

IoT based Air Conditioner Control using ESP32

¹J.Arul, ²R.Balaji, ³S.Jeyamoorthy, ⁴M.Manipathra, ⁵R.Sundar, S.Saravanan⁶
^{1,2,3,4} U.G.Scholar, ⁵ Assistant Professor, ⁶Professor, Department of Electrical and Electronics Engineering
Muthayammal Engineering College (Autonomous), Rasipuram, Tamilnadu, India

Abstract:The objective of this article is to smart air conditioner automation using internet of things technology. The main scope of the article is security and Appliances control of smart security system using IOTs uses computers or mobile devices to control basic home functions (air conditioner) and features through internet from anywhere around the world. Safety and security of any living or working place is one of the most primary concerns. The advancement of technology has increased the safety and security of people along with their belongings. One of the reasons for the rise of the smart appliance is the increasing risk of burglary and the busy lifestyle. For this reason we are creating a IOT based home automation. Using this real time technology wherever in the world we are turn on and off the home appliances using IOT.

I. INTRODUCTION

The home automation is control of home device form a central control point automation is today s facts where more things are being completed every day automatically. Usually the basic tasks of turning on or off certain device and beyond, either remotely or in close proximity. The concept of the RF- based system is to use the underlying wireless data network such as IEEE 802.11(Wi-Fi). The popularity of wireless networks at home has increased in recent years, and the advanced. Computer technology has made the personal digital device to commonly have the capability to communicate through the wireless network. Hence, it issuitable to use RF-based location determination system to estimate location of the personal digital device in a home environment with high data rate transmission, supporting multimedia application may be feasible in WLAN.

One if the possible application is wirelessnetwork for home automation. Imagine a private home equipped with motion light temperature and other sensor actuators for opining the door dimming lights with a remote control as complex as setting up a network of items in your home (such as thermostat, security system lighting and appliances) that can be programmed using a main controller. The basic idea of home automation is to employ sensor and control system to monitor dwelling and Home automation using IOT application. Accordingly adjust the various mechanisms that provide heat ventilation lighting and other service. The automated “intelligent” home can provide a safer more comfortable and more economical dwelling. In an intelligent home automation system there are many possible solution for how and form where to control the automation system and single device a user interface can be a computer- based system a mechanical switch a single light a loudspeaker with a microphone or a some kind of personal remote controller using normal PC, laptop or table PC.

II.EXISTING SYSTEM

The existing System focusing on Bluetooth based system for turning on homeappliances The PIC microcontroller is used for controlling entire operation and LCD Display is used for displaying purpose. Different control technologies are used for monitoring and control of the systems, whereas the communication between a system and a user is generally realized online via wireless communication techniques such as RF, ZigBee and Bluetooth. Also, wireless communication programs are utilized for developing user interfaces. However, wireless communication programs do not provide adaptability for users because of their expensive libraries. RF, ZigBee and Bluetooth technologies are widely preferred in easy-to-use applications due to the short range between the sender and the receiver, and the small volumes of data transferred. The ZigBee, RF and Bluetooth wireless communication techniques are generally restricted to simple applications because of their slow communication speeds, distances and data security.

III.PROPOSED SYSTEM

Safety and security of any living or working place is one of the most primary concerns. The advancement of technology has increased the safety and security of people along with their belongings. One of the reasons for

the rise of the smart home is the increasing risk of burglary and robbery and the busy lifestyle. We propose a methodology .where the NODUMCU uploads these values onto the cloud with the help of IOT. These values can be accessed by the concerned person through the android smart phone. Initially the IOT server or android app in a user mobile phone give input for IOT server using WIFI module ESP8266 interface with the controller receive input from the user to automatically turn on and off the Air Conditioner (AC).

