Assistive Home Technology for Differently-abled

K. Ezhilarasan
Dept. of ECE
CMR University
Bangalore

Dipayaan Roy
Dept. of ECE,
CMR University
Bangalore

Gokul Raj S.
Dept. of ECE
CMR University
Bangalore

Mohammed Zainul Abideen
Dept. of ECE
CMR University
Bangalore

V. John Marshal
Dept. of ECE
CMR University
Bangalore

ABSTRACT

Due to the availability of the Internet everywhere, advancement in IoT-based applications has become the latest technology among their searchers. Web-based and Android-based technologies have grown in relevance in this cutting-edge technology to make applications more user-friendly. This study proposes an automatic home which requires the use of a multimodel application that can be controlled in a variety of ways so that you can also automate the entire world. For this system, an internet module is connected to the home system's main supply unit and may be accessed over the Internet. As a result of the static IP address, wireless connectivity is possible. In order to automate a home, you need to use a multimodal application that can be controlled in various ways via the user's voice recognition command via Google Assistant or through a mobile device.

Keywords
Automation, Internet of Things Multimode, and Google Assistant.

1. INTRODUCTION

As a result of technological advancements, human-machine interaction (HMI) has become increasingly realistic in everyday life as a result of technological advances. A step further in today's HMI research is connecting the device to the Internet, which was once exclusively used to communicate but now is being utilized to connect things, which is referred to as the Internet of Things. (Internet of Things). As part of this program, everything that can be accessed from anywhere will be connected over the Internet. Use the enter key to start a new paragraph. The appropriate spacing and indent are automatically applied.

It is important to note that IoT applications are not restricted to a single field of application. Essentially, it has demonstrated that small-scale applications make a significant contribution to big-scale applications in a number of ways, including those in the fields of agriculture, wearable technology, smart grid, laboratory monitoring, and e-commerce.

Although technology has advanced significantly, one of the major problems facing the globe today is electricity usage. Information and communication technologies (ICT) alone are estimated to utilize 4.7% of the world's electricity, a figure that may rise to 10% in the future.

India, which accounts for approximately 17A majority of the world's population, about a sixth of it, has limited energy resources and accounts for approximately 0.6%, 0.4%, and 7% of the global reserves of gas, oil, and coal, respectively. There is no doubt that the amount of electricity consumed by ICT usage has been increasing in India over the last five years (for the period 2009-2014) from 24 TWh to 31 TWh. As a result of this, It is a 6.5% increase in electricity use in 2015.

Power conservation is therefore of the utmost importance and is the project's fundamental goal.

This paper suggests a smart, IoT-based home automation solution to reduce energy use. Therefore, the goal of this research is to reduce energy use (thereby lowering electricity costs) while also enhancing home security and safety.

Thus, power conservation is the primary problem, and this project's primary goal. This paper suggests an IoT-based smart, energy-efficient home automation system to reduce power consumption. Therefore, this study's goal is to reduce energy use (thereby lowering electricity costs) while also ensuring the safety and security of household appliances.

2. LITERATURE SURVEY

M. Saravanan et.al [1] proposed the idea of Light fidelity is an emerging technology for high-speed data transfer and managing home appliances. Li-Fi uses visible light communication technology. LEDs are light-emitting diodes. The advancement of Li-Fi is to outperform the rate of speed and security in Wi-Fi. In this, the photo diode converts the flashes into an electrical signal, which is amplified to generate output. The optical carrier for data transmission operates at frequencies ranging from 400 to 800 THZ. The fundamental benefit of Li-Fi is its high density, speed, and precision.

Aswatha. Et al [2] suggested the idea of Li-Fi as a wireless communication system that is bidirectional, high speed, and completely networked, comparable to Wi-Fi. Li-Fi is suited for high-density wireless data coverage in restricted spaces and for reducing radio frequency interference. This study proposes and constructs a new home automation system based on Li-Fi technology. The system can be controlled locally or remotely by the user. The suggested system is divided into two components. For managing many devices, the software is implemented utilising the PIC microcontroller. The hardware that controls the numerous devices based on switching is the next component.

