

# “EMPOWERING INDIA THROUGH DIGITAL TRANSFORMATION : A SUSTAINABLE APPROACH”

Volume - I

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# **Empowering India through Digital Transformation – A Sustainable Approach**

**Vol. – 1**

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**Empowering India through Digital Transformation**  
**- A Sustainable Approach, Volume - 1**

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**Dr. T. Kiruthika**  
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## PREFACE

Digital transformation has been a key driver of progress and empowerment across the globe in recent years. In India, the rapid adoption of digital technologies has unlocked unprecedented opportunities for economic and social development. From improved access to education and healthcare, to increased financial inclusion and digital governance, the benefits of digitalization have touched the lives of millions of Indians.

However, as India continues its digital journey, it is crucial that this transformation is sustainable and equitable. The edited volume "Empowering India through Digital Transformation: A Sustainable Approach" delves into this critical imperative. Bringing together leading experts and practitioners, the book explores strategies and models to harness the power of digital technologies while ensuring their benefits are distributed fairly and the environmental impact is minimized.

The chapters in this volume cover a wide range of topics, from innovative digital platforms empowering rural communities, to the role of emerging technologies like AI and block-chain in building a sustainable future. Readers will gain valuable insights into best practices, case studies, and policy frameworks that can guide India's path towards becoming a truly digitally empowered nation.

As India celebrates 75 years of independence, this book serves as a timely contribution towards realizing the vision of a self-reliant, technology-driven, and sustainable India. We are confident that the knowledge and ideas presented here will inspire policymakers, industry leaders, civil society, and citizens alike to work together in leveraging the transformative power of digital technologies for the greater good of the country and its people.

We extend our heartfelt gratitude to the Indian Council of Social Science Research (ICSSR) – Southern Regional Centre, Hyderabad, for their partial support in organizing this National Seminar. We also express our sincere thanks to the authors who generously contributed chapters to this book.

*- Editors*

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# Digital Transformation :

## Smart Home Hawk Android Automation System

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### Abstract

*This paper presents a low cost, flexible and standalone home devices control and monitoring system using an embedded Arduino micro-web server, with real IP connectivity for accessing and controlling devices and kitchen appliances remotely using Android structured Smartphone software running on android platform. The offered system does not require a dedicated server PERSONAL COMPUTER with respect to similar systems and offers a novel communication protocol to monitor and control the home environment. Devices such as light switches, heat sensors, humidity sensors, current sensors, smoke/gas sensors and sirens have been included in the system to show the feasibility and effectiveness of the suggested smart home system.*

**Keywords :** Internet of Things (IoT), Smart Home, Home Automation, Arduino.

### I. Introduction

House automation is automation of the home or home activity. Home automation may include control of light, fans, appliances, and other systems, to provide more convenience, comfort, power cutting down and security. The idea of home automation has been evolved through many years and products have recently been on the industry for long, though no person solution has broken before the popular yet. Home automation also helps for the aged and disables folks that have reached home as they need not move from one location to another

place just for switching on or off the appliances, beginning the door, etc. That can also give a distant interface to home kitchen appliances or the automation system, over the internet, to provide control and monitoring via a smart phone or web browser. This paper will describe system which our company is implementing to control various cookware with Arduino Ethernet, web server and google android smartphone.

## **II. Related Literature**

Smart home is not a new term for science society, it is been used from years. As electronic technologies are advancing, the field of home automation is increasing fastly. There are various smart systems have been recommended where the control is via Bluetooth internet and so forth Bluetooth capacities are good and almost all of current laptop/desktops, tablets, notebooks and cell phones have pre-installed adaptor that will not directly reduce the price tag on the program. Yet it limits the control to within the Wireless range of the environment while most some are not so feasible to be implemented as low cost solution. In Wi-Fi based home automation strategy is presented. That uses a PC (with built in Wi-Fi card) based web server that manages the linked home devices. The system facilitates a variety of home automation devices like fans, lights, other appliances for the home. A similar structure is proposed in where the actions are coordinated by the home agent working on a PC. Different papers such as also offered internet handled systems consisting of a web storage space, database and an internet site of websites for adjoining and handling the devices. These systems start using a PC which brings about an immediate increase in cost and power usage. On the other aspect, the development and hosting of the web webpage will also costs high. Lately few researchers also have presented use of World Wide Web services, Simple Object Gain access to Protocol (SOAP) and Representational State Transfer (REST) as an

