Internet of Things based Air-Monitoring System

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Abstract—The IoT shall be able to control and incorporate a large number of heterogeneous end systems. There shall not be a general architecture for the IoT since it is very complex and mainly due to the large variety of devices and services that may be involved in such a system. In this paper we focus specifically to a smart air conditioner which incorporates other devices to detect the impurities in the air and activity during sleep to determine the sleeping state and adjusting the sleeping function flexibly. This system with a pollutant detector could keep human health and also could reduce the consumption of energy by a great amount.

Keywords: IoT, Sensor, Controller, Home appliances, Smart AC's, Sensordrone, Android

I.   INTRODUCTION

THE Internet of Things (IoT) is a recent communication paradigm that envisions a near future, in which the objects of everyday life will be equipped with microcontrollers, transceivers for digital communication, and suitable protocol stacks that will make them able to communicate with one another and with the users, becoming an integral part of the Internet. The IoT concept, hence, aims at making the Internet even more immersive and pervasive. Furthermore, by enabling easy access and interaction with a wide variety of devices such as, for instance, home appliances, surveillance cameras, monitoring sensors, actuators, displays, vehicles, and so on, the IoT will foster the development of a number of applications that make use of the potentially enormous amount and variety of data generated by such objects to provide new services to citizens, companies, and public administrations. This paradigm indeed finds application in many different domains, such as home automation, industrial automation, medical aids, mobile healthcare, elderly assistance, intelligent energy management and smart grids, automotive, traffic management, and many others. However, such a heterogeneous field of application makes the identification of solutions capable of satisfying the requirements of all possible application scenarios a formidable challenge. This difficulty has led to the proliferation of different and, sometimes, incompatible proposals for the practical realization of IoT systems. Therefore, from a system perspective, the realization of an IoT network, together with the required backend network services and devices, still lacks an established best practice because of its novelty and complexity.

The objective of this paper is to discuss the framework concept of a smart- air conditioner. We describe the specific characteristics of a smart air-conditioner and the services that may lead to the adoption of these air-conditioners in the society. We would want to end the discussion by reporting that this system would be of great help to all.

For a higher quality and comfortable lifestyle, people rely on air conditioners much more than before. AC's also lead to rapid growth in the energy consumption.

The developing history of ACs is related to the efficiency, technology, human comfort, and energy consumption. ACs' progress includes window type, split type, fixed frequency, convertible frequency, and the recently presented smart type.

Since 2010, smart phones, tablet, personal computers, and cloud computing and 4th generation (4G) communication in 2014 were widely utilized and have caused an information revolution. These novel technologies were also adopted for the control of air conditioners, and this resulted in further air conditioning technology improvements to become smart air conditioner.

A smart air conditioner can be combined with an infrared sensor for human position sensing, to test and detect the presence of impurities in the air, meteorological webs for outdoor weather information, wearable devices for human activity and intention awareness.

The rest of paper is sectioned as follows. Section II contains the methods and the implementation of smart AC's. Section III provides a general overview of the related work

II.SMART AC REQUIREMENTS AND METHODS

The smart air conditioner includes the following devices: (1) air conditioner with adjustable refrigeration power; (2) novel sensors capable of interacting with occupants; (3) communicating units for mobile phone and network.

Sensordrone

The Sensordrone sensor is a special purpose sensor which takes care of the amount of pollutants and also the temperature monitoring.

Sensordrone is a weather station, temperature sensor, gas sensor, and a whole bunch of other new sensors in one compact package!

Figure1. Sensordrone Sensor

Sensordrone is a Bluetooth sensor platform in the world for making your smartphone or tablet smarter. Run apps for air quality, weather, carbon monoxide, breath analysis, infrared temperature, colour, light, and much more. Android sensors and iOS sensors will never be the same.
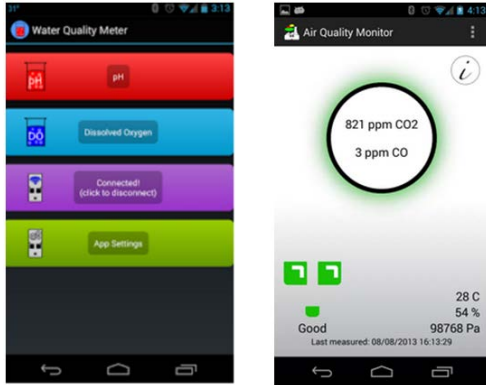

Figure2.AndroidApplications

Bracelet

A Bracelet may be adopted for detecting the human sleeping state as the feedback signals of the sleeping function. Figure 10a,b present bracelet with a digital accelerator. It can collect human motion information and feedback to the smart air conditioner for further control.

