

Smart Automation System for Controlling Various Appliances using a Mobile Device

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Abstract—This paper outlines the methodology of designing and developing a smart control system for controlling light, air conditioning and ceiling fans in a room. This system considers the requirements of the users appropriately and makes a comfort zone for the users. An android application with a user friendly Graphical Interface, which is easy to communicate with the smart control system, has been developed. The application is connected with the control system through Wi-Fi across a cloud network and it can respond quickly. RGB LED panel light system that controls the color, color temperature and luminance was designed by considering the requirements of the instances and lighting conditions. Although there are RGB LED panel lights available, there are no systems defined for the activity based color modes. An IR Remote module controller system was built for controlling inverter type air conditioners by giving commands from a smart phone application. This system considers the mean value of the preferences of many users to control the air conditioning system. The running mode of the air conditioner is chosen from the data given through the application by many users in a same place. Although the inverter type air conditioners continuously regulate the temperatures, the fan does not do it. Because of this problem, a ceiling fan controlling system with two modes, automatic and manual, was designed. Automatic mode utilizes the users skin moisture related hybrid system to set the room temperature. Manual mode works according to the suggestions given by the crowd just as the air conditioning system. This air conditioning and ceiling fan control system that works according to the suggestions of crowd is better than the individual preference system using a conventional remote controller.

Keywords— *smart homes, smart city, smart farming, IoT, cloud networking, wireless communication, air conditioning control system, ceiling fan control system, RGB LED panel light, arduino microcontroller, pulse width modulation, mobile application, color psychology*

I. INTRODUCTION

Smart automation systems allow users to control electric appliances of various kinds smartly and automatically from anywhere in the world. When using an automation system with wired communication, cabling is required which will have to be installed during the construction of the building or after [1]. The implementation cost for these two occasions are very high. Therefore people are moving towards wireless automation systems, which are powered by the wireless technologies such as ZigBee, Wi-Fi, Worldwide Interoperability for Microwave Access (WiMAX), Near Field Communication (NFC), and

cloud networks. The advantages of using the wireless technologies are system scalability and easy extension, smart building interior design, integration of mobile devices.

Smart automation system is not a new terminology in the field of science and technology even though it is still far away from people's vision. It has highly advanced automatic systems for controlling light, temperature, security, appliances and other functions by using smart devices. Internet of Things (IoTs) is linked together with smart automation systems. IoT is a computing concept that the physical objects communicate between things and people, and between things themselves, and across the internet. Methods like Radio-Frequency Identification (RFID), sensor technology, and wireless technology or Quick Response (QR) codes are used in communicating with each other. In the last couple of years, IoT has become significantly important and it has added a new dimension to the communication technologies in the world [2]. IoT technology helps in creating wide development space for smart homes with intelligence, human comfort zone and improvement of quality of life. In addition to controlling of devices IoT can also continuously monitor the home environment and the amount of energy consumption. As this system can be designed to control automatically in an optimum way, the power consumption reduces and it will contribute to the cost reduction and energy saving which are more important in today's world.

When automating a home by using Wireless Automation System with IoT, it is called a smart home. Nowadays the world tends to move towards the concept of smart city without satisfying with smart homes. The concept of the smart city is to build eco and socio friendly city, which provides high standards of living for citizens and broadens their participation in the development of a smart and resilient city. Smart City Projects focus on the vital role of infrastructure facilities in the city. The smart systems such as Smart health facilities, smart road systems, smart cinema and lecture theaters, smart classrooms, and smart farms are designed under smart city concept. The smart city concept has achieved worldwide success in both developed and developing nations. The solutions for the challenges in the fields of economic, social and environment are given from combining innovation in digital technology, engineering and social sciences for the success of this concept [3].

When doing this study, the attention was given not only to the smart home but also for the smart city concept. This study