interoperable application coating to remotely access home automation systems introduced an intelligent home management scheme within the Ethernet network based on XML SOAP standards. The disadvantage of using CLEANSING SOAP based Web a service is that it is hard to manage and provides overhead to the customer and server when parsing the message, leading to halt procedure and higher Band width. REST has been symbolized as a Web-based conversation for controlling household devices using Web techniques such as HTTP (Hyper Text Copy Protocol) caching and force messaging technique. The Web-affiliated graphical user interface has been developed to deal with the home devices. House automation using Cloud work that has also recently been proposed by where users could actually control various lamps and appliances within their home. All above pointed out systems has made incredible contributions in home robotisation system. However, a COMPUTER is employed as a storage space that increases the cost and power consumption while others require web page hosting that can add up the extra cost.

### **III. Proposed System & Architecture**

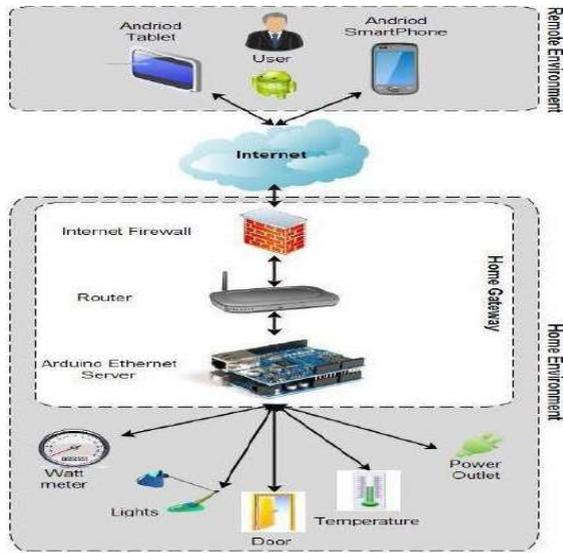
#### ***A. Features of the Proposed System***

In order to address the problems described flexibility and overall functionality of the current system, we have designed and implemented a novel, shower and inexpensive home control and monitoring system using REST world according to the web services wide as a layer of interoperable application. The system contains a micro World Wide Web - server based on Arduino Ethernet interface modules hardware and software Android Smartphone compatible program that runs on Android. The architecture presented can be measured in several ways in order to cater to different application scenarios with minimal recoding and design that says every time a new device to the mini web server, a new thread (task) dedicated

adds the device is automatically created in the smartphone software. Therefore, the objective of the proposed work is never incorporate expensive components such as high-end personal computers, which causes high cost straight. This type of system proposed allows owners of houses officers to control and monitor slightly paired devices in the home using any Wi-Fi or 3G / 4G enabled smartphone that supports Java. The smartphone application provides a visual user interface (GUI) for access and control of devices in the home through real IP server.

