic problems will be avoided to a great extent by the help of this new technology.Research indicates that the traffic patterns will be more predictable and less problematic with the integration of autonomous cars.

Smooth traffic flow is at the top of the wish list for countless transportation officials. Car manufacturers are already using various driver assist systems in their high-end models and this trend is becoming more and more common. As a result of this trend,

the early co- pilot systems are expected to gradually evolve to autopilots.All developments show that one day the intelligent vehicles will be a part of our daily lives, but it is hard to predict when. The most important factor is whether the public sector will be proactive in taking advantage of this capability or not. The Public Sector will determine if the benefits will come sooner rather than later. Since these assist systems are very similar with the systems that are used in autonomous car prototypes, they are regarded as the transition elements on the way to the implementation fully autonomous vehicles.

5. CONCLUSION

Currently, there are many different technologies available that can assist in creating autonomous vehicle systems. Items such as GPS, automated cruise control,and lane keeping assistance are available to consumers on some luxury vehicles. The combination of these technologies and other systems such as video based lane analysis, steering and brake actuation systems, and the programs necessary to control all of the components will become a fully autonomous system. The problem is winning the trust of the people to allow a computer to drive a vehicle for them,because of this, there must be research and testing done over and over again to assure a near fool proof final product. The product will not be accepted instantly, but overtime as the systems become more widely used people will realize the benefits of it.The implementation of autonomous vehicles will bring up the problem of replacing humans with computers that can do the work for them. There will not be an instant change in society, but it will become more apparent over time as they are integrated into society.

#A. SHANTHAN KUMAR

(IV/IV)