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Implementation of Smart Monitoring System based on Breathing Sensor

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Abstract

In the 21st century, information collection and information provision based on digital informatization and intelligent automation are emerging as one of the social problems in the society for the elderly and the vulnerable groups in the welfare society including the disabled, and various methods are being studied to find realistic alternatives. Among these factors, the problem of the elderly living alone is emerging as the most serious, and as a realistic approach to solve some problems by applying information devices, it is a monitoring system using the Internet of Things(IoT). The need for an optimized system is emerging. In this study, the state of the elderly and the elderly living alone can be measured remotely by applying IoT technology. We present the research cases of a Breathing Sensor-based Smart Monitoring System that is used as a smart information system and used as a monitoring system for the elderly and infirm when it is identified as deceased through state detection

Keywords: *Sensor,IoT, Breathing sensor, Position Indicator Scope, Time, Image.Smart Monitoring*

1. Introduction

In 2022, local governments, including the Seoul Metropolitan Government, promoted various policies to expand the monitoring system area using the Internet of Things to manage the health and safety of the elderly living alone. The IoT Monitoring System using various human tracking solutions [1-3] operated by immediately visiting the household and reporting it to 119 when no activity movement of the elderly living alone is detected for a certain period of time or when abnormal symptoms are analyzed through information detection and analysis such as temperature, humidity and illumination. In addition, the monitoring system can be used in various ways, such as preventing accidents caused by highly contagious viral diseases such as COVID-19, and reducing the possibility of safety accidents that may occur in various ways depending on the age of 60 and high-risk groups. However conventioal human body sensor soultions [[1-3] have been maiin ly focused to coarse human detection or human behavior characteristics evnen though COVID 19 like recent environment

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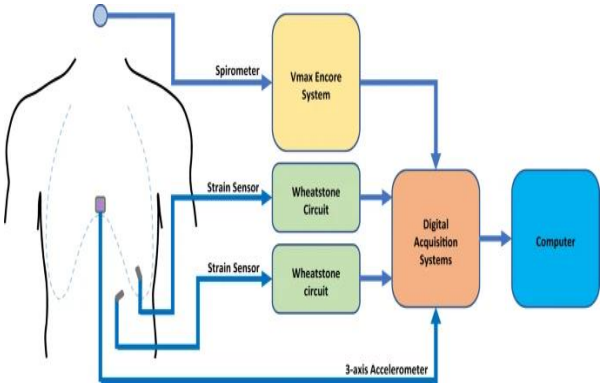
request Breathing sensor like human sanitary related functions. Thus, In this paper we survey characteristics of breathing sensors and suggest monitoring system based sensor's operation method. Additionally we will show breathing sensor connected Smart Monitoring System Configuration and experimental result examples.

2. Conventional Breathing Sensor case study

We surveyed various breathing sensr cases. Especially we introduce conventioal representative breathing sensors [4-5] using human body or human mouse. Digital Medicine journal[4] introduced breathing sensor concept examle using human body strain sensor case. In case of human body strain sensor, sensing data connected with monitoring graph or monitoring functions[6-7] through data acquisition devices and communication protocols such as WiFi or Blootooth like wireless soultions. Additional breathing Sensor concept using mouse liked optical fiber structure case is shown in Figure 2. mouse liked optical fiber breathing Sensor case is generally more convenient than human body strain sensor. Especially, mouse liked optical fiber breathing Sensor characterized as compact size and compatible useful structure with Bio-MEMS(micro electronic micro system) applications. However, above conventional sensor cases have basic level of data monitoring and data analysis function.



Fgure 1. Breathing Sensor concept examle 1 : human body strain sensor case [4]