Isbat Ahmed et.al [3] developed the Light Fidelity (Li-Fi is system that uses light-emitting diodes to transmit data in a wireless optical network. Li-Fi is a data transfer system that

uses LED light bulbs, similar to those used in many energy-efficient homes and offices. Li-Fi, on the other hand, is a wireless technology that holds the key to solving the forthcoming issues that 5th Generation (5G) technology will encounter. This technology can carry data at many gigabits per second, is more authenticated, almost interference-free, and significantly more secure than radio technologies such as Wi-Fi or cellular. Because of recent advancements, it has become a solid alternative solution to the looming radio frequency RF spectrum crisis, particularly in certain locations and scenarios. Soon, Li-Fi, which is related to Visible Light connection (VLC), will be the most recent and fastest data connection technology.

R. Puviarasi et.al [4] suggested the development of an innovative and low-cost self-assistive technology used to help disabled persons manage their wheelchairs and home appliances by using advanced voice commands. This proposed system will allow physically challenged people with quadriplegics (who are unable to move their limbs but can speak and hear) and elderly people to control the motion of their wheelchairs and home appliances using their voices, allowing them to live an independent, confident, and enjoyable life. This microcontroller-based and voice-integrated design's performance in diverse situations is tested in terms of accuracy and rapidity. The findings indicate that it might be used as part of assistive technology for impaired people without the intervention of a third party. Aqeel-ur-Rehman et.al [5] suggested the idea of Home automation as one of the major rising businesses that have the potential to revolutionise the way people live. Some of these home automation systems are aimed at people looking for luxurious and sophisticated home automation platforms, while others are aimed at people with specific requirements, such as the elderly and the disabled. A typical wireless home automation system allows users to operate household appliances via a wireless centralised control unit. As a result, a voice-controlled home automation system is designed, so that users can perform certain tasks simply by using their voices. Furthermore, the system is designed to include a hand-held device (remote) so that users can easily speak their commands, rather than having to walk over to the microphone to speak. Having a remote makes the system more user-friendly and portable.

D. Vijendra Babu et.al [6] suggested the idea of Recent technological developments have aided humanity in critical and major ways. Disabled people are a valuable human resource for the country, and a platform for their successful participation should be provided. A prototype is being created to manage home appliances using Eyeball movement for cursor control. The camera records the movement of the eye and detects the pupil centre position of the eye. The numerous changes in pupil position result in different instructions for the virtual keyboard. The obtained signals allow the motor driver to collaborate with the virtual keyboard. Depending on the signal, the prototype moves in various ways.

Dr.A.N. Jayanthi et.al [7] developed with the advancement of automation technology, life has become simpler and easier in every aspect of our lives. Today, automatic systems are preferred over manual systems. Throughout the last decade, there has been a tremendous increase in the number of people who have access to the Internet.It is intended to save electricity and human energy. The home automation system varies from previous systems in that it allows the user to

control it from anywhere in the globe via an internet connection.

3. PROPOSED METHOD
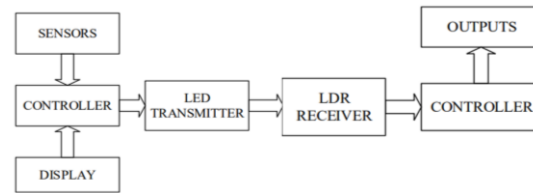
Fig 1: Block Diagram of Assistive Home Technology

[11] In this Figure depicts the prototype application of a Li-Fi home automation system. It is made up of a Li-Fi emitter and a Li-Fi receiver in one. The temperature sensor, light sensor, smoke sensor, and motion sensor provided data to the transmitter's microcontroller. The receiver is made up of a relay circuit, a fan, a bulb, a buzzer, and an LED.

