Design and Implementation of Intelligent Controller for Domestic Applications

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Abstract - The automatic function of an electric fan will be designed, built, developed, controlled, and evaluated in this project. The fan is essential for air circulation. In order to meet the demands of modern technology, the Automatic Fan with Human Detector System by Using PIR Sensor developed in this project has to be made with a fresh design. This project uses a PIR sensor-based people detection system with a 13-foot maximum detection range. A sensor, controller, motor, and Arduino UNO serve as the primary controller for this autonomous fan with human detection system. This project also outlines the automatic fan's anticipated performance with a human detector mechanism.

I. INTRODUCTION

Most homes in Southeast Asia have at least one ceiling fan, which is designed to maintain a comfortable temperature in the room. This project aims to take advantage of electrical energy lost during ceiling fan operation in the fan motor. It will provide two functions: control the turned on/off the fan with respect to the human detection and control the speed of a fan with respect of temperature set. Arduino Uno will detect the human with the PIR sensor and senses the temperature with the temperature sensor. When the current temperature is greater than or equal to the set temperature the fan turned on otherwise it will stay off. The limitations and scope of future enhancement of the project are discussed. The post-PC era has seen the shift from PCs to multi-touch mobile devices, with the use and implementation of Cloud Networking. This paper develops a Home Automation system that integrates mobile devices, cloud networking, wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home. The system is designed to be low cost and expandable, allowing a variety of devices to be controlled.

Home automation is a system implemented at a residential place to make the place intelligent so that energy is conserved and security is maintained. Initially, systems had to be deployed on the Internet and heavy machineries, but our system will be free from all these components. Most systems exchange data or communicate with the help of Bluetooth, ZigBee and GSM, but these systems have their own disadvantages. Java Based Systems and SMS based systems still use web pages, but Wi-Fi protocol has some upper hand benefits, such as its range of 150-200m and password protected application.

The Internet-of-Things (IoT) is a future in which digital and physical things or objects can be connected by means of suitable information and communication technologies. Its characteristics, such as an ultra-large-scale network of things, device and network level heterogeneity, and large numbers of events generated spontaneously by these things, make development of diverse applications and services a challenging task. Middleware can ease this process by integrating heterogeneous computing and communications devices and supporting interoperability. Recently, there have been proposals for IoT middleware, but they do not consider Radio-Frequency Identification (RFID), Machine-to-Machine (M2M) communications, and Supervisory Control and Data Acquisition (SCADA). This article outlines a set of requirements and reviews existing middleware solutions against those requirements, as well as open research issues, challenges, and future research directions.

II. PROPOSED WORK

The Automatic Fan with Human Detector System by Using PIR Sensor is a system used to detect human motion by using PIR sensor. The motor driver IC L239D was chosen to control the speed of the motor based on temperature sensor and 5V single relay to switching ON the power supply. The main part of this project is Arduino UNO R3, a microcontroller board that consists of 20 digital inputs/outputs pins that connect to the automatic mini fan. The power supplies used are AC power supply and AC voltage. The amount of current used for this project depends on the amount of voltage because it has the differences between battery voltage and charger adapter voltage from main power supply.
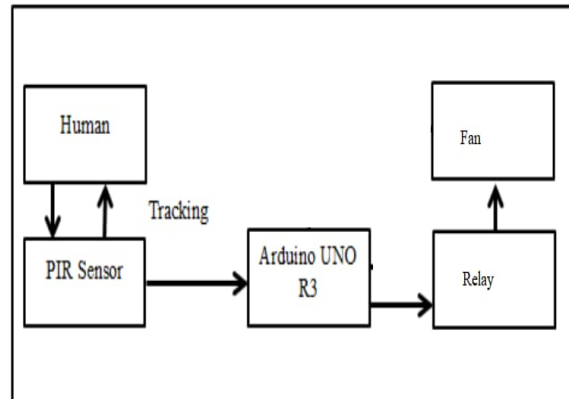

Fig 1. Block Diagram for Proposed System

The human detection systems by using PIR sensor are implemented in this project and the detection range is up to 13 feet. At first the PIR sensor can detect the human and if it detected then the fan can be switched on.

The PIR Module

The PIR module has three terminals, the right one is the ground terminal, center one is the positive +3.3V or +5V, and the left terminal is the responsive output lead of the device.

When the particular assigned (+) and (-) terminals of the PIR device are connected to the specified supply voltages, the device instantly becomes responsive and begins "thinking". No human presence or motion should be created in front of the unit's lens during this initial switch ON period for about a minute or so, until the device locks ON and puts itself into an alert or a ready stand by position. The unit now becomes ready and responds to even the slightest human motion or presence in front of its lens by generating a positive supply at its output terminal, this high at its output terminal persists as long as a human presence is detected within a radial range of around 20 meters in front of the PIR device.

Sensing Human Presence

The output turns into a zero voltage as soon as the human presence moves away or is removed.

SPECIFICATION

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins:14(of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40mA
- DC Current for 3.3V Pin: 50mA

- Flash Memory: 32KB (ATmega328) of which 0.5 KB used by boot loader
- SRAM: 2KB(ATmega328)
- EEPROM: 1KB(ATmega328)

Clock Speed: 16MHz

III. HARDWARE DESCRIPTION

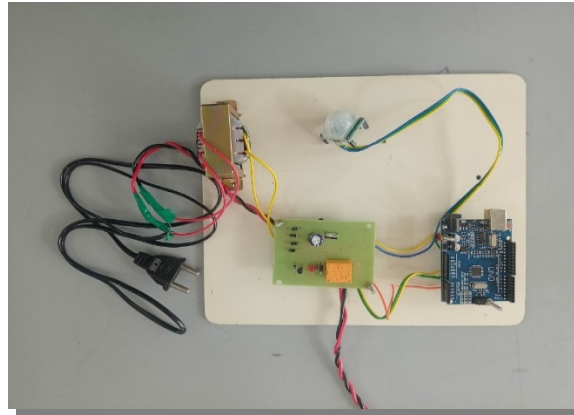Fig 2. Hardware of the proposed model

IV. CONCLUSION

This paper presents the development of automatic fan. The proposes of this project was to fabricate an automatic fan with human detector by using the PIR sensor. It was the new design for the fan. It was the portable fan that can carry everywhere. The design is based on the available on the market today with some improvement. The project is focused to develop thefan with efficient and convenient model. The same model can also be applied for system having two types of power supply also, so that it can continue to work more efficiently.The dual power system is applied by using two different power sources. The fan can automatically function when the sensor detects the presence of a human in the living room. The maximum range of detection is 13 feet. It is very useful for human and has a potential to be commercialized.

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