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# Voice Based Home Automation Using Tamil Language

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***Abstract:***

*Speech Recognition is an inter-disciplinary sub field of computational linguistic that develops methodologies and technologies enables the recognition and translation of spoken language into text by computers. Speech recognition can be implemented by using the concepts of IOT.*

*Internet of things is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people are provided with unique identifiers and ability to transfer data over a network without requiring human-to-human, Main objective of this project is to design low cost voice recognition based home automation system for the physically challenged people to control the various home appliances in real time. This is possible by implementing the input using voice commands from the users. It provides a user-friendly interface for smart home automation system especially for disabled and elderly. Designing an embedded wireless controller system helps in enabling the control of automation.*

*The proposed system consists of a voice recognition module, Arduino Uno microcontroller, relay circuit. The speech recognizer is built for Tamil language. The data sets required for voice recognition are recorded and trained. These voice commands are tested to know the recognition rate of the speech recognizer to build a robust recognizer. Upon successful recognition of voice commands, Arduino drives the relay circuit. Hence, the home appliances are controlled by the regional language with the help of Arduino Uno microcontroller.*

## 1. Introduction

Today world is a global hub due to advancements in technology. Inventions and evolution in technology has made this possible. Home automation has an important role in people's life when it comes to their standard of living as it provides convenient and hassle free environment. We require the intelligence of a microcontroller to control the devices and home appliances. There are various existing technologies available for similar purposes but their cost and complexity is major disadvantage. In this project, we have designed an affordable and simple to use system that takes the input from the voice recognition module and uses the microcontroller's intelligence to operate different devices. The home automation systems are gaining popularity day by day due to their ease of use and wide operations capabilities. Integrating voice recognition technology to home automation systems make the system more users friendly and easy to operate. Some require home automation system to satisfy their needs and comfort while for physically challenged people it can provide great assistance. Voice controlled House Automation System leverages the power of Arduino to provide a holistic voice controlled automation system.

## 2. Literature Review:

Norhafizah bt Aripin , M. B. Othman ,"Voice Control of Home Appliances using Android" , 2014,IEEE transactions of EECCIS.Description: Voice input is captured by the android and will be sent to the Arduino Uno.Bluetooth module in Arduino Uno received the signal and processed the input signal to control the light and fan. Vaishnavi S. Gunge, Pratibha S. Yalagi," Smart Home Automation", International Journal of Computer Applications,2016Description: System uses Arduino board with Bluetooth for home automation.Bluetooth board has I/O ports and relays are used for interfacing with the devices which are to be controlled and monitor.Aurnav Anand,M.V Pruthvi Kumar ,Guru Prasad N.K ,Ritwik Saurav,"Voice Recognition Based Wireless Home Automation System ", 2016, IJRTER.Description:System recognizes voice commands, convert them into required data format.Sends the data through the wireless transmitter. Amrutha , Aravind , Ansu

Mathew , Swathy Sugathan , Rajasree , Priyalakshmi ,"Voice Controlled Smart Home" , 2013,IJETAE Description: Voice controlled wireless smart home system has been presented for elderly and disabled people. Has two main components (a) voice recognition system, and (b) wireless system. Each home load will be having two commands ON and OFF commands.Devyani S. Kulkarni, Ratnadeep R. Deshmukh, Pukhraj P. Shrishrimal, Swapnil D. Waghmare ," HTK Based Speech Recognition Systems for Indian Regional languages " , 2016, IRJET . Description: The paper is taken in the point of view of the Language, Type of utterance, No. of Speakers, Utterances of each word, Recording environment, No. of words / sentences, Feature extraction technique used, Word accuracy.Humaid AlShu'eili, Gourab Sen Gupta, S.C. Mukhopadhyay, "Voice recognition based wireless home automation system",2015. Description: Overall design of a wireless home automation system (WHAS)Verification tests included voice recognition response test, indoor ZigBee communication test.Bhavik Pandya, Mihir Mehta, Nilesh Jain ,"Android Based Home Automation System Using Bluetooth & Voice Command " , 2016,IRJET. Description:Home automation system using a smartphone to enable any naïve user to operate all the appliances Based on a standalone Arduino BT board. Anandhavalli, Noorul S. Mubina ,"Smart Home Automation Control Using Bluetooth And GSM" , 2015. Description: The mobile application is created and interfaced with the device to control home appliances through Bluetooth and GSM.