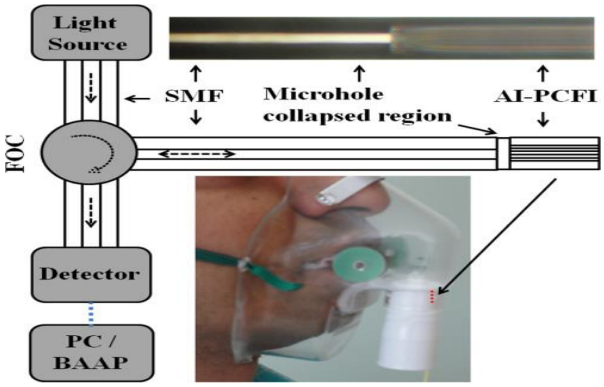
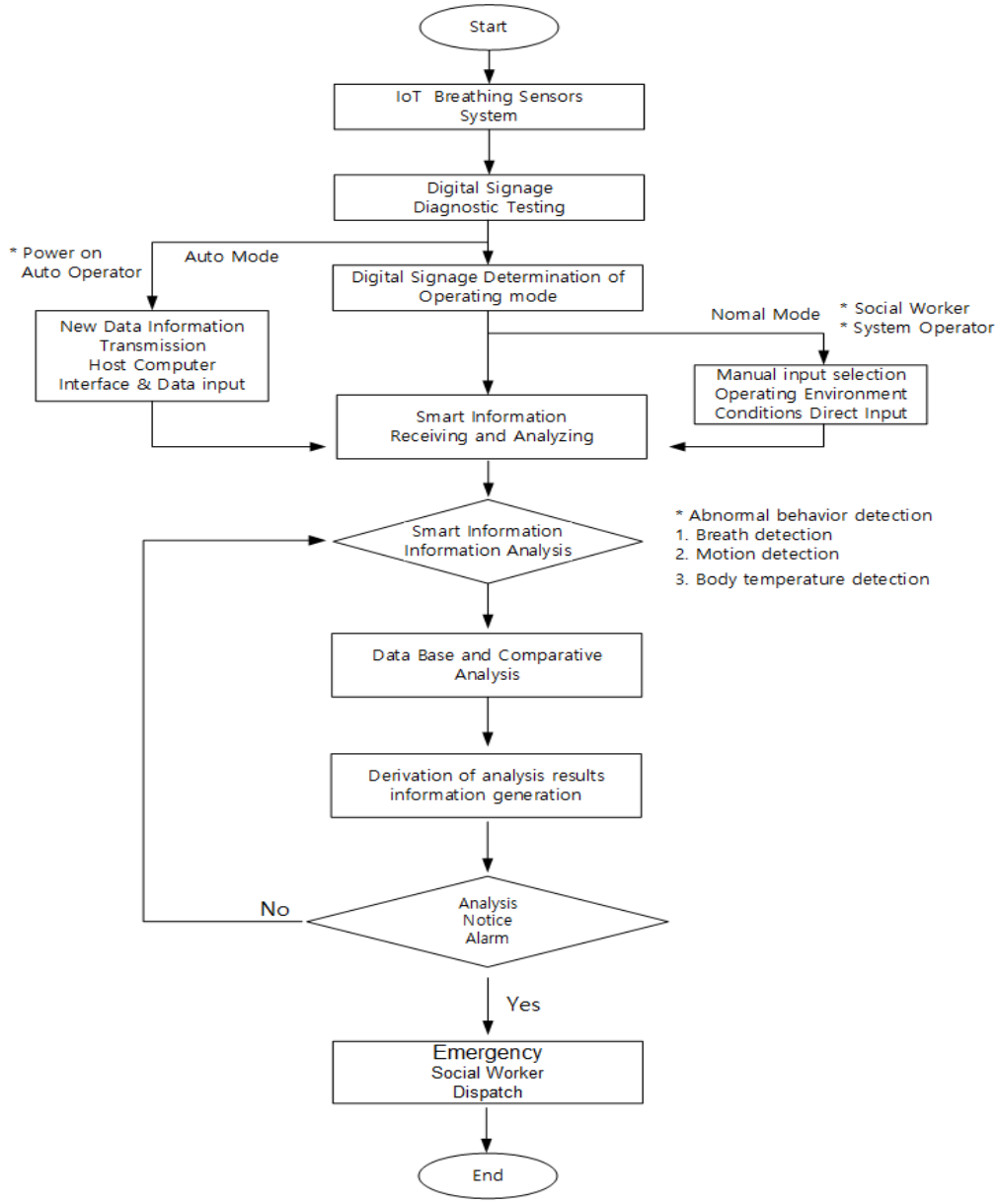


Figure 2. Breathing Sensor concept examle 2 : mouse linked optical fiber sensor case [5]

3. Smart Breathing Senssising algorithm and Monitoring System Configuration

In this paper, we propose more detailed new smart Breathing Senssising algorithm compared with conventioal sensors[1-2][6]. As shown in Figure. 3. main operation flow of proposed algorithm are summarized as follow 5 steps.

STEP1 : Smart monitoring system initialltion
STEP2 : Dianostic testing of Basic activity for IoT Breathing Function
STEP3 : Information Data gathering from sensors
STEP4 : Intelligient Data base analysis and smart decision making
STEP5 : Command data sending and control



