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Pid Based Monitoring System With Home Automatic

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Abstract- **There area unit totally different ways in wireless technology like Bluetooth, WIFI, and GSM. during this paper, new style and totally different home appliances area unit given. Bluetooth based mostly Home Automation System mistreatment Arduino UNO Microcontroller is style and enforced. PWM technique on Arduino is employed to manage the DC motor speed reckoning on the dimension of the Pulses and H-Bridge driver circuit is employed to manage the direction of the motor. the house automation applications that has given during this paper is that the ability to manage the DC motor speed and its direction, bulb, fan and heater employing a good phone application with Bluetooth wireless technology. The relays is employed to attach these appliances to the input/ output ports of the board The design could be a low price, versatile and employing a trendy technology and devices for this application. Application of wireless Bluetooth association on top of things board permits a simplified thanks to system installation. The system has been designed and operated with success.**

Keywords- **Bluetooth, Home Automation, Arduino UNO Microcontroller, H-Bridg.**

I.INTRODUCTION

Bluetooth may be a wireless technology normal for exchanging knowledge over short distances exploitation short wavelength radio frequency radio waves a pair of.4 to 2.485 rate from mobile device and building personal space networks. It will connect many devices, overcoming issues of synchronization. Arduino Uno may be a microcontroller board supported the AT mega series. it's fourteen digital input/output pins, half-dozen analog inputs, a 16MHz quartz, a USB association, an influence jack, associate degree ICSP header and a push. It contains everything required to support the microcontroller; merely connect it to a laptop with a USB cable or power it with associate degree AC to DC adapter or battery to induce started. "Uno" suggests that one in Italian and was chosen to mark the discharge of Arduino software system (IDE) one.0.5.

Bluetooth could also be a rate base technology for wireless communication. it's designed to change cable connections. Usually, it connects small devices like mobile phones, computer, PDAs and TVs using a short-range wireless association. It uses the 2.45 GHz per second band. The association has the utmost vary is 10 meters. The transfer rate of the information is 1Mbps (or a most of 2Mbps).We used associate Arduino Uno where we have a tendency to tend to activate and OFF semiconductor diode light-weight practice Bluetooth commands. which we have a tendency to send that instruction practice our golem Phone. In short, we'll management our semiconductor diode using a phone via Bluetooth.

II. PID CONTROLLER

A proportional-integral-derivative controller (PID controller) is a control loop feedback mechanism (controller) widely used in industrial control systems. A PID controller calculates an error value as the difference between a measured process variable and a desired set point. The controller attempts to minimize the error by adjusting the process through use of a manipulated variable. The PID controller algorithm involves three separate constant parameters, and is accordingly sometimes called three-term control: the proportional, the integral and derivative values, denoted P, I, and D. Simply put, these values can be interpreted in terms of time: P depends on the present error, I on the accumulation of past errors, and D is a prediction of future errors, based on current rate of change. The weighted sum of these three actions is used to adjust the process via a control element such as the position of a control valve, a damper, or the power supplied to a heating element.

In the absence of knowledge of the underlying process, a PID controller has historically been considered to be the most useful controller. By tuning the three parameters in the PID controller algorithm, the controller can provide control action designed for specific process requirements. The response of the controller can be described in terms of the responsiveness of the controller to an error, the degree to which the controller overshoots the setpoint, and the degree of system oscillation. Note that the use of the PID algorithm for control does not guarantee optimal control of the system or system stability. Some

applications may require using only one or two actions to provide the appropriate system control. This is achieved by setting the other parameters to zero. A PID controller will be called a PI, PD, P or I controller in the absence of the respective control actions. PI controllers are fairly common, since derivative action is sensitive to measurement noise, whereas the absence of an integral term may prevent the system from reaching its target value due to the control action.

1. Interactive Algorithm-

$$u(t) = K_c\left[e(t) + \frac{1}{Ti}\int_0^t e(\tau)d\tau\right] \times \left[1 + T_d\frac{d}{dt}e(t)\right]$$

2. Non Interactive Algorithm

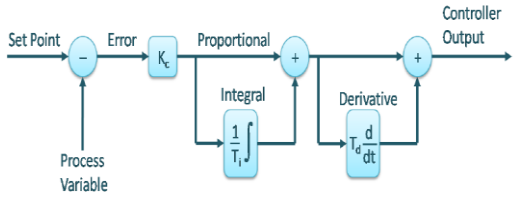

Fig.1 Interactive Algorithm.

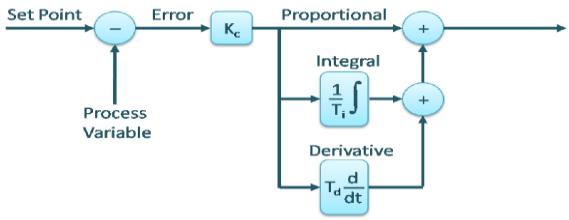

Fig.2 Non Interactive Algorithm.