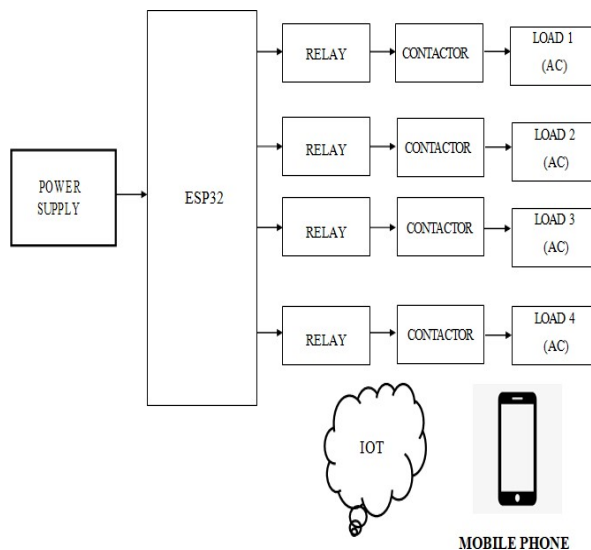


Fig. 1. Block Diagram

ESP32:

An ultrasonic sensor is an instrument that measures ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. Traditional hardware devices embedded WIFI modules can use WIFI directly to connect to the internet. Commonly used WIFI module, such as the USB interface module of mobile phone, laptop and tablet. Now many manufactures have tried to add WIFI modules to TV, air conditioning and other devices to build wireless home intelligent systems.



Fig. 2. ESP32

Relay Module:

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.



Fig.3.RELAY

Contactor:

A contactor is an electromechanical control device that used to make or break the connection between the load and power supply. The use of a contactor is similar to the relay. But the device used for higher current carrying application is known as a contactor and the device used for lower current applications is known as Relay. A contactor has several contacts as per the application and load. Generally, these contacts are normally open (NO) contact. And hence the load is shut off when the coil of the contactor is de-energized. But the contactor can design for both normally open and normally close applications. The most common application of contactor is in the starter that used to turn ON and OFF the equipment like motor, transformer, etc. An electromagnetic field produced when the electromagnetic coil is energized. As we have seen in the construction, the moving contact of the contactor is connected with the armature (metallic rod) of an electromagnet. When an electromagnetic field produced, the armature experiences the force and pulls towards the fixed contact. The force produced by the coil is more than the force of the spring. Both contacts remain in this position until the coil is not de-energized. Once the coil is de-energized, the electromagnetic force is zero and the armature pulls back due to the force of spring. And return in the normal condition (OFF position). The contactors are designed for the rapid ON-OFF operation. The input of the contactor coil may be AC or DC or in some cases, the universal coil is used as an electromagnetic coil. The universal coils operate on AC and DC both. A small amount of power loss occurs in the contacts and an economizer circuit is used to reduce this loss. While making and breaking of contacts, an arc is produced between the contacts. This arc may reduce the life of contactor as it increases the temperature of contacts. Due to arc, harmful gases are produced like mono-oxide.



Fig. 4.Contactor
IV.SIMULATION MODEL

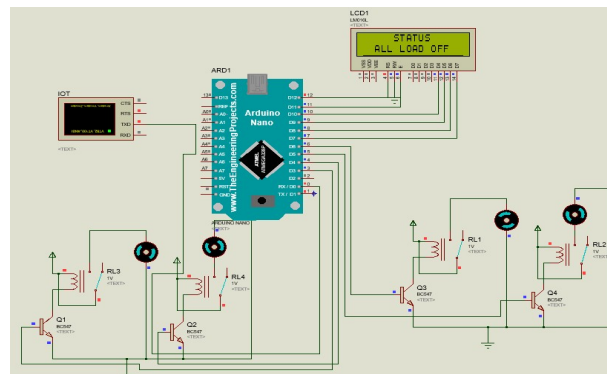


Fig. 5.Simulation Model

IOT based air conditioner control using ESP32, is design to control the Air conditioner basic function OFF and

ON by using our android phone ,laptop ,pc throughout anywhere from the world. When the device attached components are ESP32 is a series of low cost, low power system on a chip microcontroller with integrated wifi and dual mode Bluetooth, relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts, contactor is an electromechanical control device that used to make or break the connection between the load and power supply, its work by our mobile phone passes the signal to ESP32 its gives 5V of supply through the rectifier than relay, when relay normally open to power supply is gives normally closes, than the already to connect contactor and relay power supply through the contactor where connected our ac through contactor to operate the load.

