DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

RISE-MAGAZINE

Recent Innovations In Sophisticated Electronics

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DEPARTMENT PROFILE

Electronics and Communication Engineering has emerged as the major driving force in the present day Information Technology revolution. It is acting as a bridge between different disciplines of engineering and technology. It has penetrated into other prominent sectors such as health care, instrumentation, agriculture, automation, signal processing, remote sensing etc.., The recent developments such as IoT, Artificial Intelligence and the mercurial advancements in the field of communication.

Vision

To be a focal centre for academic excellence in competing global standards and dynamics in the field of Electronics and Communication Engineering with research and services focusing on effective communication skills, entrepreneurial, ethical and social concern.

Mission

To impart quality technical education in Electronics and Communication Engineering with well established infrastructure, state- of- the art laboratories, core instructions and cognizant faculty.

To prepare the young and dynamic Electronics and Communication Engineers professionally deft and intellectually adept with knowledge, behaviour and information competency.

To enable the learners for changing trends in the field of Electronics and Communication Engineering with a focus on career guidance, placements and higher education by Industry-Institute relationship.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1. Graduates should be cognizant in basic science, fundamental engineering stream along with core related domains in ECE and Allied fields.

PEO 2. Graduates should understand issues related to design, problem solving, and intellectually adept with knowledge, behavior and information competency.

PEO 3. Graduates should demonstrate their technical, communication, research, aptitudes along with leadership skills in professional environment to empower employability, higher education and entrepreneurs successfully through industry-institute interaction.

PEO 4. Graduate should be motivated with high ethical, human values and team work towards development of the societ.

PROGRAM OUTCOMES

ENGINEERING KNOWLEDGE: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PROBLEM ANALYSIS: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

DESIGN/DEVELOPMENT OF SOLUTIONS: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

MODERN TOOL USAGE: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

THE ENGINEER AND SOCIETY: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

ENVIRONMENT AND SUSTAINABILITY: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

ETHICS: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

INDIVIDUAL AND TEAM WORK: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

COMMUNICATION: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PROJECT MANAGEMENT AND FINANCE: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

LIFE-LONG LEARNING: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO 1. An ability to get an employment in Electronics and Communication Engineering field and related industries and to participate & succeed in competitive examinations like GRE, GATE,TOEFL, PSUs, etc.

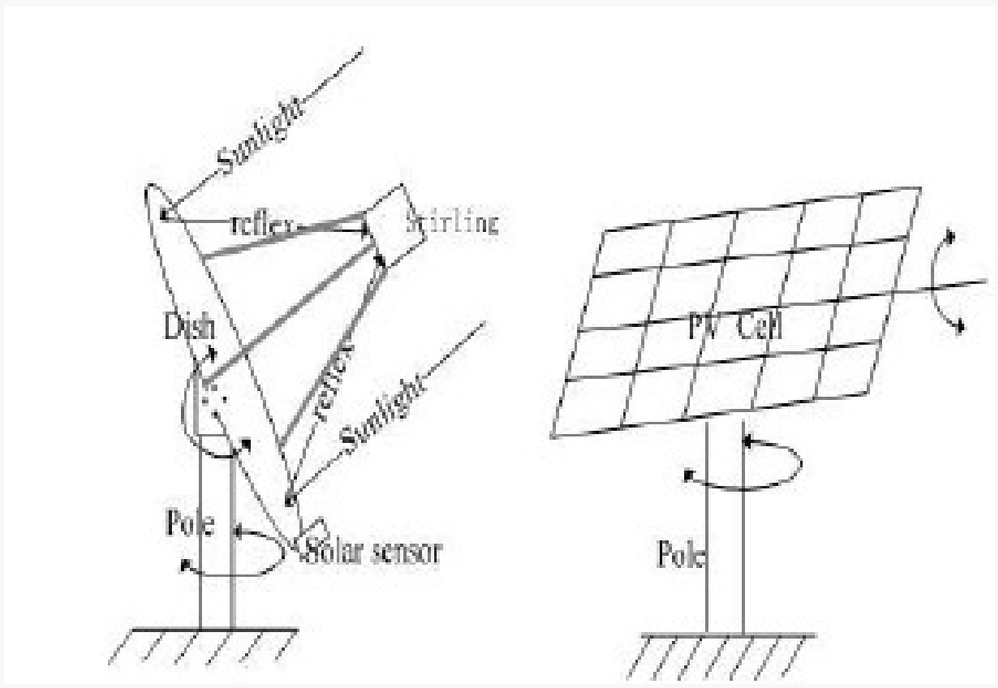
PSO 2. Should be able to design and test various electronic systems that perform analog and digital processing functions.