III. MECHANISM

Convertible frequency type AC

The convertible frequency type could first rectify the 60 Hz electricity into the direct current type, and then modulate the frequency of output electricity continuously by pulse width modulation (PWM). According to the feedback temperature difference, the air conditioner could provide the air flow of stable temperature to control the temperature of indoor space by adjusting the refrigerator flow.
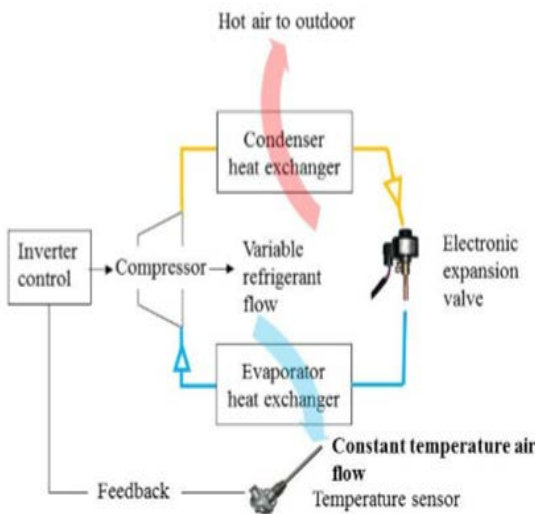

Figure 2. Convertible Frequency

The smart air conditioner could adjust the compressor output actively according to the occupants' active intention (going home) and passive one (falling into a deep sleep) for the goals of human comfort and energy conservation. Smart control, based on the information collected by the use of mobile phones and wearable devices, intensifies the interaction with occupants and carries out the intention causing control.
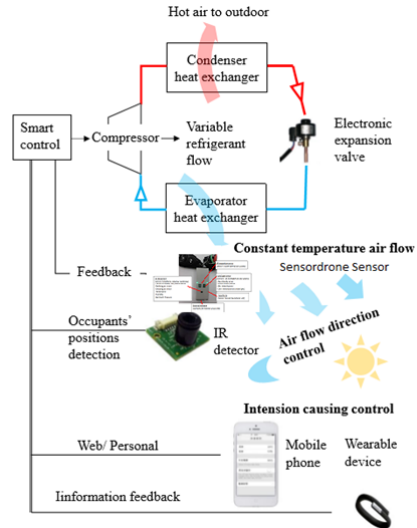

Figure 3. Smart Air Monitor

It may include the following aspects:

(1) Mobile phones with GPS and personal schedules, for detecting the occupants' position and intentions, could foresee the occupants' intention of entering the enclosed space. t this moment, the compressor, which is off in the general situation, could turn on in the full power. Before entering, the circulating fan turns on at the highest speed, and the air deflector swings for 10 min to enhance the air circulation. Therefore, smart control may enable the enclosed space could be cooled down rapidly after the occupant enters.

 (2) The bracelet with the accelerator could detect the movement of occupants while the sleeping. After the occupant falls into a deep sleep, the air conditioner would lift the indoor temperature flexibly to avoid energy consumption.

Compared with Figure 2, the control structure of the smart air conditioner in Figure 11 utilizes a multi-sensor system to achieve smart control. The indoor infrared sensor can detect humans' position and carry out the air flow direction control. Mobile phones with GPS and personal schedules, can be used to detect the occupants' position and intention. Wearable devices can be the bracelet with the accelerator. It detects the movement of occupants while sleeping. After the occupant falls into a deep sleep, the smart air conditioner would uplift the indoor temperature flexibly to avoid energy consumption.

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IV.   CONCLUSION

The mentioned IoT based Air Monitoring System could prove to be very useful for human comfort and also in reducing the consumption of energy.

The Smart AC's could save the energy by almost about 49% which indeed is a great benefit to the society.

V.   ADVANTAGES

✓ You can adjust the fan speed while sitting on the couch or change the temperature while at work if the weather has suddenly changed.

✓ You will save money simply by using your air conditioner when it best fits your schedule at the appropriate temperature without sacrificing comfort.

✓ You don't have to turn off the air conditioner or figure out complicated menus anymore. A few simple presses within the smart AC app are all that's needed, keeping you comfortable all season long.