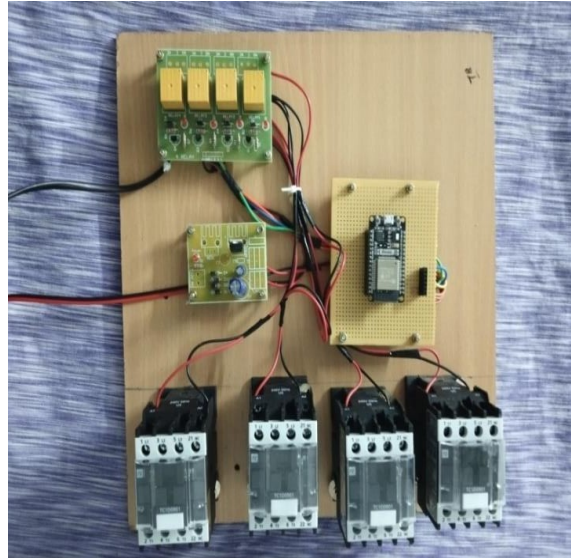


Fig.6. Hardware Results

The hardware result of this system will depend on the accuracy and reliability of the component used, the stability of the internet connection, and the overall implementation system is so good to control and more efficient.

V.CONCLUSION

The next phase for the home automation market will occur based on a few key improvements in the technology available in automation, such as improvements in wireless automation solutions as well as lowering of price points as the market begins to accept automaton usage in larger volumes. Some trends that we foresee for this phase of the industry are big companies like philips, Siemens & scheider will eventually bring out fairly mass market automation products with appealing user interface but at a lower price point today, and more people will be able to afford the products. Some foreign players will have niche in high and automation and focus fun the premium market.

REFERENCES

- [1] P. S. Pandey, P. Ranjan, M. K. Aghwariya, "The Real- Time Hardware Design and Simulation of Thermoelectric Refrigerator System Based on Peltier Effect" ICICCD 2016 DOI 10.1007/978- 981-10-1708- 7_66, Vol. 7, pp. 581-589, (2016).
- [2] G. Rani, P. S. Pandey, M. K. Aghwariya, P. Ranjan, "LASER as a Medium for Data Transmission Proceeding of International conference on ICARE MIT-2016 9-11 DEC-2016 Organized by Department of Mechanical Engineering, M.J.P. Rohilkhand University, Bareilly-. ISBN No. : 978-93-82972-19-8.
- [3] P. S. Pandey, M. K. Aghwariya, P. Ranjan, G. Rani, "Designing of Tracking System And Emergency Vehicle Locator With UltraSensitive GPS Receiver Active Antenna" on National conference on Advancement in Engineering Materials(NCAEM-2016) M.J.P.Rohilkhand University, Bareilly, 24-25 Feb 2016, ISBN No.: 978-93-82972-12-9.
- [4] P. S. Pandey, D.S. Chauhan, R. Singh, "The Real Time Hardware Design and simulation of moving message Display System Integrated with PLC Modem" Innovative Systems Design and Engineering, ISSN 2222-1727 (Paper) ISSN 2222-2871 (Online), Vol. 3, No. 10, (2012).
- [5] Oudji, S., Courrèges, S., Paillard, J. N., Magneron, P., Meghdadi, V., Brauers, C., and Kays, R. "Radiofrequency Interconnection between Smart Grid and Smart Meters Using KNX-RF and 2.4 GHz Standard Protocols for Efficient Home Automation Applications". Journal of Communications, Vol.10, No. 10, (2015).
- [6] V.Dhinesh, T.Premkumar, S.Saravanan and G.Vijayakumar, "Online Grid Integrated Photovoltaic System with New Level Inverter System" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 12, pp.1544-1547, 2018.