Automatic Sun Tracking System

In remote areas the sun is a cheap source of electricity because instead of hydraulic generators it uses solar cells to produce electricity. While the output of solar cells depends on the intensity of sunlight and the angle of incidence. It means to get maximum efficiency; the solar panels1 must remain in front of sun during the whole day. But due to rotation of earth those panels can't maintain their position always in front of sun. This problem results in decrease of their efficiency. Thus to get a constant output, an automated system is required which should be capable to constantly rotate the solar panel.

The Automatic Sun Tracking System (ASTS) was made as a prototype to solve the problem, mentioned above. It is completely automatic and keeps the panel in front of sun until that is visible. The unique feature of this system is that instead of taking the earth as its reference, it takes the sun as a guiding source. Its active sensors constantly monitor the sunlight and rotate the panel towards the direction where the intensity of sunlight is maximum. In case the sun gets invisible e.g. in cloudy weather, then without tracking the sun the ASTS keeps rotating the solar panel in opposite direction to the rotation of earth. But its speed of rotation is same as that of earth's rotation2.

Due to this property when after some time e.g. half an hour when the sun again gets visible, the solar panel is exactly in front of sun. Moreover the system can manage the errors and also provides the error messages on the LCD display. In manual mode, through the software (GUI) at computer, the solar panel can be rotated at any desired angle.



ASTS can be used for Parabolic Trough tracker, Dishes tracker, PV (Photovoltaic generator) tracker, Heliostat, Solar Furnace and so on. Even though the theory of the controller system is similar to all the applications, there are some differences: the precision requirement for dishes tracker is more strict than PV tracker, while the Heliostat and solar furnace need the strictest precision requirement, and more difficult to apply solar sensor to make a closed-loop control system. So, when design these systems, selection of motor type, controller type and tracking mode should be different.

ASTS is a hybrid hardware/software project. Its general structural diagram is shown in figure-3.