### ***B. Description of Proposed Architecture***

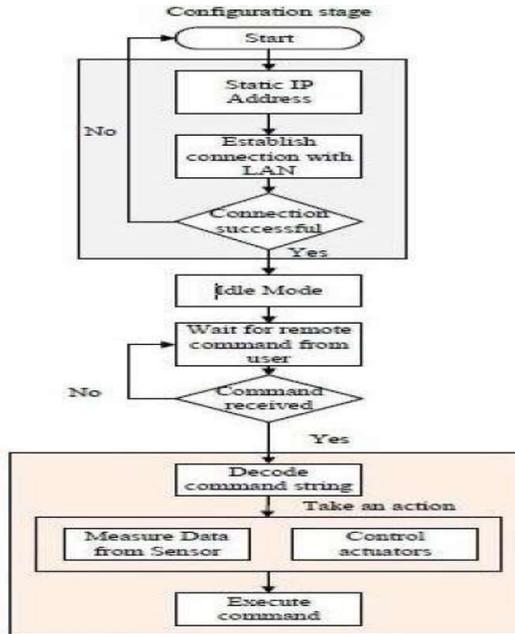
The architecture is divided into three layers: Residence of Environment and Environment Home Gateway Remote (see number 1). Remote environment means that authorized users can access the system on your smartphone software through the Internet via Wi-Fi, data connection linked to the 3G / 4G network. Home Environment involves main router and hardware interface module. The main function of the main router (gateway) for the proposed architecture is provide translation of data between Internet through shipping and procurement needs and responses, respectively. The key component of Housing gateway is a small web server based on Arduino Ethernet, embedded with a microcontroller. The main task of the server is the management, control and monitoring of parts of the system that allows the modules to interface hardware to run their assigned by actuators work and storage space reports events triggered by sensors such as cigarette smoke detection sensors, and so on hardware interface issues are directly related to sensors and actuators through cables. It has the ability to regulate power management systems, such as lamps, electrical outlets and security systems such as door locks home, and the door. Pertaining to monitoring, control Home Environment system is compatible with devices such as temperature, smoking, humidity and current.



**Fig 1. A Overview of Conceptual architecture**

In order to successfully connect and access the smart home micro web server, the end user has to enter the real IP address and the correct password. In the event that the web server grants the Android permission to access the intelligent software home working on the Android platform, you will be received reply packet containing the response code 200. The application processes the response packet to find the answer micro web server. Response packet containing the response code 200 indicates that the password is appropriate, and the application will move to the page control key and synchronize using information response packet sent from the web server to reflect the real-time status home automation devices. If the password is incorrect, no response packet containing the response code 404. The standard layout of the response packet will be received. The response code and have their states are separated by a space while the device and its status is secreted by a colon (:). For example when the user wants from the software to activate the fan 1 is successful, the response packet is "200 Fan: 1" where fan is connected to the Ethernet network device, web server kit. zero indicates out of state while a 1 indicates the status.

### C. Software Development for Gateway



**Fig 2. Home Gateway flow chart for the connection establishment with the Internet**

Internet server software is constructed of two parts: the application software and firmware of the machine microcontroller. To speak to hit the home automation program and the main entrance configuration phase and layers of control stage Fuller been implemented in the Arduino Uno. The <> Ethernet's libraries are being used to receive data on Arduino messages and make final results in Target JavaScript notation format (JSON). Form 2 shows the flowchart of establishing the connection between the Arduino and the Internet kit (not smartphone application). Your input is linked to home network over the TCP / IP protocol. As Arduino Ethernet shield is already compatible with a collection of TCP / IP, the design focused on software application to connect to the remote user. In the preliminary stage, the gateway property once started goes into the construction...phase...During the next phase, the phase of the Ethernet

network configuration, the module establishes the connection to the local area network (LAN) using a static IP address. In order to optimize the connection process, this design uses static address Internet protocol instead of acquiring a dynamic IP through Sponsor Configuration Protocol (DHCP). When the Home Gateway has recently been initialized, it enters an idle state until any command is received from the remote application. Once the successful reception of commands as given strings iPhone smart phone application that appropriate control measures are taken.

## Conclusion

This type of project is a continuum. Each of our main goal is to help older people with disabilities / old. This document gives basic idea of controlling multiple appliances and provides security through Google Android phone or tablet. This type of work is based on Android and Arduino program both happen to be FOSS (Free Open Source Software). And what the overall cost of implementation is very cheap and is accessible by an ordinary person. Due to the big hug android phone you are on, here we are using Android applications. The design consists of an Android phone with home automation application, Arduino Mega ADK embedded with a microcontroller. The user can connect to Android mobile phone and send control indication to the Arduino ADK which in turn control other devices / embedded sensors.

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