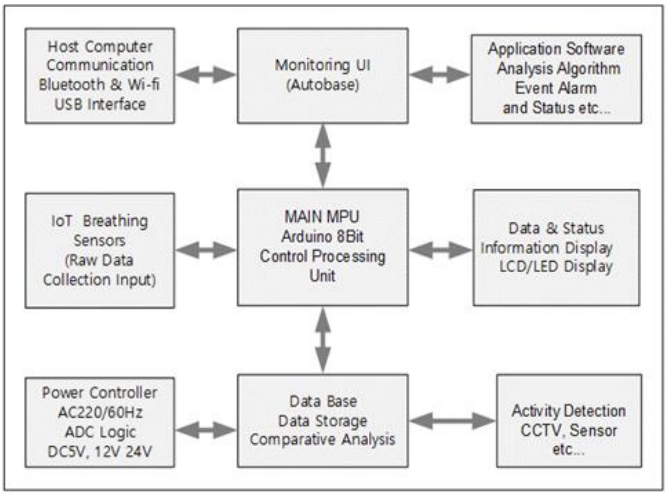


Figure 4. Smart Breathing Sensor's Interactivity

As shown in Figure 4, smart breathing Sensor's Interactivity function characterized with major blocks as

Block 1 : Monitoring UI (Autobase) connectted with Host Computer & Applicatiojn S/W
Block 2: Main controller (onitoring UI (Autobase) connectted with IoT Breathing Sensors & Data/Status Disply
Block 3: Smart Data Analysus block ring UI (Autobase) connectted with IoT Breathing Sensors & Data/Status Disply

By using above sensor's interactivity and smart sensing algorithms we configured Smart Monitoring System as Figure 5.

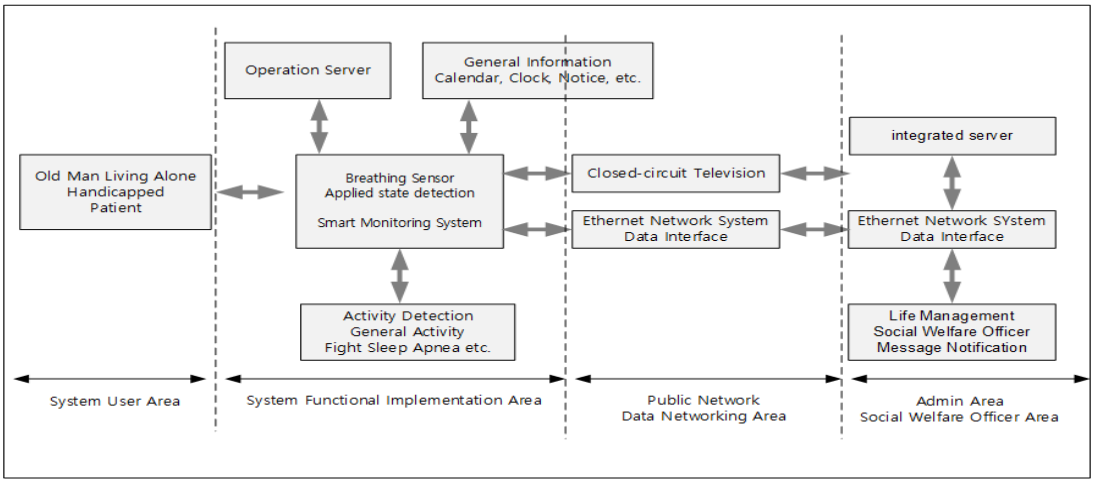


Figure 5. Smart Monitoring System Configuration

As shown in Figure 5, sMain core H/W consist of Monitioring block (LCD Monitor etc.), Controller block (MCU etc.), Data gathering and communication, Big Data processing and Decision Making with high precision embedded Firmware Breathing Sensors.

4. Experimenal Result

In order to verify proposed Configuration, we testified about Smart Monitoring System using basic fundermental experiments. As shown in Figure 5, Fundermental Experiment configuration consist of sensor block and senssor data measurement and contrller block and monitoring block. Breathing sensor using breathing air pressure detection sensor connected with IoT function are adopted. And we used open source based Arduino controller in the experiment case as a convinient controller device, Sensing Breathing Data entered to PC including smart data base analysis firmware and Autobase UI monitroing S/W. Figure 6. shows detailed fundermental experiment result about control siganl waveforms measument example. And Figure 7. shows Autobase monitoring UI screen of Fundermental Experiment result. Using above experiments we certified implementation possibility about breathing sensor based smart monitoring solutions.