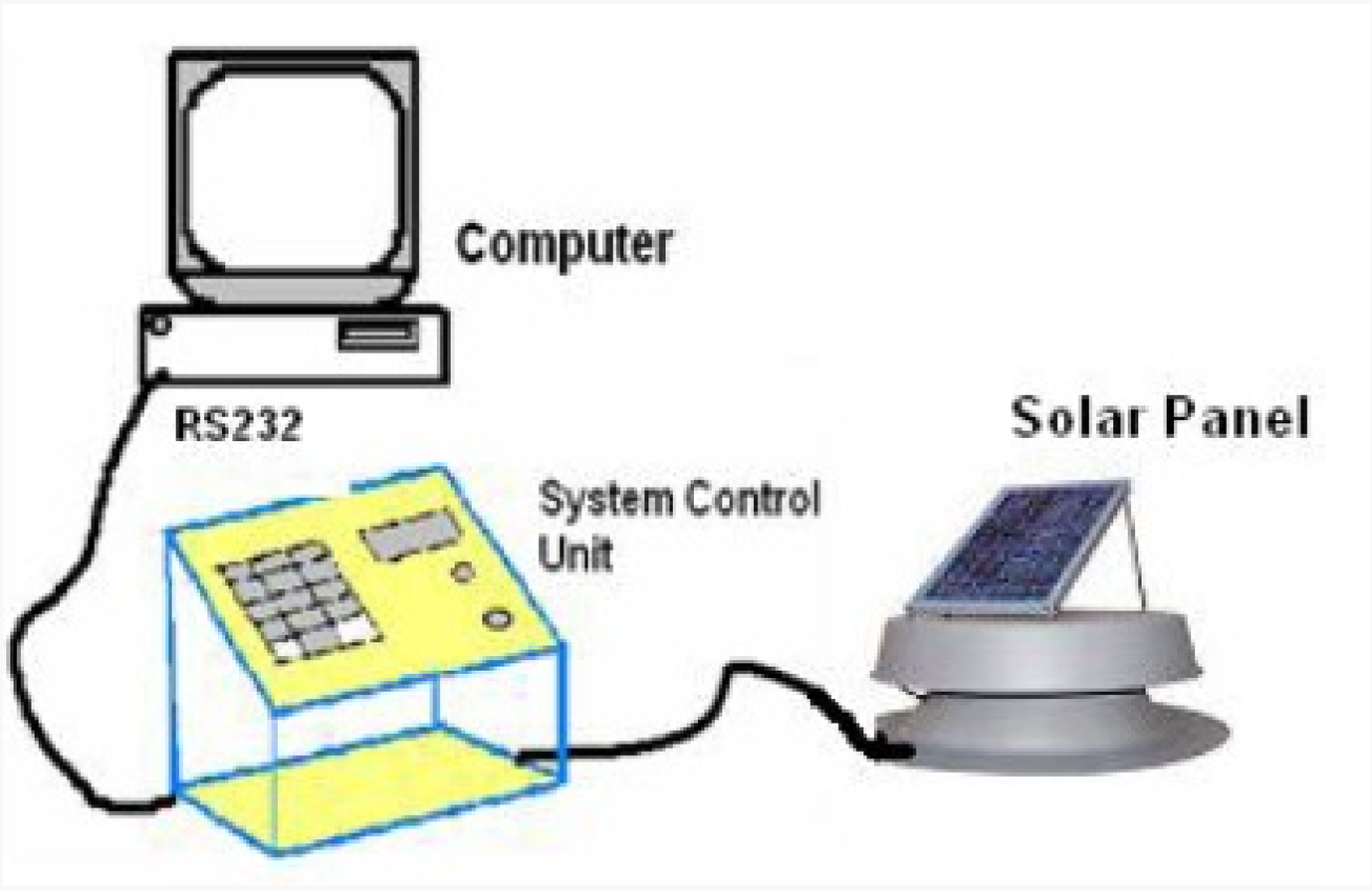
The software includes:

- VB 6.0 based GUI.
- Microsoft Access Database.
- Embedded Software (written in C) for microcontroller AT89c52.

The hardware includes:

- Solar panel assembly structure containing six functional sensors, stepper motor and solar cells.
- System Control Unit containing LCD, Keypad, Error Indicators and Emergency Stop switch.
- Complete PCB containing two microcontrollers (89c52). First one is the “Master Microcontroller” which controls the automatic operation of ASTS.

While second one, the “Slave Microcontroller” serially communicates (RS232) with VB software in computer.**-----A Nikhila- 18BF1A0401**