3. Parallel Algorithm

$$u(t) = K_p e(t) + K_i\int_0^t e(\tau)d\tau + K_d\frac{d}{dt}e(t)$$

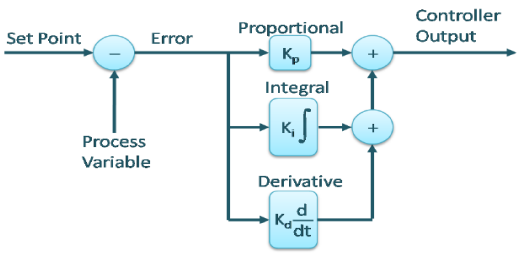

Fig.3 Parallel Algorithm.

III. LITERATURE REVIEW

SunenSoni, Mayank Thanvi -Automation is that the key to the present trends (system) being followed to rework them into a stronger, quicker and reliable technological solutions or systems. Automation refers to technique of creating systems management themselves with a read to scale back human effort. With this principle came the concept of our project "Home Automation System". The planned project controls electrical appliances and parts reception to be mechanically or remotely controlled by the system or by the user severally. The backbone of this technique is that the Arduino UNO microcontroller and Wireless local area network protect that provides the interface between the user and also the appliances.

Via net (webpage) user will access or operate any connected device from anyplace and system additionally checks for any device left switched on by user to change it off. With the employment of varied sensors (Infrared sensors, temperature sensors) and actuators entire affiliation is established between local area network protect and also the device. System would even be ready to monitor presence of any individual within the area and mistreatment this knowledge, user will manage the operability of any connected devices. Modules will be integrated as and once needed for relieving the task and energy of human [10].

Rajesh Singh, Piyush Kuchhal - This paper provides answer for home automation, in terms of AN energy economical system. the target is to style a tool within the variety of AN intelligent device, to regulate the close condition of a house. Methods: AN intelligent RF based mostly device is developed that is capable of dominant in 2 modes- autonomous and semiautonomous. The dimming levels of appliances area unit tuned with optimized inflammatory disease controller. a true hardware image is developed to regulate 2 parameters-strength and humidness level of the area. The standard desertion parameters of inflammatory disease controller area unit calculated with the assistance of overall transfer perform of the system, which has the feedback signal from detector, objective perform of optimization algorithmic rule and transfer perform of the appliance (which is employed to regulate the close conditions of room).

Particle Swarm optimization algorithmic rule is employed to optimize the standardization parameters for inflammatory disease and results shows a lot of energy potency with planned system, in comparison to standard systems. Findings: The experimental results show distinguished saving of energy by mistreatment planned PSO-PID algorithmic rule for designed system. it's calculated as thirty seven.49% for strength system and for humidness management saving comes out thirty six.9%. Novelty of the planned system is new approach in terms of intelligent hybrid device [11].

Aayushi Gautam, Divya Bareja:-In this day and age we individuals are such a great amount of occupied in our lives that we have to control some of our

undertakings naturally. Some time we don't recall switching of the lights and other electronic apparatuses in our homes. This prompts increment in our power bills and additionally wastage of force. To take care of this issue the work is done to control the gadgets in our home with cellular telephones and PCs. This prompts a mechanized home whose gadgets can be controlled consequently if there is any action saw for the same. The work is likewise done to distinguish any sort of action in the house for wellbeing reason like fire alerts for identifying fire and fan for stickiness in the house. Arduino Uno, PIR sensor, LM35 and IR Led are utilized as primary segments. Interfacing of parts with Arduino and afterward with MATLAB and XAMP is finished [12].

Humayun Rashid, Sayed Bin Osman: -The paper demonstrates to design a smart home system for physically disabled persons with the purpose of reduction of water and power consumption. The physically disabled persons require special assistances from caretakers or other persons to lead their normal life and even at home, it is not convenient for them to control the house apparatus system according to their wish. In this paper, a smart home automation system is implemented which consists of automatic control of lights to turn on in presence of human and turn off rest of the time as well as Bluetooth remote controlling ability along with automatic door lock and open system,

automatic Water tap, automatic water tank fill-up and Solar charging system with the solar controller to reduce the power consumption. The project as been implemented using low-cost components and based on Arduino platform with an aim to develop a system which will be effective to reduce water wastage in real time as well as the project will be able to reduce power consumption and utility bill by using renewable energy as the power source [13].