- [7] J.Vinoth, T.Muthukumar, M.Murugandam and S.Saravanan, "Efficiency Improvement of Partially Shaded PV System, International Journal of Innovative Research in Science, Engineering and Technology, Vol.4, Special issue 6, pp.1502-1510, 2015.
- [8] M.B.Malayandi, Dr.S.Saravanan, Dr. M.Muruganandam, "A Single Phase Bridgeless Boost Converter for Power Factor Correction on Three State Switching Cells", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1560-1566, May 2015.
- [9] A.Sasipriya, T.Malathi, and S.Saravanan, "Analysis of Peak to Average Power Ratio Reduction Techniques in SFBC OFDM System" IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Vol. 7, No.5, 2013.
- [10] P.Ranjitha, V.Dhinesh, M.Muruganandam, S.Saravanan, "Implementation of Soft Switching with Cascaded Transformers to drive the PMDC Motor", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1411-1418, May 2015.
- [11] C.Sowmya, N.Mohanandhini, S.Saravanan and M.Ranjitha, "Inverter Power Control Based On DC-Link Voltage Regulation for IPMSM Drives using ANN" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 11, pp.1442-1448, 2018.
- [12] N.Yuvaraj, B.Deepan, M.Muruganandam, S.Saravanan, "STATCOM Based of Adaptive Control Technique to Enhance Voltage Stability on Power Grid", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1454-1461, May 2015.
- [13] P.Manikandan, S.Karthick, S.Saravanan and T.Divya, "Role of Solar Powered Automatic Traffic Light Controller for Energy Conservation" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 12, pp.989-992, 2018.
- [14] R.Satheesh Kumar, D. Kanimozhi, S. Saravanan, "An Efficient Control Scheme for Wind Farm Using Back to Back Converter," International Journal of Engineering Research & Technology (IJERT), Vol. 2, No.9, pp.3282-3289, 2013.
- [15] K.Prakashraj, G.Vijayakumar, S.Saravanan and S.Saranraj, "IoT Based Energy Monitoring and Management System for Smart Home Using Renewable Energy Resources," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1790-1797, 2020.
- [16] J Mohammed siddi, A. Senthil kumar, S.Saravanan, M. Swathisriranjani, "Hybrid Renewable Energy Sources for Power Quality Improvement with Intelligent Controller," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1782-1789, 2020.
- [17] S. Raveendar, P.M. Manikandan, S. Saravanan, V. Dhinesh, M. Swathisriranjani, "Flyback Converter Based BLDC Motor Drives for Power Device Applications," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1632-1637, 2020.
- [18] K. Manikanth, P. Manikandan, V. Dhinesh, Dr. N. Mohanandhini, Dr. S. Saravanan, "Optimal Scheduling of Solar Wind Bio-Mass Systems and Evaluating the Demand Response Impacts on Effective Load Carrying Capability," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1632-1637, 2020.
- [19] T.R. Vignesh, M.Swathisriranjani, R.Sundar, S.Saravanan, T.Thenmozhi, "Controller for Charging Electric Vehicles Using Solar Energy", Journal of Engineering Research and Application, vol.10, Issue.01,pp.49-53, 2020.
- [20] V.Dhinesh, Dr.G.Vijayakumar, Dr.S.Saravanan, "A Photovoltaic Modeling module with different Converters for Grid Operations", International Journal of Innovative Research in Technology, vol.6, Issue 8, pp.89-95, 2020.
- [21] V. Dhinesh, R. Raja, S. Karthick, Dr. S. Saravanan, "A Dual Stage Flyback Converter using VC Method", International Research Journal of Engineering and Technology, Vol.7, Issue 1, pp.1057-1062, 2020.
- [22] G. Poovarasan, S. Susikumar, S. Naveen, N. Mohanandhini, S. Saravanan, "Study of Poultry Fodder Passing Through Trolley in Feeder Box," International Journal of Engineering Technology Research & Management, vol.4, Issue.1, pp.76-83, 2020.