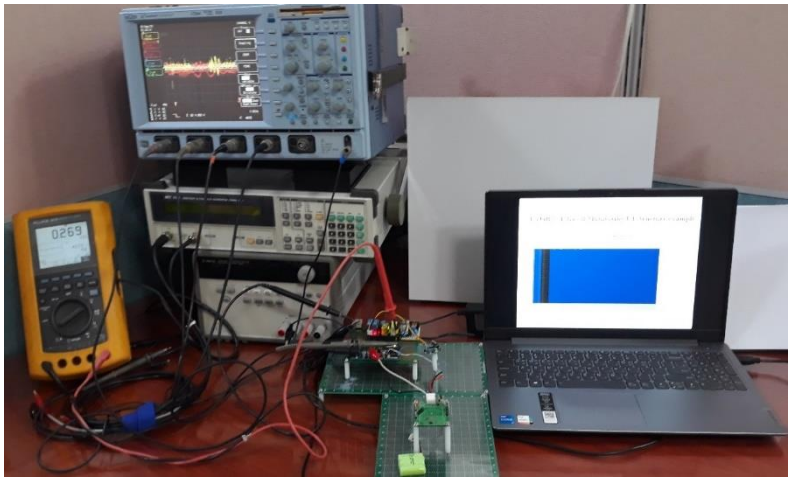


Figure 5. Fundermental Experiment result (totla configureation example)

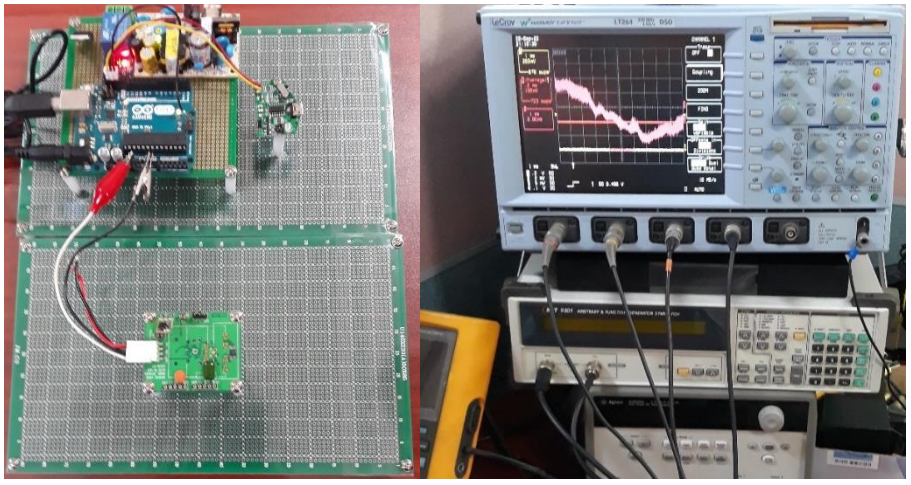


Figure 6. Fundermental Experiment result (control siganl measurement example)

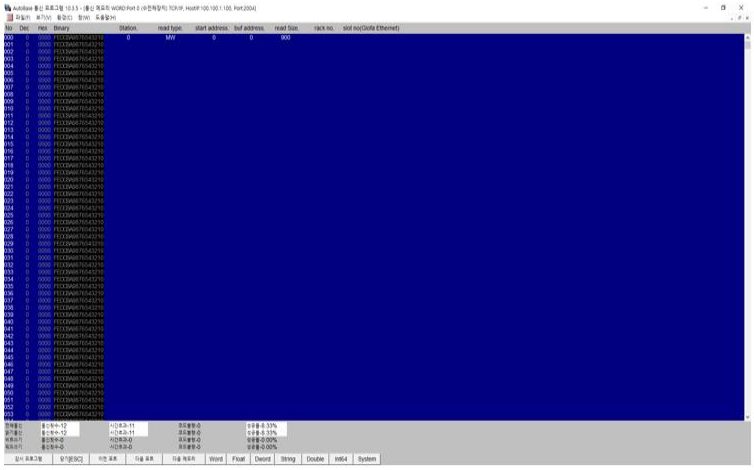


Figure 7. Fundermental Experiment result (Autobase monitoring UI example)

5. Conclusion

In this paper we surveyed characteristics of breathing sensors and suggested monitoring system based sensor's operation method. Additionally we showed breathing sensor connected Smart Monitoring System Configuration and experimental result examples.

Proposed breathing Sensor structure cmpattable with IoT devices and Smart monitoring system. As a anti-Covid 19 sensor breathing sensing function is very important and it could be a useful application as smart warable body sensor, health care sensor, santitary sensor etc. . And, it was designed by studying the user's breathing and movement in the event of an accident to be monitored using a detection radar sensor. By combining Breathing Sensor to the existing smart frame function, it was implemented as an information device that can be easily and conveniently used by vulnerable social welfare groups with various purposes, and it was studied to be used as an information device for the elderly and the elderly living alone. In the future, it can be used as an information device to reduce welfare blind spots by conveniently, easily, and usefully supplementing with an intelligent cognitive system through theoretical consideration and research on how to collect emergency and various information in real time and predict the possibility of accidents. Even though we proposed new fundermental concept of brething sensor connected smart monitoring system, we anticipate future continuous enhanced research work for useful application fields such as anti-Covid 19 or sanitary envireonment implemetation etc.

Acknowledgement

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