Configurable ZigBee-based Control System for People with Multiple Disabilities in Smart Homes

Abstract:

Nowadays, home appliances manufacturers are increasingly relying on wireless sensor network and single chip embedded technologies to build smart environment. Many existing systems are already in the market; however, they were designed without envisioning the need of residents with special needs. This work presents a framework that enables the integration and control of devices within a smart home environment for residents with disabilities. The framework supports the integration of multiple control devices for different residents with different disabilities. Moreover, the work addresses the safety of the users by providing warnings and notifications in case of an emergency.

Existing system:

Most of the existing smart home monitoring and control systems do not accommodate special needy users to manage their home appliances.

Disadvantage:
It is still a limited resource unable to provide an independent control system for people with disabilities.

**Block Diagram:**

- **SENSORS**
- **POWER SUPPLY**
- **MICRO CONTROLLER**
- **ZIGBEE MODULE**
**Proposed system:**

The proposed system consists of four functional wireless sensor nodes: light, fire alarm, door and doorbell, refrigerator and the master controller. The master controller communicates to the nodes wirelessly using ZigBee. ZigBee is enabled through the XBee boards connected to the master controller and the wireless nodes. The appliances and devices within the house register with the master controller. Events and activities are coordinated by the master controller. Once the appliance is turned on, it registers its address, capabilities, and the events that can be consumed with the master node through the registration module. The control
device consists of a Mega microcontroller connected to several I/O. Inputs include keypad and switches. Outputs are LEDs, LCD display and buzzer. The control device is also connected to XBee chip which connects to the master controller.

**Advantages:**

- The proposed system saves the time to recognize the status of the devices.
- The system provides home residents with disabilities to take advantage of the advancement in technology.
- The system is programmed so that it can be configured to adjust to the customer’s disability providing them with better and convenient lifestyle.

**Conclusion:**

A wireless sensor network based system for smart home automation was designed, built and tested to address such missing functionality. The implemented system’s major contribution is that it is customized to provide the special need residents with tools and services to monitor and operate home appliances remotely. The implemented system provides home residents with disabilities to take advantage of the advancement in technology. It enables them to perform their daily activities by remotely monitoring and controlling their home appliances without having to depend on others. The system is programmed so that it can be configured to adjust to the customer’s disability providing them with better and convenient lifestyle.

**Reference:**


