Automatic Electrical Appliance Fault Detection System with Remote Monitoring Through IoT

Mahendran P, AravinthanT, Diwahar S J,Sharan S,Sneha Y

Asst. Prof. in Department of ECE, KSRCE TIRUNCHENCODE, TamilNadu, India
Student in Dept.of ECE,KSRCE TIRUCHENGODE,TamilNadu,India

Abstract-In the current state of affairs, monitoring and automation is not only about controlling things when the users are physically present, it specifically means that they can control it from any place within the world. It presents controlling and monitoring home appliances with fault detection, appliance status monitoring. When fault occur, report to their corresponding service center immediately. Together with IOT Board, a current sensor or speed sensor or any monitoring sensor is employed for fault exploration and monitoring the activity of the appliance. Current is a parameter in the electricity world. Each appliance works properly for a selected worth of current. In this paper, frequent approach is introduced to show the current status or motor speed monitoring of the appliances, that it is on/off. And it additionally provides manual operative approach together with IOT-based automation by coordination of various control.

I.INTRODUCTION

Over two billion people around the world use Internet for browsing Web, sending and receiving emails, accessingmultimedia system content and services, playing games, social networking applications and many other tasks. IOT explain different type of technologies and disciplines that achieve out into the real world to implement on physical of objects.IOT is represented as connection of objects like phones, TVs, Sensors etc. to the internet wherever and make new kind of communication between people and things. Any person can connect to anything from anywhere and anytime and except that these connections extend and workcompletely many on advance dynamic network. This technology can be applied to generate new ideas and develop areas to make home smart, comfortable and toenhance standards of life.

II.LITERATURE SURVEY

[1] Somak R. Das has proposed the Home automation and security for mobile devices. Wherever Overseeing Mobile phone have become pervasive in our society, a home automation and security system for mobile devices that leverages mobile technology to provide essential security to our home and associated control operations, with the help of Mobile devices the home appliances are controlled such as turning ON/OFF a television, Light and so on. The device used is Apple's ios device, the ios application support the x10 standard and video cameras with limitations x10 commander controls x10-compatible light and the appliances, it does not support any cameras or motion detectors the cameras automatically initiate recording and the ios device alerts the home owner immediately. Home automation and security capability into mobile devices. The application is also available through web browser.

[2] Jorge C has proposed a IoT based intelligent system for fault detection and Diagnosis in Domestic Appliances. The system is able to analyze the collected data, detect possible faults, and report the situation to the user, interface make use of digital TV, mobile device or conventional computers to warn householders about necessary interventions.The fault diagnosis can determine the type, location, magnitude, imestamps, and behavior of the variable with time, for every

type of fault the intelligent system stores its residual values in a database. The fault is diagnosed through the classifier and the FDDs decision maker, which will identify the degree of relevance of the fault by comparing manufactures information stored in the database and the fault data history database.

[3] Ranjith Balakrishnan has proposed the IoT based Monitoring and controlsystem for Home Automation. Home Appliances are controlled via smart phone using Wi-Fi as communication protocol and raspberry pi as server system, where as home appliances like light, fan and door lock are remotely controlled through the website. The protection from the fire place associates an alerting message and an image is sent to the smart phone, the server will beinterfaced with relay hardware circuits the control appliances running at home.

[4] Hiroshi Ignacio has proposed the Mashing up

Multiple Logs in Home Network System for Promoting Energy-Saving Behavior. By mashing up the appliance control theenvironment logs with energy consumption data, user which finds and evaluate the relationships, appliances control logs andenvironment logs which is collected via the home network system. In the log, date, a user name, an appliance name, an appliancefunction are recorded when the appliance function is used, the appliance control logs and the environmental sensor logs, users canidentify past energy inefficient behaviors about appliances control.