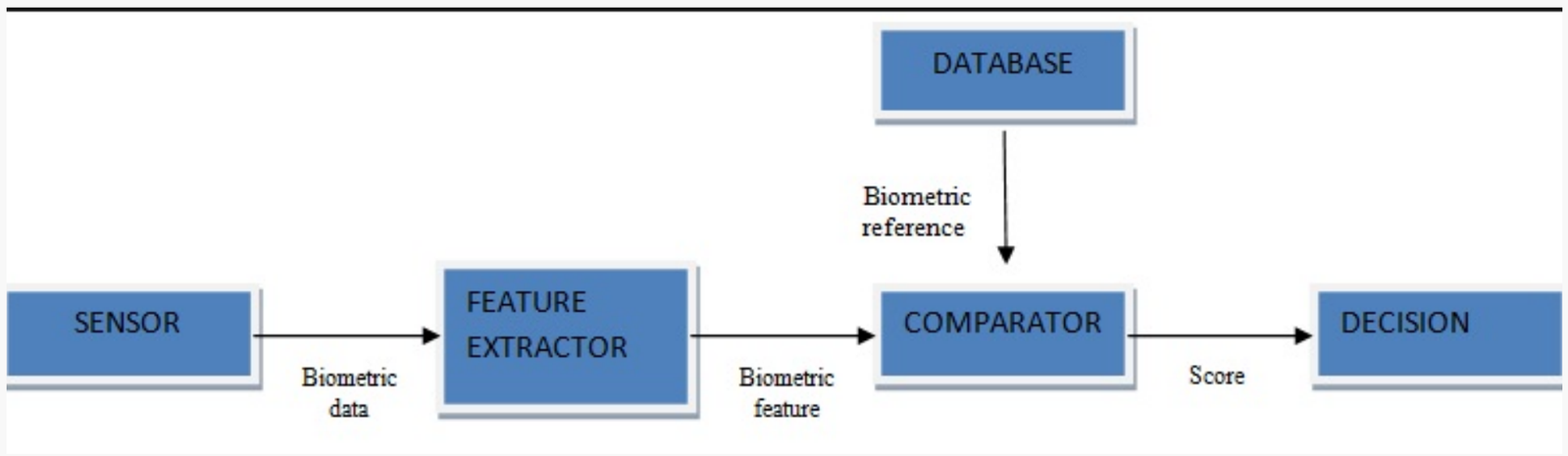


Face Biometric Antispoofing

In an increasingly digital world, protecting confidential information from hackers and unauthorized individuals is becoming more difficult and the need for robust security is paramount. As a result, Biometric spoofing is a growing concern as biometric traits are vulnerable to attacks. Biometric spoofing is the ability to fool a biometric system into recognizing a fake user as a genuine user by means of presenting a synthetic forged version of the original biometric trait to the sensor. Specific countermeasures that allow biometric system to detect fake artefacts and to reject them need to be developed. This paper's main goal is to provide an overview of different antispoofing techniques used in the now emerging field of antispoofing with special attention to face modality.

Biometrics is the specialized term for body estimations and counts. It alludes to measurements identified with human attributes. Biometrics validation (or sensible confirmation) is utilized as a part of software engineering as a type of recognizable proof and access control. Biometric verification is any method by which a man can be interestingly recognized by assessing at least one recognizing organic attributes. Fig.1 shows the general block diagram for a biometric system. Interesting identifiers incorporate fingerprints, hand geometry, ear cartilage geometry, retina and iris designs, voice waves, DNA, and face. The most established type of biometric confirmation is fingerprinting. Biometric check has progressed extensively with the appearance of modernized databases and the digitization of simple information, considering relatively momentary individual distinguishing proof. Iris and retina-design validation techniques are, as of now utilized in some bank programmed teller machines.

Voice waveform acknowledgment, a strategy for confirmation that has been utilized for a long time with tape accounts in phone wiretaps, is presently being utilized for access to exclusive databanks in look into offices. Facial recognition innovation has been utilized by law implementation to choose people in vast group with extensive unwavering quality. Hand geometry is being utilized as a part of industry to give physical access to structures. Ear cartilage geometry has been utilized to invalidate the personality of people who claim to be somebody else (wholesale fraud). Signature correlation isn't as dependable, independent from anyone else, as the other biometric confirmation techniques however offer an additional layer of check when utilized as a part of conjunction with at least one different strategy. This paper is focused on face biometrics, the various spoofing and anti spoofing methods.



Face biometrics is the second largest biometric used, with fingerprint being the first. Hence, it is more open to spoofing attacks or direct (presentation) attacks in which intruders use synthetically produced artefact or try to mimic the behaviour of genuine users, to fraudulently gain access to the biometric system. Certain countermeasures have to be implemented in the form of anti spoofing methods in order to make biometric verification more secure. An antispoofing technique is normally acknowledged to be any procedure, which can consequently recognize genuine biometric attributes displayed to the sensor from fake biometric characteristic.