Mohamed Abd El-Latif Mowad, Ahmed Fathy:- Smart Home System (SHS) is a dwelling incorporating a communications network that connects the electrical appliances and services allowing them to be remotely controlled, monitored or accessed. SHS includes different approaches to achieve multiple objectives range from enhancing comfort in daily life to enabling a more independent life for elderly and handicapped people. In this paper, the main four fields for SHS which are, home automation and remote monitoring, environmental monitoring, including humidity, temperature, fault tracking and management and finally the health monitoring have been considered. The system design is based on the Microcontroller MIKRO C software; multiple passive and active sensors and also a wireless internet services which is used in different monitoring and control processes. This paper presents the hardware implementation of a multiplat-form control system for house automation and combines both hardware and software technologies. The system results shows that it can be classified as a comfortable, secure, private, economic and safe system in addition to its great flexibility and reliability [14].

Hohite Fetene- Semiconductor gas sensors detect gases by a chemical reaction that takes place when the gas is in contact with the sensor and sensitivity is affected by operating temperature and humidity. The accurate control of gas sensor's operating temperature is a fundamental aspect that determines the sensitivity and selectivity of gas sensors. A variety of gas sensors are developed so far, and each has different working temperature requirement ranging from 200°C - 400°C for functioning at the finest.

This research mainly focuses on the package design criteria of semiconductor gas sensor substrate being developed by Arizona State University. To maximize the sensor's sensitivity, stability, and accuracy; the package design needs to regulate the gas sensing material at apre set temperature of 200°C using automated temperature control system. To achieve these requirements, we developed a system that contains a microcontroller, micro-heater, and temperature control circuit with temperature sensors (thermocouples) to control the temperature measurement and read the resistance change of the gas sensor using Proportional Integral Derivative (PID) Controller algorithms.

This paper proposes an invention of smart package design for gas sensor technology. It uses the Arduino microcontroller for processing and controlling the circuit operation and PID controller algorithm to automatically control the temperature by using PWM control of the metal ceramic heater and temperature sensor This technology utilizes the principle of Wheatstone bridge to read the resistance change of the gas sensor and used an instrumentation amplifier (INA125P) to amplify the voltage reading from the circuit. In addition to the sensor's performance, the designed package considers low-cost fabrication, portability, energy consumption and regulation of low voltage for operation [15].

IV. METHODOLOGY

1. Arduino Bluetooth Control -Device Application is to allow you to control various electrical devices up to eight devices and independently controlled. Use Android Bluetooth mobile device to remote control your device with Serial TTL Bluetooth Module and Arduino Board. It is used for Automation System, Smart Home Automation, light control etc. The program features.

- It can Control up to 8 devices.

- It Can be set Timer to ON / OFF the device and show the countdown timer.(Timer can be set to 1 minute, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours).
- You can Change and Edit your Device Name.
- It is Free Version Application with AD.

2. Hardware Side -The first component in the home system is the PCB to which all the sensors, devices and the GPRS module is attached. The GPRS module handles all the commands sent by the user and forwards them to the microcontroller. It is connected to the internet via a SIM. The connection with the sensors can be wireless as well. It can be implemented by using RF transceiver. On a small scale, however, the devices and sensors are connected with the board through wires except one device.

3. Client-Side User Interface -The client can access the home system by logging in a website which can be accessed on any internet browser. The client sends a request and gets a reply after the request is processed. The client can visit the website http://www.iotdemoo.herokuapp.com, choose appropriate mode and give various commands accordingly. The main circuit consists of different sensors, devices, power supply, the Arduino UNO board and a SIM800 module.

4. Client Side- It is implemented in Django framework. The different files which are used include: views.py, urls.py, models.py and templates.

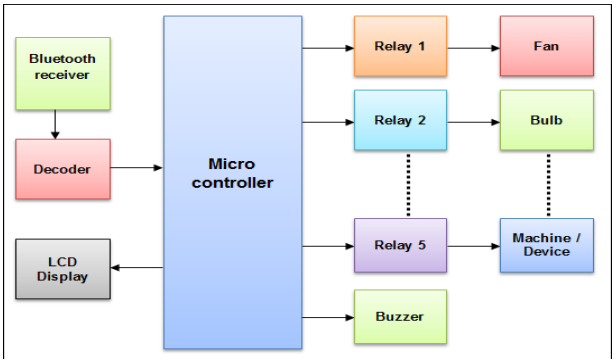

Fig.4 block diagram.

V.COMPONENT DESCRIPTION

1. ARDUINO UNO-The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Fig.5 Arduino Uno.

Fig.6 Arduino Unonano.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

VI. RESULT AND SIMULATION

1. Hardware Representation

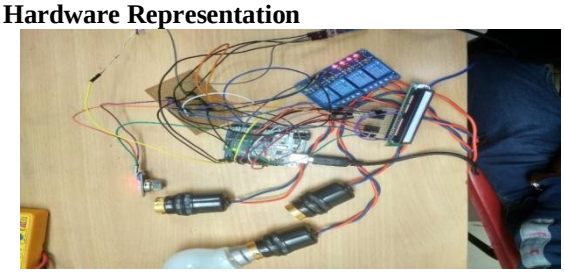

Fig. 7 Hardware Presentation.

