INDUSTRIAL AUTOMATION WITH BIDIRECTIONAL VISITOR COUNTER

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Abstract: This paper displays the plan of Industrial Automation utilizing Arduino. This circuit will do the task of tallying the number of persons or workers in an industry bi-directionally. This count will be very accurate and it will beep a warning alarm if the number of people exceeds the limit. The aggregate number of people will appear on the LCD. In the circuit an Arduino UNO Board is utilized. This will help in the accurate measurement of the visitors and is less complex compared to a microcontroller. The arduino will get signals from the sensors and those signals work under the control of a programming code which is put away in the ROM of the arduino. The Infrared Receivers will continuously monitor any entity which passes both outside the building and inside the building. According to the number of guest inside the industry, electronic appliances like lights, fans and coolers will be triggered on and off. This automation will save lots of electricity. There will also be a temperature and humidity sensor which will detect the temperature of an industry. If the temperature exceeds for any reason the circuit will beep, a warning alarm.

Keywords: Arduino, Digital bidirectional visitor counter, IR Rays, LCD, DHT11, Alarm, electronic appliances.

1. INTRODUCTION

Industries require a huge number of work force and maintenance. Here in this given paper we have taken steps to ease the industry work by reducing the consumption of electricity and providing safety features which will not lead to dangerous situations. This will ease the work of electricity maintenance. Over many years guest, counters are used in many areas. Here microcontroller is replaced with an arduino board for better results and less complexity. The sensors used in this circuit are very efficient in terms of execution in comparison to the manual tally counter. This circuit can be used in many places like classroom halls, an auditorium, libraries, community halls, etc. It is a necessity to monitor the visitors for better human traffic management. The initial method for counting the visitors
involves hiring people to stand and manually calculate the number of guests or workers who enters or exits by a specific location.

The human counting was unreliable and came at a great cost. It may be confusing for a person to tally the quantity of individual entering and leaving at a same time. Our intension is to design and develop this system to manage human traffic in a large industry and also conserve the usage of electricity. Our main aim in this paper adds constructing a visitor counter which will make a controller circuit model to count and calculate the number of guest in a building or room at a particular time and all the electrical appliances will be turned on and off accordingly. It is also our aim that this controller base circuit model beeps a warning alarm for safety purposes when the capacity of the building and the temperature exceeds.

2. METHODOLOGY

This section involves the methodology of DBVC from the system overview of each and every component used to congregate the guest counter to allow effective crowd management as in monitoring and controlling. The Arduino based guest counter is created to react to the defects in the executions of already-occurred counters. The design in its sense has four (4) main sections and circuits as displayed in Figure1. These include detection section (IR sensor circuitry), Arduino section, alerting sections (LCD and Buzzer) and power supply circuit.

3. EXISTING SYSTEM:

Many already made systems for temperature measuring and analyzing, generally uses an microcontroller ATMEL 89C512. When the calculated signals are converted to digital form are called the examining(sampling) instants; the time in between continuous samplings is called the examining(sampling) period. The output recieved from the process is a continuous time signal. The output is then changed into digital form by the A-D converter. The alteration is done during the examining times.

DISADVANTAGES OF EXISTING SYSTEM:

a) Theoretical concepts may require few changes in practical implementation.
b) Circuits with low range cannot be used to work at large areas.
c) While continuous changes in the count value may look confusing.
d) Uses micro-Controller ATMEL 89C51.
e) Circuit gets bigger in size
f) Programming for microcontroller 8051 is difficult.
g) Circuit gets complex, difficult and confusing.

4. PROPOSED SYSTEM

In this model we are using DHT11 sensor into a correct voltage. This voltage is applied to arduino and according to program it processes the analog signal into digital signal and forms a particular voltage for a particular temperature. We used an arduino (microcontroller) to implement this system. IR sensors will count the numbers of guests and automatically run the lights and fans accordingly. An LCD display will show the results as output.

ADVANTAGES

a) This model can be implemented as an automated switch to increase energy efficiency.
b) The model can be applied at the entrance of a room to operate the lights and other appliances.
c) When the count of people is zero in a room, the circuit will automatically put off the power supply and thus conserving the use of electricity.
d) It will greatly help the physically challenged people.
e) It is easily operated and not complex like micro-controller.
4.1. APPLICATIONS

a) This model can be implemented in party or community halls where the number of people attending a party can be calculated easily.
b) It can be applied at offices.
c) It can be used at homes and classrooms to calculate the number of guests getting inside.
d) It can also be used for electricity conservation by automatically switching off the lights and fans when not in use.

4.2. COMPONENTS USED:

Here in this model we have used the following components

1. Arduino UNO as the control unit: The Arduino Uno is an open source platform of electronics. The microcontroller board runs on the ATmega328. It consists of 14 digital input/output pins, 6 analog inputs, 16 MHz ceramic resonator, a USB port, a power port, an ICSP header, a reset button. It consists of necessary items needed to run the microcontroller; just we have to connect the arduino to a computer with a USB cable or power it with an AC-to-DC adapter or a battery to initiate.