## 3. Existing System

The Existing system combines the active operation mode were distress calls are captured and a vocal interface is enabled for controlling the home automation subsystem and a pro-active mode, were a novelty detection algorithm detects abnormal acoustic events to alert the user of a possible emergency. In the first operation mode, a voice activity detector captures voice segments of audio signal and a speech recogniser detects commands and distress calls. The main functional unit is named Local Multimedia Control Unit (LMCU), it is based on ARM Cortex-A8 CPU, and it is equipped with a LCD monitor, video camera, microphone array, and loudspeaker. It is connected to the local area network of home to communicate with the gateway of the home automation devices 195 and with a local Private Branch exchange (PBX) that interfaces it with the Public Switched Telephone Network (PSTN).

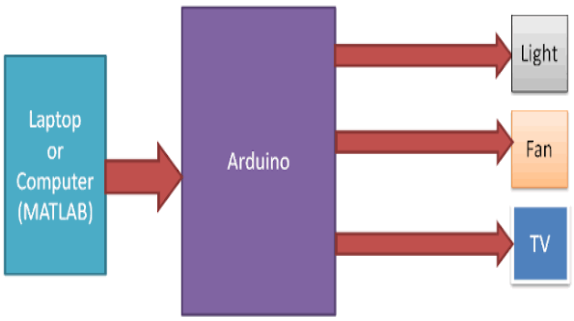
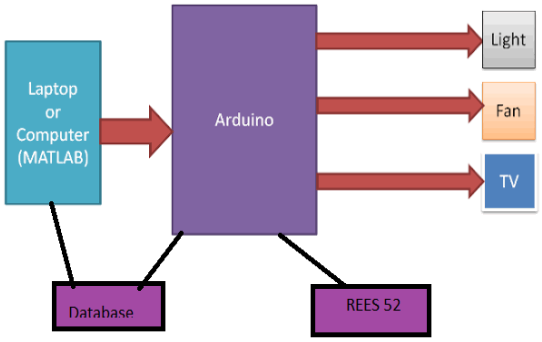



**Figure 1. Existing Voice Recognition System.**

## 4. Proposed System

In the proposed system, voice based home automation is designed using Arduino UNO. It is controlled by means of regional language. In EPROM, analog signals are stored and signals are compared when some inputs are given. The output will be displayed in the loads. When input signal is matched then the power supply between the appliances are triggered. The voice is given through sound sensor (mike) which is transmitted to Arduino UNO. The signal is processed with the matched input signals. The system consists of implementations using android app and sound sensor. The android app is connected to the Arduino and voice commands are processed by means of Bluetooth module. AMR voice recognition app is used for getting input from the user by means of voice commands. Voice commands controls the appliances using Bluetooth.Arduino is connected with sound sensor. Voice commands are given in the regional language i.e. Tamil. It is helps elderly people to control their home appliances in their native language. The voice commands are processed by means of digital signal which is in the form of 0's and 1's. The appliance will glow when the 1's and 0's are matched with the original datasets.The voice is captured using a microphone, sampled, filtered and converted to digital data using an analogue-to- digital converter. The data is then compressed and sent serially as

packets of binary data. At the receiving end binary data are converted to analogue, filtered and passed to the computer through the sound card. Arduino is an open-source platform, consists of both a physical programmable circuit board and a piece of software, or IDE that runs on your computer, used to write and upload computer code to the physical board. Arduino UNO is a microcontroller board 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 provides support to the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.




**. Figure 2. Proposed Voice Recognition System.**

## 5. HTK Based Speech Recognition Systems for Indian Regional languages

Tamil is a syllable based language. For the model, input was categorized into two categories first one was connected word which were segmented into individual Words using short term energy and second the isolated words which were further broken down into characters using Varied-Length Maximum Likelihood (VLML) algorithm. The system is trained with 20 words which is related to agriculture domain and uttered by 2 speakers 2 times. They have used Gaussian Mixture Model (GMM) [2], which is a speaker-independent model suitable for large sets of data, for classifying the characters for later pattern matching against the trained syllables. An algorithm named VLML algorithm is used for identifying the boundary of each character. Accuracy given by the particular system was 70%.Type-style and Fonts Wherever Times is specified, Times Roman, or New Times Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times that you have access to. Please avoid using bitmapped fonts if possible. True-Type 1 fonts are preferred.

## 6. Conclusion

Voice based home automation in regional language was developed. It is implemented using Arduino and sound sensor. The data sets are trained accordingly. The users can operate home appliances like light, fan etc., using voice commands in Tamil. It helps people with disability and elderly people to operate the home appliances in their native language without any physical movement to on /off the appliances. Voice controlled home automation is to assist physically challenged people/old aged people in a comfortable manner. Cost effective and time saving open source voice controlled home automation system will be much useful in day today activities. Various devices like fan, TV, refrigerator, lights etc. are controlled using voice commands. The system can be implemented within an extremely low budget owing to open source hardware and software.

## 7. References

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