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Study On The Intensive Care For Air Conditioner With Machine Learning Through IoT

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Abstract--*This paper proposes a survey on intensive care for air conditioner to monitor faults. As world gets more and more technologically advanced, which results many electronic application devices developed and use by the people. We find new electronic devices coming in deeper and deeper into our personal lives. It leads to the production of more and more electronic devices .This causes the devices needs to be maintained otherwise devices can lead to damages. These electronic devices can be maintained by the specialist about device. The normal person cannot able to predict and resume the operation of the electronic machine. But the entire situation, the specialist of the device cannot be attempted in time. These reason leads replacement of new device. This proposed project will give the solution to avoid the electronic devices failure and prevent the devices replacement. The Machine language technique is adapted to this project to evaluate the device day by day status and monitoring, comparing with the predefined machine parameter values. If the variation is find based on the estimated status with predefined status then the machine need to be repaired before leads to fail .The proposed project estimate the variation and send alarm to the invented company and the end user to alert to take decision before the machine fails. The project was developed using Internet of Things incorporated with machine learning algorithm to communicate between devices with company or user. The advantage of this work is to prevent the machine failure, increase the life time of the machine and avoid wrong repair made by the specialist .It takes constant amount of time to monitor and detect the faults so the concept of machine learning is used which involves the study of machines so that the faults can be easily detected. This project demonstrates a simple home automated Air Conditioner System embedded with IoT device that allows monitoring the faults periodically.*

Keywords—*Internet of Things, machine learning, home automation*

1. INTRODUCTION

At present, energy consumption of electrical equipments in the large-scale buildings is huge, especially in air conditioning. The proportion of it increases year by year. At the same time, there are a number of unreasonable phenomena in the use of energy consumption. Accurate measurement of energy consumption in real time and energy-saving management of air conditioning have large loopholes. Because of this, the rules on energy consumption measurement and audit cannot be implemented in time. Therefore, it becomes more important to monitor the building and to optimize the energy consumption of air conditioning. Access to modern energy services limits people's ability to reach their

potential. Around 1.3 billion people do not have access to electricity and 2.9 billion make use of traditional heating and cooking fuels. These people are largely living in what can be described as rural locations. Electrification programmers have been developed in a number of countries to bring power to the people. However, even with ambitious schemes such as the Ravi Ghandi Rural Electrification Programmed in India, people, especially the rural poor, are still going to be 'under the cable': that is unable to afford to connect to the grid. It is expected that by 2035 the number of people without access to electricity will not decline owing to population growth.

Support Vector Machine (SVM) is one of the significant technologies to make an accurate air conditioning load prediction to promote the energy-conservation of buildings, and a major method to ensure the quality of air. For far, the most chief methods to predict the air conditioning load have linear regression method, exponential smoothing method, transfer function method.

2. LITERATURE SURVEY

[1] Bass Abushakra presented a new method for predicting and evaluating the energy performance of large commercial and institutional buildings is developed, as an alternative to using existing comprehensive energy simulation programs like DOE-2 and BLAST, or oversimplified tools like analyzing monthly utility bills. The steps are convenient and practical in their potential use by the energy analysts. The method mainly groups the Stepwise Multiple Linear Regression (SMLR) to
empirically model the dynamic building thermal performance; Fourier series to predict (extrapolate) internal loads; the Monte-Carlo Simulation to deal with the prediction of internal loads probabilistically; and a new approach in normalizing weather conditions. The method is capable of predicting the building energy performance in the pre retrofit phase, identifies appropriate energy conservation measures, and estimates potential energy savings.
Advantage--Alternative to using existing comprehensive energy simulation programs. The steps are convenient and practical in their potential use by the energy analysts. The method mainly groups the Stepwise Multiple Linear Regression (SMLR) to empirically model the dynamic building thermal performance.
Disadvantage--Not "predicting" in the real meaning of the term. Both training and prediction durations are not optimized. Thermal Networks models were only applied to model test cells, and Single zone houses.

[2] Lei Yu illustrated a method for feature selection, as a pre-processing step to machine learning, is effective in reducing di- mensionality, removing irrelevant data, in- creasing learning accuracy, and improving result comprehensibility. However, the re- cent increase of dimensionality of data poses a severe challenge to many existing feature selection methods with respect to efficiency and effectiveness. In this work, they intro- duced a novel concept, predominant correla- tion, and propose a faster method which can identify relevant features as well as re- dundancy among relevant features without pairwise correlation analysis. The efficiency and effectiveness of this method is demon- strated through extensive comparisons with other methods using real-world data.
Advantage--Feature selection, as a preprocessing step to machine learning, is effective in reducing dimensionality. Removing irrelevant data, increasing learning accuracy. Improving result comprehensibility.
Disadvantage--Increase of dimensionality of data poses a severe challenge. Huge data degrade the performance of learning algorithms.