[5] Matthias Kovatsch has proposed the Embedding InternetTechnology for Home Automation. Home Automation system over all covers the heating, lighting, shading and door/windowcontrol. Main objective is taking care of energy efficiency, the ipv6 provides the auto configuration mechanism that generatesinterface addresses from link-layer addersses and router advertisements, security system provides like firewalls, VPN, IPSec andSSL/TLS these are the backbone network of the homes and manage as remotely. Meter which is supplying and monitoringappliances in the home, a gateway that manages and provides access to the data obtained by the smart meter, mobile device that allows real time feedback on the energy consumption.
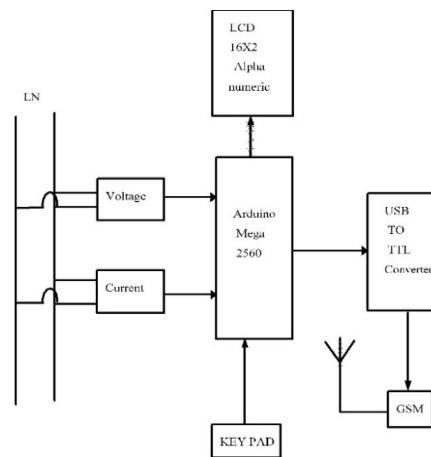
III. PROPOSED SYSTEM

Fig.1 Block diagram of proposed system

IV. REQUIREMENTS

There are two types of tools used in Arduino UNO, they are**:** Hardware tools and software tools

HARDWARE REQUIREMENT:

- Arduino Uno
- Current sensor
- GPRS modem
- GSM SIM
- Key pad

SOFTWARE REQUIREMENTS:

- Arduino IDE

HARDWARE COMPONENTS
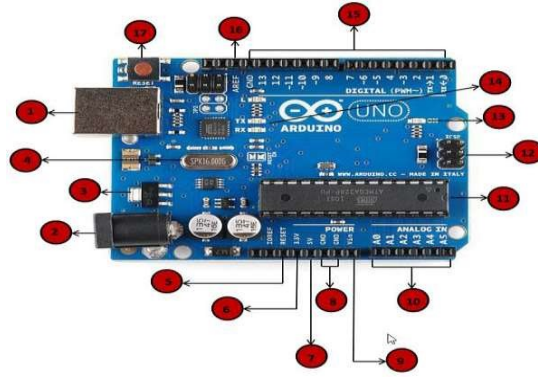
A.   ARDUINO UNO

Fig.2 Arduino board

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board. The key features are,

- + the functions of the microcontroller into a more accessible package.
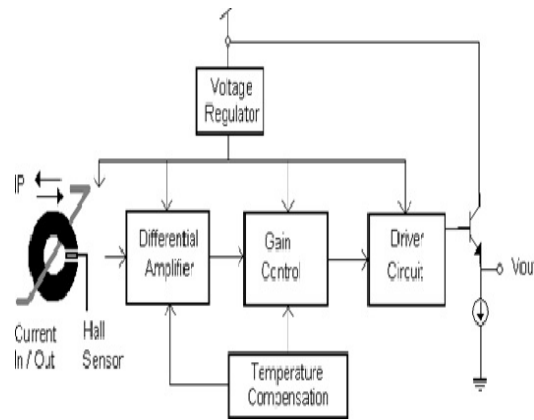
B. CURRENT SENSOR

Fig.2 Current sensor

- Lownoiseanalogsignalpath
- 0.4mΩinternalconductorresistance
- OutputvoltageproportionaltoACandDCcurrent
- Min.sensingcurrent0~20Aat5Vvoltagesupply
- HighSensitivity64mV/A
- Wideoperatingvoltagerange3.0~12V.
- Lowoperatingcurrent3mA
- Nearlyzeromagnetichysteresis.
- Radiometricoutputfromsupplyvoltage
- 23KHzbandwidth

C.GPRS MODEM

Fig.3 GPRS Modem

PRODUCT FEATURES:

- Always on-lined and high-speed connection.
- Easily installation: Don't need any driving program.
- Dual Band GSM/GPRS modem (GPRS/EGSM900/1800Mhz)
- Network, Data fax, SMS
- Transmitting speed: 115.2 kbps
- Channel spaces: 200 kbps
- Stability of frequency: 0.1ppm
- Operating temperature: -20C - 60C
- Storage temperature: -30C - 85C
- Humidity: 98%
- Vibration(non-working): 25g
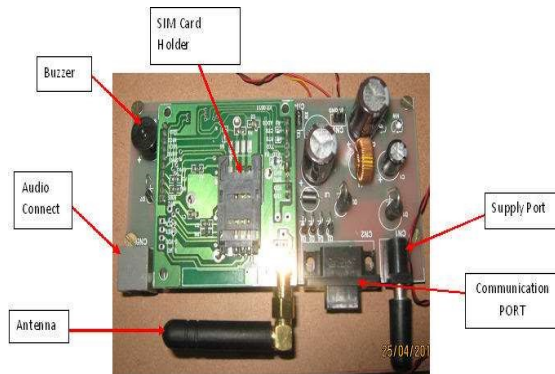- Operating power: 15mA

D. GSM MODEM

Fig.4 GSM Modem

GSM MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also, they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification. For sending message, a GSM Module named SIMCOM_300 with RS232, power supply, buzzer and audio interface are used. This can be connected to PC by using a USB to Serial Adaptor. Terminal programs such as Real term are used to send & receive data. The interface between GSM Module and microcontroller can also be done directly with the help of wires.

GSM Module works with AT COMMANDS where AT stands for Application Terminal.Some useful AT Commands are:

1. AT
2. AT+CMGS
3. AT+CMGR

4.   AT+CMGD
5.   AT+CSQ?
and so on.

E. CONNECTION BETWEEN MICROCONTROLLER AND GSM MODULE

For connection, Receiver Pin (Rx) of Microcontroller is connected to the Transmitter Pin (Tx) of GSM Module and Transmitter Pin (Tx) of Microcontroller is connected to the Receiver Pin (Rx) of GSM Module. Also Ground Pin (GND) of both are connected.
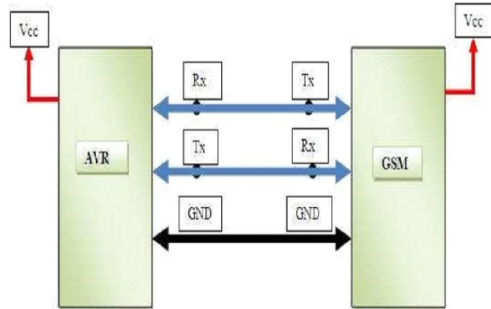

Fig.5 Connection between microcontroller and GSM module

V. RESULT AND DISCUSSION

We designed a kit which will help us to find the fault in the appliances. Here is how we test the kit for the dection of fault,
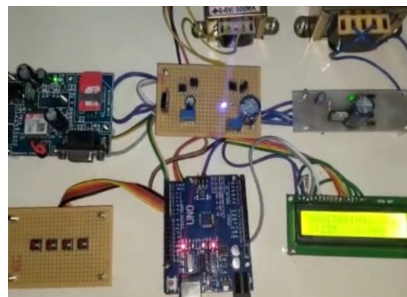

Fig.6 testing the kit

The output for the detection of the fault in the appliances is shown in the given below figure
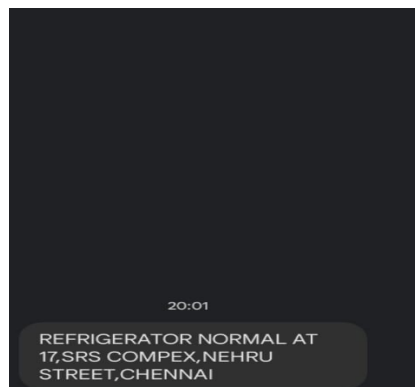

Fig.7 Output of the kit

VI. CONCLUSION

The proposed system identifies the fault and displays the fault location on the LCD screen and sends the data within fraction of seconds through IOT. This helps the operators to locate the fault precisely and send the service man to clear the fault and restore the power system back into service. The data for every phase can also be recorded for every second and can be used for data sampling, behaviorsof the transmission network for various load flow studies can be analyzed.In this design, a system not only monitor environmental conditions but also act according to the human interaction.It sends message to the user and the supplier, and then we can eliminate human interaction and able to manage low price to resolve its error with energy savings.