In general, people used to disguise themselves as a different person in order to access their personal data. This is known as spoofing. With the advancement in technology, plastic surgery has become quite popular due to its low cost as well as the speed in which this is carried out, this makes spoofing attacks more difficult to detect. Regardless of the endeavours to create particular algorithms to facial surgery changes, the issue of recognition after surgery is as yet an open challenge for automatic face authentication systems. Some works have also shown that face-based biometric systems may be bypassed using a normal make-up.

In the anti spoofing techniques, the sensor level presents a higher fake detection rate, whilst feature level techniques are less expensive, less intrusive and more user friendly, since their implementation is hidden from the user. The score level protection technique presents a much lower performance when compared to the sensor level and feature level protection measures. Hence, they are designed only as a support to the sensor level and feature level techniques.

----- CVS Harsha- 18BF1A0427

Lip Contour Detection

Lip segmentation is an essential stage in many multimedia systems such as video-conferencing, lip reading, or low bit rate coding communication systems. It is also useful in various image / video acquisition devices encouraged the development of many computer vision applications, such as vision-based surveillance, vision based man machine interfaces, vision-based biometrics, and so on.

Hence extraction of lip becomes a broad field. This paper presents an algorithm for extraction of lip contour. We have used two algorithms for this. Our first algorithm is a color based algorithm derived from a quadratic polynomial, with the assumption that color of lips should lie in the range of blue. The accuracy of the first proposed algorithm is 91% in case of normal skin people, and 95% in case of fairer skin color people. Our second algorithm is model a based algorithm which gives accuracy up to 96%.

Detection of the lip contour is a fundamental procedure of mouth feature extraction. It forms a preliminary stage of face image analysis, which is essential for numerous application areas including man-machine interaction based on the observed human behavior, video-telephony, face and person identification, bimodal speech recognition, face and visual speech synthesis, facial expressions classification etc. All of these applications require an efficient and fully automated mouth feature extraction method that can be achieved using an automatic lip contour detection technique. Observing the pixels of lips, we find that lip color of fairer skin people ranges from dark red to purple, and for normal skin color people it is in the range of blue under normal light conditions.

From the perspective of human visual perception, the lips are very easy to be differentiated from the face, cause of different contrasts in colors. The outer labial contour of the mouth is having very poor color distinction when compared against its skin background; it makes extraction of lip a difficult problem. In order to improve the contrast between lip and the other face regions we need different type of lip extraction techniques.

Algorithm 1 is tested on 270 images. 150 images of fairer skin color people with dark red to purple color lips, and 120 images of normal skin color people where, the test images contains both full face and part of face. The accuracy of the proposed algorithm is 91% for the normal skin, and 95% for the fairer skin people, where the test images contains full face, as 142 images among 150 gives correct result for fairer skin color people. And 110 among 120 gives correct result for normal skin color people. Algorithm 2 is tested on 50 images of normal skin people database containing frontal face images having mouth only. Out of 50 images, 48 images successfully fulfilled the criteria for the acceptance of lip contour. Figure 5 shows the results in detail. Both the algorithms work well even for low-resolution images, but performance degrades with poor illumination.

Proposed algorithm 1 gives good results for both skin color people, and works in different well-constrained conditions of database. It has an accuracy of 91% for normal skin color and 95% for fair skin color. The accuracy is consistent across databases provided the lip color is red and image quality is good. The performance degrades if the lip color is neutral and any other face feature is similar to lip color. This is proposed as future enhancement of the algorithm. In algorithm 2 the lip contour segmentation is performed by using MSM deformation approach which gives good results for outer landmarks. This work can be further extended for inner landmark points of the mouth, which defines the position of mouth. This could also identify how much lips are open which is highly required in the visual speech recognition systems. Both the algorithms work well for good quality images. Small degradation is observed in poorly illuminated images.**-----D Anusha- 18BF1A0450**