[3] Zeeshan Abbas and Wonyong Yoon proposed a idea on energy conserving mechanisms for the internet of things in wireless networking aspects. The Internet of Things (IoT) is an emerging key technology for future industries and everyday lives of people, where a myriad of battery operated sensors, actuators, and smart objects are connected to the Internet to provide services such as mobile healthcare, intelligent transport system, environmental monitoring, etc. Since energy efficiency is of atmost importance to these battery constrained IoT devices, IoT-related standards and research works have focused on the device energy conserving issues. This paper presents a comprehensive survey on energy conserving issues and solutions in using diverse wireless radio access technologies for IoT connectivity, e.g., the 3rd Generation Partnership Project (3GPP) machine type communications, IEEE 802.11ah, Bluetooth Low Energy (BLE), and Z-Wave. They looked into the literature in broad areas of standardization, academic research ,and industry development, and structurally summarize the energy conserving solutions based on several technical criteria. We also propose future research directions regarding energy conserving issues in wireless networking-based IoT.

Advantage--Energy efficiency is of utmost importance to these batteries constrained IoT devices structurally summarize the energy conserving solutions based on several technical criteria. Future research directions regarding energy conserving issues in wireless networking-based IoT.
Disadvantage--Devices in such IoT networks will typically operate based on battery power sources, and hence, energy efficiency is naturally of utmost importance in device management. IoT network characteristics and deployment scenarios are more complex than traditional WSNs in various aspects.

[4] Diksha M made a survey on big data energy based on smart grid. Energy is the most important part of human life. As a significant approach energy in smart grid is interconnected with power grid that involves sensors, deployment strategies, smart meters, and real-time data processing. It generates the data with high velocity, large volume, and diverse variety. In this paper we gave brief introduction on big data, big data architecture, smart grid, big data architecture for smart grid and its advantages and big data applications in smart grid environment and future challenges in energy domain and smart grid communication.
Advantage--Big data technology works out data correlations to gain insight to the inherent mechanisms. Big data technology has been successfully applied as a powerful data-driven tool for numerous phenomena.
Disadvantage--Data in the power system have increased dramatically, leaving gaps and challenges. Data processing is a major concern and increases with data growth.

[5] A.Arens, F.S.Bauman, L.P.Johnston and H.Zhang illustrated a testing of localized ventilation systems in a new controlled environment chamber. In this they have described about the test of thermal comfort and air distribution performance of
two relatively new occupant-controlled localized ventilation (also called task ventilation) systems. The first is a raised-floor distribution system providing air through grilles in the floor panels, and the second is a desk-mounted unit supplying conditioned air at desktop level. The tests were performed in a new controlled environment chamber (CEC) having unique capabilities for detailed studies of space conditioning and thermal comfort in office environments. Measurements were made in a mockup of a typical partitioned open-plan office, and the resulting temperature and air velocity distributions are reported for a variety of system- and locally controlled conditions. Comfort model predictions are presented to describe the degree of environmental control and range of occupant comfort levels produced in the workstations. The results are also compared to those produced by a conventional ceiling supply system.
Advantage--The tests investigated the effects of supply volume, supply location, supply vent orientation, supply/return temperature difference, heat load density, and workstation size and layout. Temperature differences in the range of 1–2.5°C were observed between adjacent workstations and local air velocities in the vicinity of outlets could exceed 3 m/s. Such wide-ranging values could violate existing comfort standards (ASHRAE, 1981; ISO, 1984), if strictly interpreted.
Disadvantage--However since these systems put the local thermal conditions within the workstations under the direct control of their occupants, it is recommended that the standards grant exceptions to such systems.

[6] Yang B, Sekhar SC, Melikov AK provided a concept on ceiling-mounted personalized ventilation system integrated with a secondary air distribution system based on a human response study in hot and humid climate. The benefits of thermal comfort and indoor air quality with personalized ventilation (PV) systems have been demonstrated in recent studies. One of the barriers for wide spread acceptance by architects and HVAC designers has been attributed to challenges and constraints faced in the integration of PV systems with the work station. A newly developed ceiling-mounted PV system addresses the challenges and provides a practical solution while retaining much of the apparent benefits of PV systems. Assessments of thermal environment, air movement, and air quality for ceiling-mounted PV system were performed with tropically acclimatized subjects in a Field Environmental Chamber. The local and whole body thermal sensations were reduced when PV airflow rates were increased. Inhaled air temperature was perceived cooler and perceived air quality and air freshness improved when PV airflow rate was increased or temperature was reduced.
Advantage--By remotely locating the PV ATDs on the ceiling directly above the occupants and under their control, the conditioned outdoor air is now provided to the occupants through the downward momentum of the air. Air-conditioning and air distribution system offers additional cooling in the room and maintains a higher ambient temperature, thus offering significant benefits in conserving energy.
Disadvantage--The results of this study provide designers and consultants with needed knowledge for design of PV systems.