2. Infrared sensor module: An infrared sensor emits infra rays in order to detect any object of its surroundings. An IR sensor can both detect the heat and motion of an object. The rays are not being seen by our eyes and can be identified by an IR. The emitter is a LED (Light Emitting Diode) and the detector is a photodiode.

3. Liquid Crystal Display: Liquid Crystal Display screen is a digital display module. It is found in a colossal range of applications. It is 16*2 LCD display basic module. LCDs are easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. An 16*2 LCD can display 16 characters per line and there are two lines.

4. Digital Humidity and Temperature Sensor (DHT11): The DHT11 sensor is an ultralow-cost temperature and humidity sensor. It uses a capacitance dampness sensor and a thermostat to calculate nearby surrounding, and throws out an output signal on the data pin. It can be used very easily, but needs correct timing to achieve data.

5. Relay Switch: A relay is an electrically operated switch. Many relays are used to control various electrical appliances safely. Relays are used in a circuit controls by a separate less power signal and also many circuits can be controlled by only one signal.

6. Buzzer: A buzzer or alarm is an audio device, which may be of the following types, mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers include alarm devices and safety. It will notify the user if there is some kind of overload.

7. Electronic Devices: Electronic devices like bulb and fan are used to test the system. Many other electronic devices can be used in this module in the future.

4.3 HARDWARE PLATFORM

In this model our main intension is to propose a model that consists a guest counter which will automatically switch on the electrical devices and also, the temperature and dampness will be measured inside an industry. The Proposed system’s architecture diagram is given in Figure. An IR beam is used as the source of a light beam. Bidirectional Guest Counter, which helps in the automatic electrical devices controller and Arduino as the main control unit has two sections. DHT11 sensor is used for detecting room temperature and a buzzer will notify if there is highly increase of both people and temperature.
A. **Monitoring Arduino Reading:**
Arduino helps clients to screen different sorts of sensors, for example, IR sensor and motion sensors. The GPIO pins inbuilt on Arduino board can help as universal use I/P and O/P pins (GPIO). The ATmega328 micro-controller on the Arduino board carries out the analog-to-digital conversion, which changes the I/P signal from 0 to 1023.

B. **Controller:**
The activating is last done by the Arduino door. The Arduino makes a move continuously to operate the on/off of the LED and controlling the buzzer. In this model it has two parts, one the transmitter section where the light output is given. The other is the receiver end where light is taken as input and applied on entry sensor circuit and exit sensor circuit.

C. **System Protection**
Often random power supply may lead to damaging the components of the circuit. When the arduino cable is fed with the I/P power source then it sends the output of components. It provides a regular and static power supply and also protects from any type of power surges.

D. **Infrared Sensing System**
The IR module holds IR diodes and LEDs. Potentiometer is utilized for setting similar voltage at comparator's one terminal and IR sensor detects any individual and give an adjustment in voltage at comparator's second terminal. At that point comparator looks at other two voltages and a digital signal at output one is send for entry sensor and second for an exit sensor circuit.

E. **Counter Display**
In this segment we have utilized LCD to show the number of guests in the room. The framework is outlined utilizing the Arduino(IKE) stage. At the point when Arduino check for zero condition (Zero condition implies nobody in the room) and discovers it is genuine then the Arduino kills the globule by deactivating the transfer through a transistor. Here there are two capacities for in and out. This addition or decrement is executed in LCD.

### 4.4 BLOCK DIAGRAM

![Block Diagram](image-url)
4.5 FLOWCHART OF WORKING MODEL

In the beginning the sensor 1 is interfered first then the arduino will search for the sensor 2. Furthermore, on the off chance that is intruded on the arduino will add the count. When the first individual goes inside the room then the counter goes to 1 and that time the FAN/LIGHT will turn on. Again the sensor 2 is interfered with first then the arduino will search for the sensor 1. And if it is interrupted then the count will be decreased.

When all people in the room leaves then counter goes to 0 and then the FAN/LIGHT will turn off. If there are excess numbers of persons the buzzer will start beeping and will stop buzzing once the excess members leaves the room. Also if the temperature of the room exceeds than certain limit the buzzer will start beeping and this will add as a safety feature. The figure is shown in fig3.
4.6 GRAPH OF DATA STORED:

We put away the information of the mugginess and temperature. The information is constantly received over excel sheet. The information is then appeared as a graph. This data can be utilized as checking and recording for security reason. In the future this data can be additionally applied for data analytics.

Fig4: Data stored over excel sheet and graph

5. EXPERIMENTAL EVALUATION

So as to actualize and exhibit the framework grew hypothetically, we made a model that speaks to the framework. Thus the whole system that is being developed is given below in the fig4.
Fig5: Complete Circuit

For future work, some suggestions like, expansion of cameras through with considering the picture can be put away accurately. