Secure Multimodal Biometric Authentication Using Face, Palmprint and Ear: A Feature Level Fusion Approach

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Abstract:

Widespread of biometric technology for identity management in many nations has given rise to new means for biometric research. Due to the cumulative requirement of higher security schemes, multiple biometrics are preferred over single biometric to generate most accurate authentication result. Involving multiple biometric traits comes up with challenges to combine the feature data by selecting proper level of fusion. This paper proposes reduced dimension feature vector concatenation method for three biometric traits like Face, Palmprint and Ear. The use of only one algorithm of Principal Component Analysis for feature extraction and Euclidean distance for final matching make the system robust by reducing the computational complexity. The resultant biometric template is also protected by using intermixing of feature vector scheme.

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FALSE DATA INJECTION ATTACKS IN CYBER PHYSICAL NETWORK SYSTEM

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Abstract : Wireless sensor networks (WSN) are expected to interact with the physical world at an unprecedented level to enable various new applications. However, a large-scale sensor network may be situated in a probably unpropitious or even hostile surroundings and potential threats can range from coincidental node failures to intended deface. Due to their relatively small sizes and disregarded operations, sensor nodes have a high risk of being encapsulated and compromised. False sensing reports can be injected through compromised nodes, which could conduct to not only false alarms but also the consumption of limited energy resource in a battery powered network.

I. Introduction

In Cyber-Physical Network Systems (CPNS), attackers could inject false measurements to the controller through compromised sensor nodes, which not just threaten the security of the system, additionally consumes system resources. To deal with this issue, various en-route filtering have been intended for wireless sensor networks. However, these schemes either need flexibility to the quantity of compromised nodes or rely on upon the statically arranged routes and node limitation, which are not suitable for CPNS.

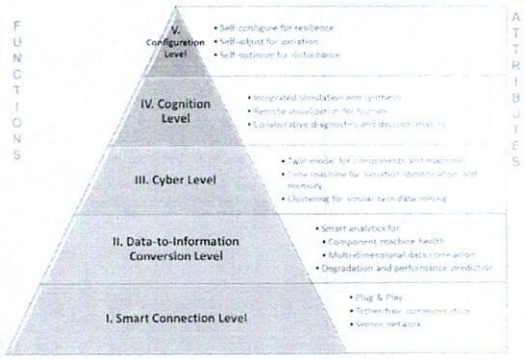

Fig 1 - Cyber physical network system

The false data insertion in a cyber physical network system can be overcome by the formation of clusters where the neighbor sensor node with exactly similar properties will be standardized into the form of clusters. In the hierarchical network structure each cluster has a leader, which is called cluster head (CH). The sensor nodes repeatedly transmit their data to the CH nodes. CH nodes compound the data and transmit them to the base station (BS). CH nodes transmit the data either directly or through the intermediate data transmission with other CH nodes. The BS is the data processing module for the data which is received from the sensor nodes. The Base Station is not variable it's fixed at a place in a stable manner which is up to a point from the all the sensor nodes. The function of each CH is to fulfill ordinary or common functions for all the nodes in each cluster, like collecting all the data before sending towards the BS. In other way, the CH is the sink node for the cluster nodes, and the BS is the sink for the CHs [1].

A cyber-physical system (CPS) is a mechanism that is controlled or monitored by computer-based algorithms, tightly integrated with the Internet and its users. In cyber-physical network systems, physical and software elements are extremely twisted, each working on inconsistent structural and secular scales [2]. The advantages of cluster based environment are: 1) Supporting network extensibility and decreasing energy consumption through data collection. 2) It can localize the route setup within the cluster and thus reduce the size of the routing table stored at the individual node.

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Theoretical & Computational Design of Wind Turbine with Wind Lens

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Abstract - *The power generated in a wind turbine is directly proportional to the cube of the wind speed as per theory. As per Betz limit, only 59.3% of kinetic energy is converted into power output by using wind turbine. If more wind energy is concentrated over the turbine blade then an effective increase in power output can be achieved. Thus, in order to achieve this a wind diffuser can be utilized which creates a turbulence behind turbine blades which draws more air into the turbine. This diffuser can effectively increase the energy output by increasing the speed of the wind turbine. The objective of work is to increase the reliability of turbine blades by developing airfoil structure and also to achieve reduction in noise during operation of the turbine.*

Key Words: **Betz Limit, Turbine Blade, Wind Diffuser, Turbulence, Airfoil**

1. INTRODUCTION

For effective energy resource in the future, the limitation of fossil fuel is known and security of alternative sources of energy has become important. Also due to environmental issues like global warming the development of alternative source of energy is imminent. Wind energy technologies are developing rapidly and are set to play a major role in the energy field in the future. But comparing the overall demand for energy, the extent of wind power usage is relatively small. Wind power generation is proportional to the cube of wind speed. Therefore, a large increase in output is brought about if it is possible to create even a slight increase in the velocity of the approaching wind to a wind turbine. If we can increase the wind speed by utilizing the fluid dynamic nature around a structure or topography, namely if we can concentrate the wind energy locally, the power output of a wind turbine can be increased substantially. The diffuser creates a lower air pressure zone directly behind the blades, so as we know air will tend to move towards equilibrium the high-pressure air in the frontal side of the turbine will accelerate in to the low-pressure area at the caudal end of the turbine. It is also known and accepted that no turbine can produce a sustained and viable electric current at speeds below 10 mph. The wind lens creates an area of lower pressure behind the turbine thereby inducing a suction of wind through the turbine which increases the effective wind speed.

1.1 Working of Wind Turbine

Kinetic energy of moving air due to motion is utilized for the working of the wind turbine. When wind blows past the turbine blades., energy conservation takes place due to profile of the blades and the rotor rotates capturing the kinetic energy of the wind. Energy conversion from kinetic to mechanical energy takes place due to rotation of the blades. The blades are coupled to the rotor shaft and the shaft is further coupled to a step-up gearbox. The part of the turbine behind the blades which consist of the gearbox and generator is termed as Nacelle. The mechanical energy is converted into electrical energy by a generator giving power output. The nacelle is also equipped with wind vanes and anemometer. The anemometer is a wind speed measuring device and its main function is to measure high velocities i.e. greater than 10 m/sec. when the wind velocity is high the gearbox is cut off from the turbine to avoid any mechanical damages. Wind vanes are used to sense the change in the wind direction.

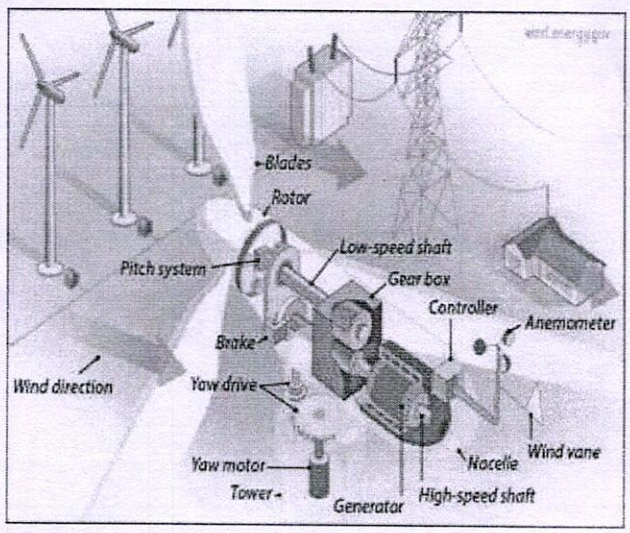

Fig-1: Working of a wind turbine

1.2 Wind Lens Turbine

Wind lens turbine is newly developed system which adopts a diffuser shaped structure along with a large flange attached at the exit of the shroud. Due to a strong vortex formation at the end of the flange, a huge amount of flow of mass can be drawn in to the turbine. Thus, this new system can exceed the Betz limit. Due to this the power developed by the turbine can be increased to a relatively greater amount.

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Differentiate Theoretical and Computational Performance of Oval Shape Fin with Different Geometry

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Abstract - *Fins are important part of engine mostly used for transfer cooled and effective air for cooling of IC engine. The main purpose of using these cooling fins is to cool the engine cylinder by air. Normally rectangular fins are used in these work we are changing rectangular shape fin to oval shape. Fins are subjected to high temperature variations and thermal stresses. By doing thermal analysis on the engine cylinder fins, it is helpful to know the heat dissipation inside the cylinder. Aim of these project is to increase the heat dissipation rate by increasing the surface area. The fin materials used in this analysis are: Aluminum alloy 204 the modification was done in size as well as geometry*

***Key Words*:-Engine Cylinder Fins, Thermal Analysis, ANSYS, SOLID EDGE, Heat Flux**

1. INTRODUCTION

Fins are extended surfaces designed to increase the heat transfer rate of the body by increasing the convective surface area. Mainly transfer cooled and effective air to engine & maintain uniform temperature. Fins are use by increase heat transfer rate; improve fin efficiency & cooling capacity and avoid failure. An air cooled motorbike engine dissipates waste heat from the cylinder through the cooling fins to the cooling air flow created by the relative motion of moving motorbikes. A fin are used to cool engine by increasing convection. In cylinder only 25-30% of power that are produce are useful about 70% of power is loss ,it should be necessary to remove waste heat from cylinder block. If it is not remove it causes damage to cylinder and piston. Shape of cylinder block, piston is change. To prevent the parts from damage fins are used. To prevent from damage Engine have cooling mechanism in engine to remove this heat from the engine. In some bikes water-cooling system and almost all two wheelers uses Air cooled engines, because Air-cooled engines have more advantages like lighter weight and lesser space requirement.

1.1 Problem Statement

It is seen that the quantity of heat given to the cylinder walls is considerable and if this heat is not removed from the cylinders it would result in the prigniation of the charge. In addition, the lubricant would also burn away, thereby causing the seizing of the piston. Change the shape of block and piston Excess heating will also damage the cylinder material

1.2 Objectives

- In this present work thermal analysis of Honda splendor bike fins and it valid with theoretical result
- Thermal analysis and mathematically evaluation of modified existing fins dimensions
- To determine the type of geometry and its dimensions for optimum heat transfer rate.

1.3 Methodology

- 2 D drawing of Exiting fins
- 3 D Modeling of Exiting fins on SOLID EDGE ST9
- Theoretical Calculation of fins
- Thermal Analysis of fins on analytical software(ANSYS)

1.4LiteratureReview

In this chapter, reviews various studies carried out in the field fins and their analysis,

RashinNath.KK, (2017) et al. The heat transfer rate increases for zigzag and wavy fin compared to that of conventional flat fin. By changing the fin geometry from the convention flat fin the heat transfer rate can be improved greatly, which leading to less thermal stress development. Zigzag and wavy fin thus can be preferred over conventional fins

B N Niroop Kumar Gowd (2014) concluded that the shape of the fin can be modified to improve the heat transfer rate and can be analyzed. The thickness of the original model is 3mm, reduced to 2.5mm.

By reducing the thickness of the fins, three other materials are considered which have more thermal conductivities than Aluminum Alloy 204. By observing the thermal analysis results, thermal flux is more for Beryllium than other materials.

Experimental Validation of Computational Design of Wind Turbine with Wind Lens

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Abstract

The power generated in a wind turbine is directly proportional to the cube of the wind speed as per theory. As per Betz limit, only 59.3% of kinetic energy is converted into power output by using wind turbine. The objective of work is to increase the reliability of turbine blades by developing air foil structure and also to achieve reduction in noise during operation of the turbine. Thus, in order to achieve this a wind diffuser can be utilized which creates a turbulence behind turbine blades which draws more air into the turbine. This diffuser can effectively increase the energy output by increasing the speed of the wind turbine. If more wind energy is concentrated over the turbine blade then an effective increase in power output can be achieved.

Keywords — *Wind turbine blades, Aerofoil, Wind Diffuser.*

I. INTRODUCTION

For the application of an effective energy resource in the future, the limitation of fossil fuels is clear and the security of alternative energy sources is an important subject. Furthermore, due to concerns for environmental issues, i.e., global warming, etc., the development and application of renewable and clean new energy are strongly expected. Among others, wind energy technologies have developed rapidly and are about to play a big role in a new energy field. However, in comparison with the overall demand for energy, the scale of wind power usage is still small; especially, the level of development in Japan is extremely small. As for the reasons, various causes are conceivable. For example, the limited local area suitable for wind power plants, the complex terrain compared to that in European or North American countries and the turbulent nature of the local wind are pointed out. Wind power generation is proportional to the wind speed cubed. Therefore, a large increase in output is brought about if it is possible to create even a slight increase in the velocity of the approaching wind to a wind turbine. If we can increase the wind speed by utilizing the fluid dynamic nature around a structure or topography, namely if we can concentrate the wind energy locally, the power output of a wind turbine can be increased substantially. This creates a lower air pressure within the area directly behind the blades. Because air will tend to move toward equilibrium, the high-pressure air in front of the blades will necessarily accelerates into the low-pressure area the wind lens working at lower wind speeds than traditional turbines.

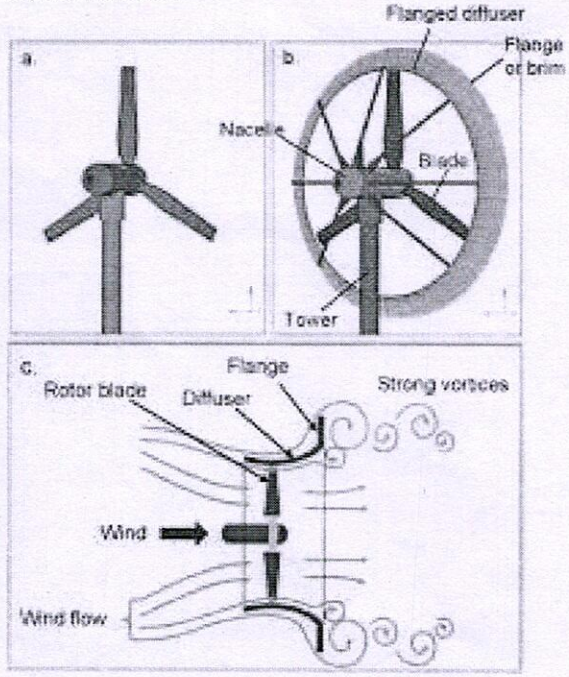

Fig 1: Wind Turbine with Wind Lens

II. WORKING OF WIND TURBINE

Kinetic energy of moving air due to motion is utilized for the working of the wind turbine. When wind blows past the turbine blades., energy conservation takes place due to profile of the blades and the rotor rotates capturing the kinetic energy of the wind. Energy conversion from kinetic to mechanical energy takes place due to rotation of the blades. The blades are coupled to the rotor shaft and the shaft is further coupled to a step-up gearbox. The part of the turbine behind the blades which consist of the gearbox and generator is termed as Nacelle. The mechanical energy is converted into electrical energy by a generator giving power output. The nacelle is also equipped with wind vanes and anemometer. The