[2] Sensor information will be sent to the machine. The information will be handled by the processor and sent to the LiFi transmitter. (LED). The LED will send a light signal into space, which will be detected by a photo detector (LDR) at the Li-Fi recipient. The controller will process the light indication and send it to a relay circuit, which will turn on the electrical devices associated with the sensors. The Arduino Uno board microcontroller, which has an embedded universal asynchronous receiver-transmitter (UART) as a controller, is used to connect to a Li-Fi LED transmitter to handle the output in the form of flickering LEDs that indicate data '0' and '1'. Li-Fi receiver with an LDR that captures light and sends it to the receiver's microprocessor. In this Pulse Position Modulation (PPM) will be replaced by Pulse Width Modulation (PWM) in microcontrollers to reduce delay and improve data rates. PPM necessitates the synchronization of tools for both sending and receiving. Multi-pathway interference, which can disrupt a transmission by altering the difference in arrival timings of each signal, is also particularly problematic for PPM. The model of a Li-Fi-based home automation system is powered by a 9V power source. The flow of the system's utility sensors is depicted in the next Figure. It will start the input data of sensors using two Arduino microcontrollers. The inputs are an LM35 temperature sensor, an LDR light sensor, a PIR motion sensor, and a MQ-2 gas sensor. The voltage will rise if the LM35 detects an elevated temperature. If the sensor value is greater than the voltage of the ambient temperature, the microcontroller will be activated. The Li-Fi transmitter will receive the output signal from the microcontroller, send the light signal to the LiFi receiver, and turn on the fan. The same is true for the MQ-2 gas monitor; if it detects excessive smoke, the voltage rises, and it sends data to the controller.
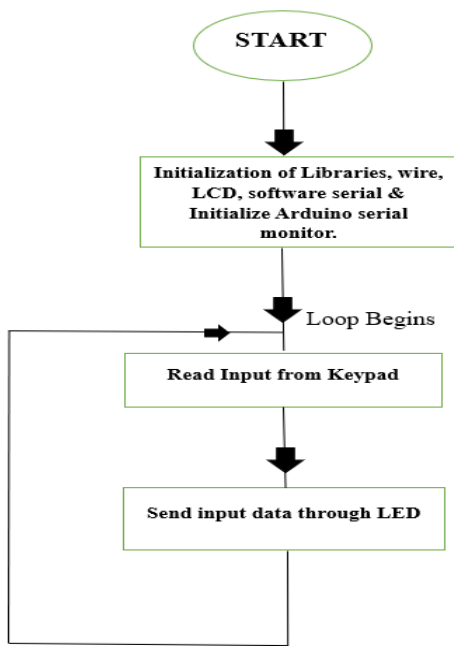
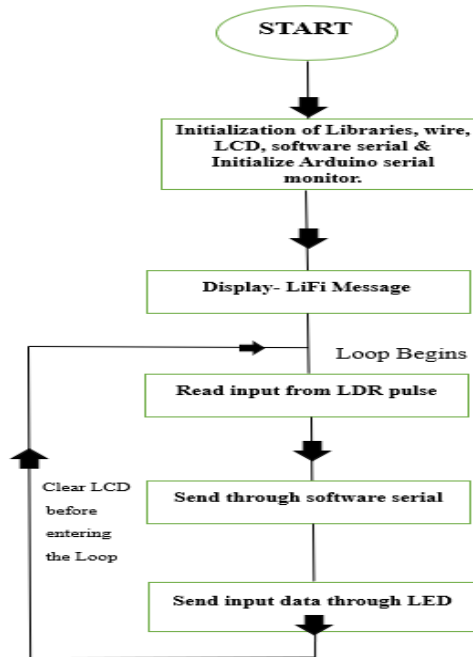# 4. FLOWCHART OF PROPOSED METHODOLOGY