- [23] C. Sowmya, N. Mohanandhini, S. Saravanan, and A. Senthil kumar, "Using artificial intelligence inverter power control which is based on DC link voltage regulation for IPMSM drives with electrolytic capacitor," AIP Conference Proceedings 2207, 050001 (2020); <https://doi.org/10.1063/5.0000390>, Published Online: 28 February 2020.
- [24] M.Revathi, S.Saravanan, R.Raja, P.Manikandan, "A Multiport System for A Battery Storage System Based on Modified Converter with MANFIS Algorithm," International Journal of Engineering Technology Research & Management, vol.4, issue 2, pp.217-222, 2020.
- [25] D Boopathi, S Saravanan, Kaliannan Jagatheesan, B Anand, "Performance estimation of frequency regulation for a micro-grid power system using PSO-PID controller", International Journal of Applied Evolutionary Computation (IAEC), Vol.12, Issue.4, pp.36-49, 2021.
- [26] V Deepika, S Saravanan, N Mohanandhini, G Dineshkumar, S Saranraj, M Swathisriranjani, "Design and Implementation of Battery Management System for Electric Vehicle Charging Station", Annals of the Romanian Society for Cell Biology, Vol.25, Issue.6, 17769-17774, 2021.
- [27] A Senthilkumar, S Saravanan, N Mohanandhini, M Pushparaj, "Investigation on Mitigation of Power Quality Problems in Utility and Customer side Using Unified Power Quality Conditioner", Journal of Electrical Systems, Vol.18, Issue.4, pp.434-445, 2022.
- [28] V Kumarakrishnan, G Vijayakumar, D Boopathi, K Jagatheesan, S Saravanan, B Anand, "Frequency regulation of interconnected power generating system using ant colony optimization technique tuned PID controller", Control and Measurement Applications for Smart Grid: Select Proceedings of SGESC 2021, pp.129-141.
- [29] C Nagarajan, B Tharani, S Saravanan, R Prakash, "Performance estimation and control analysis of AC-DC/DC-DC hybrid multi-port intelligent controllers based power flow optimizing using STEM strategy and RPF technique", International Journal of Robotics and Control Systems", Vol.2, Issue.1, pp.124-139, 2022.
- [30] G Vijayakumar, M Sujith, S Saravanan, Dipesh B Pardeshi, MA Inayathulla, "An optimized MPPT method for PV system with fast convergence under rapidly changing of irradiation", 2022 International Virtual Conference on Power Engineering Computing and Control: Developments in Electric Vehicles and Energy Sector for Sustainable Future (PECCON), pp.1-4.
- [31] C Nagarajan, K Umadevi, S Saravanan, M Muruganandam, "Performance Analysis of PSO DFFP Based DC-DC Converter with Non Isolated CI using PV Panel", International Journal of Robotics and Control Systems' Vol.2, Issue.2, pp.408-423, 2022.
- [32] VM Geetha, S Saravanan, M Swathisriranjani, CS Satheesh, S Saranraj, "Partial Power Processing Based Bidirectional Converter for Electric Vehicle Fast Charging Stations", Journal of Physics: Conference Series, Vol.2325, Issue.1, pp.012028, 2022.
- [33] M Santhosh Kumar, G Dineshkumar, S Saravanan, M Swathisriranjani, M Selvakumari, "Converter Design and Control of Grid Connected Hybrid Renewable Energy System Using Neuro Fuzzy Logic Model", 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA), pp.1-6, 2022.
- [34] C Gnanavel, A Johny Renoald, S Saravanan, K Vanchinathan, P Sathishkhanna, "An Experimental Investigation of Fuzzy-Based Voltage-Lift Multilevel Inverter Using Solar Photovoltaic Application", Smart Grids and Green Energy Systems, pp.59-74, 2022.
- [35] C Nagarajan, K Umadevi, S Saravanan, M Muruganandam, "Performance investigation of ANFIS and PSO DFFP based boost converter with NICI using solar panel", International Journal of Engineering, Science and Technology, Vol.14, Issue.2, pp.11-21, 2022.