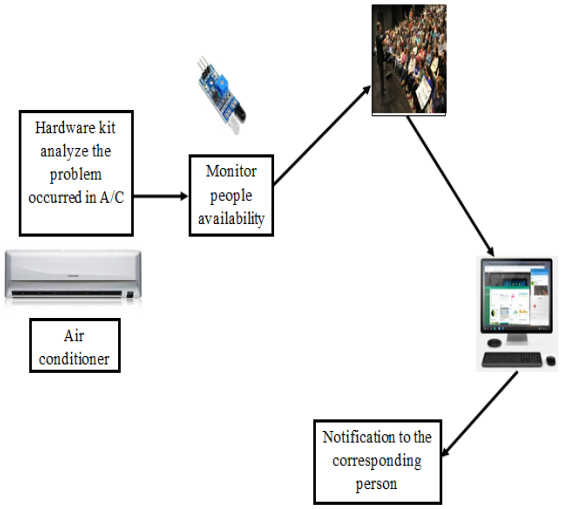
[7] L. James Lo and Atila Novoselac proposed an idea on localized air-conditioning with occupancy control in an open office. This concept explores the possibility of using a localized airflow to divide an open cubicle office into zones without partition walls. Computational fluid dynamics (CFD) model was used to simulate localized airflow in a cubicle office and both the energy and the indoor air quality concerns were addressed. The findings suggest that (1) localized airflow is plausible for zoning purposes, (2) localized airflow can result in both temperature and pollutant concentration segregations, (3) temperature segregations provide possible energy savings if coupled with occupancy-based HVAC control, and finally (4) limited air mixing between zones provide a novel way for better ventilation and indoor contaminant control.
Advantage--The airflow CFD investigation provides jet validation, zonal velocity and temperature profiles, answering the question of whether the localized airflow zoning is possible. Further CFD contaminant analysis provides results of localized airflow's impact on indoor air quality. The DOE2 energy analysis provides estimated HVAC energy usage when localized airflow coupled with occupancy control, answering the questions of whether any energy benefit is possible.
Disadvantage--The energy simulation creates a larger averaged temperature difference compared to smaller difference found in the CFD airflow study. Luckily, the true cooling energy saving can still be estimated for the scenario because of the almost linear. This linearity is due to the fact that vast majority of the energy saving is from the reduction of external conductive heat gain.

[8] Ron Kohavi, George H.John illustrated a concept on artificial intelligence wrappers for feature subset selection. In the feature subset selection problem, a learning algorithm is faced with the problem of selecting a relevant subset of features upon which to focus its attention, while ignoring the rest. To achieve the best possible performance with a particular learning algorithm on a particular training set, a feature subset selection method should consider how the algorithm and the training set interact. They explore the relation between optimal feature subset selection and relevance. Our wrapper method searches for an optimal feature subset tailored to a particular algorithm and a domain. The strengths and weaknesses of the wrapper approach and show a series of improved designs. They compared the wrapper approach to induction without feature subset selection and to Relief, a filter approach to feature subset selection. Significant improvement in accuracy is achieved for some datasets for the two families of induction algorithms used: decision trees and Naive-Bayes. @ 1997 Elsevier Science.B.V
Advantage—The problems with existing definitions of relevance, and show how partitioning relevant features into two families, weak and strong, helps us understand the issue better. Examined two general approaches to feature subset selection: the filter approach and the wrapper approach, and we then investigate each in detail.
Disadvantage--The wrapper approach is very slow. For larger datasets, it is possible to use cheaper accuracy estimation methods, such as holdout, or decrease the number of folds. The search for a good subset is conducted in a very large space.

PROPOSED WORK

In the proposed system, a new system to identify the problem of A/C using embedded with IoT is designed. In this paper we are predicting the number of people passing on the place or any room. For that we have to collect some dataset about the people who are all available in a room. There may be some problem occurred for splitting A/C while more number people occurred in one room. So we have to identify what problem occurred in A/C. For that we analyze the temperature, Gas, the flow current, and availability of people. Based on human occurrence A/C performance is monitored. If any problem occurred automatically a mail will be send to the corresponding person.

ARCHITECTURE DIAGRAM



CONCLUSION

This proposed project will give the solution to avoid the electronic devices failure and prevent the devices replacement. The Machine language technique is adapted to this project to evaluate the device day by day status and monitoring, comparing with the predefined machine parameter values.

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