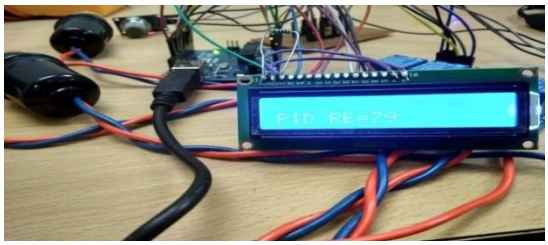

Fig. 8 Display System.

1. PID response in Temperature monitoring

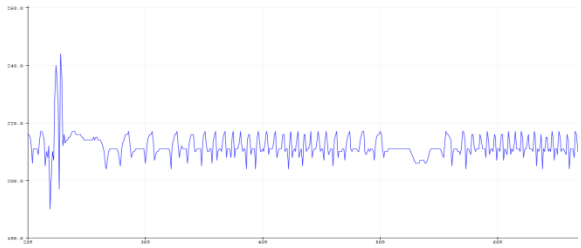

Fig. 9 PID output response.

2. Without PID response in Temperature and Gas monitoring

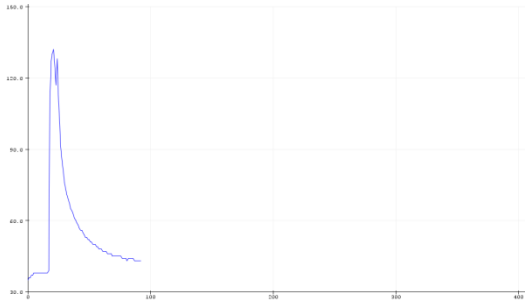

Fig.10 Gas sensor without PID response output response.

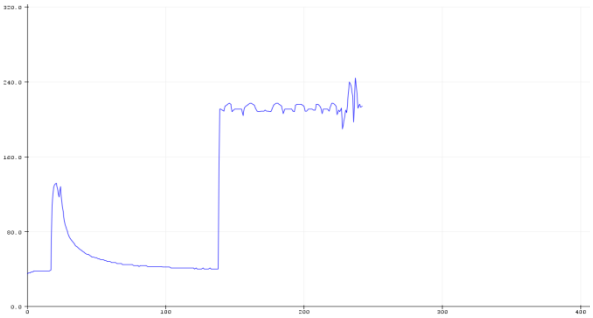

Fig .11 Temperature Monitoring By using LM35.

Table 1 PID Controlling parameters.

KP	1
KI	1
KD	1
1^0C	10mv
1 count	0.0059 Volts
Gas Sensitivity	52%
Temperature Sensitivity	41%
T_r (Transient Time)	10ms
T_s(Settling Time)	2ms
Limit the PID output	0-255
Number of bit Generation	8
Temperature change	0.6^0C

Table 2 PWM switching frequency and resolution.

Binary bits	control range	Period [ms]	Freq. [Hz}
8	256	2133.33	0.46875
7	128	1066.67	0.9375
6	64	533.33	1.875
5	32	266.67	3.75
4	16	133.33	7.5
3	8	66.67	15
2	4	33.33	30
1	2	16.67	60

The on/off controller's response parameters are discussed below:

1. Rising Time- 90% value of the temperature change from initial value to the

Set point value = (36.00℃ - 19.09℃) x 0.9 = 15.22℃ ±0.6 ℃

The value of PV with this 90%

2. Change value = 19.09℃ + 15.22℃= 34.31℃ ± 0.6℃, Which is found in approximately 514 seconds? 10% value of the temperature change from initial value to the set point value = (36. 00℃ - 20.00℃) x 0.1 = 1.69℃ ± 0.6 ℃ The value of PV with the 10% value change = 19.09℃ +1.69℃ = 20.78℃ ± 0.6 ℃, which is found in approximately 59 seconds. Hence,

3. Rising Time- (514 – 59) seconds = 455 seconds

4. Peak Time- The peak time of this system is found to be 637s, when the temperature of the system reaches 36.25℃ + 0.6℃.

5. Settling value & settling time- The system undergoes oscillation and does not settle.

6. Overshoot- Ample overshoots are observed.

VII.SCOPE AND FUTURE WORK

From this experiment, we conclude that the Arduino Uno with the Bluetooth module and relay driver works very well. It is easy to use in our home as a smart home automation system. It is very beneficial to the person who is physically disable and also used for aged person for controlling electrical appliance remotely with the help of Android mobile phone.

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