REFERENCES

[1] Dae-Man Han and Jae-Hyun Lim, "Smart Home Energy Management System using IEEE802.15.4 and ZigBee", Smart Home Energy Management System using IEEE 802.15.4 and ZigBee, 2010.
[2] Mingfu Li and Hung-Ju Lin, "Design and Implementation of Smart Home Control Systems Based on Wireless Sensor Networks and Power Line Communications", IEEE Transactions on Industrial Electronics, vol.62, no.7, July 2015.
[3] Baoan Lia, Jianjun Yub "Research and application on the smart home based on Component technologies and Internet of Things".
[4] F. A. Qayyum, M. Naeem, A S. Khwaja, A. Anbalagan, L. Guan, and B. Venkatesh, "Appliance Scheduling Optimization in Smart Home Networks" October 29, 2015.
[5] Agnetis, G. de Pascale, P. Detti, and A. Vicino, ``Load scheduling for household energy consumption optimization'' IEEE Trans. Smart Grid Dec. 2013.
[6] Mario, Giovanni Pau "A Novel Energy Management Approach for Smart Homes Using Bluetooth Low Energy" IEEE journal on selected areas in communications, vol. 33, no. 12, December 2015.
[7] Somak R. Das*, Silvia Chita†, Nina Peterson‡, Behrooz A. Shirazi†, and Medha Bhadkamkar† "Home Automation and Security for Mobile Devices" 2017 IEEE.
[8] Jorge C. Sea bra, Mario A. Costa Jr., and Mateusz M. Lucena "IoT based Intelligent System for Fault Detection and Diagnosis in Domestic Appliances" 2016 IEEE.
[9] Qian Zhu_y, RuicongWang_y, Qi Chen_y, Yan Liu_ and WeijunQiny "IOT Gateway: Bridging Wireless Sensor Networks into Internet of Things" 2010 IEEE.
[10] Matthias Kovatsch, Markus Weiss, Dominique Guinard"Embedding Internet Technology for Home Automation" 2010 IEEE.
[11] Hiroshi Igaki_, HideharuSeto_, Masayuki Fukuda_ and Masahide Nakamura "Mashing up Multiple Logs in Home Network System for Promoting Energy-Saving Behavior" 2010 IEEE.
[12] Diane J. Cook, Michael Youngblood, Edwin O. Heierman, III, Karthik Gopalratnam, Sira Rao, Andrey Litvin, and Farhan Khawaja "MavHome: An Agent-Based Smart Home" 2003 IEEE.
[13] FatihErtam, Orhan Yaman, Ayhan Akbar "Automatic Fault Detection with Bayes Method in University Campus Network", 2017 IEEE.
[14] Milad SamadyShadlu "Fault detection and diagnosis in voltage source inverters using principlecomponent analysis Sign in or Purchase", 2017 IEEE.
[15] http://en.wikipedia.org/wiki/Home_automation [wikipedia].
[16] C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - Journal of ELECTRICAL ENGINEERING, Vol.63 (6), pp.365-372, Dec.2012.
[17] C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- Springer,Electrical Engineering, Vol.93 (3), pp.167-178, September 2011.
[18] C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- Taylor & Francis, Electric Power Components and Systems, Vol.39 (8), pp.780-793, May 2011.
[19] Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- Iranian Journal of Electrical & Electronic Engineering, Vol.8 (3), pp.259-267, September 2012.
[20] G.Neelakrishnan, K.Anandhakumar, A.Prathap, S.Prakash "Performance Estimation of cascaded h-bridge MLI for HEV using SVPWM" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:750-756
[21] G.Neelakrishnan, S.N.Pruthika, P.T.Shalini, S.Soniya, "Perfromance Investigation of T-Source Inverter fed with Solar Cell" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:744-749