Fig 2: Li-Fi Transmitter Flowchart
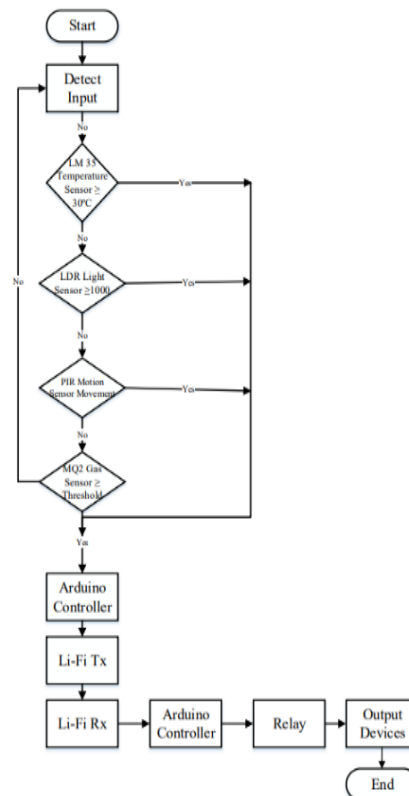

Fig 3: Li-Fi Reciever Flowchart

Fig 4: Signal Flow of Assistive Home Technology

When the LDR light sensor is in a gloomy environment, the voltage drops. As a result, it will send data to the microcontroller and switch on the receiver's light bulb. The PIR motion monitor is temperature dependent. If a change in temperature is noticed, the LED at the receiver will illuminate.

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The LED emitter will send a signal in the form of a flashing LED, which will be detected by the LDR photo detector. The controller will handle the communication. The output will be routed to a relay circuit, which will turn on the electrical equipment associated with the sensors.
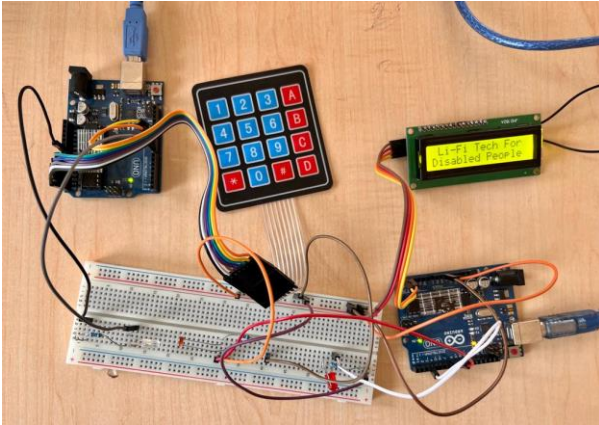
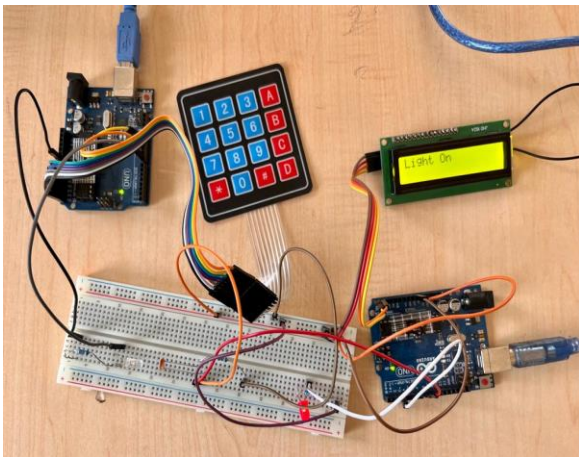## 5. EXPERIMENTAL RESULTS

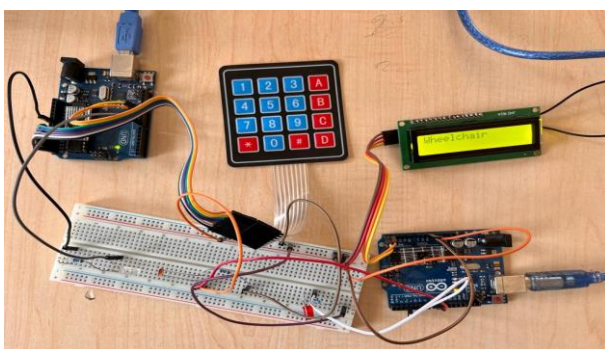**Fig 5: Working Model**

Fig 6: Light Functioning

Fig 7: Functioning of Wheelchair

6. CONCLUSION AND FUTURE SCOPE

The effect of the distance between a Li-Fi emitter and a Li-Fi receiver on the types of LEDs and how they work is shown by the use of a Li-Fi-based home automation system. As a result, the wavelength of the LED colour on the transmitter and the photodetector sensitivity have a significant impact on VLC communication. VLC via Li-Fi is capable of transmitting efficient information despite having a low power source for LED beam generation, which can be transmitted over a longer distance. The user can control their home automatically without wasting electricity by using a Li-Fi-based home automation device. Because the light spectrum cannot be tapped, a Li-Fi-based home automation device can provide greater data security.

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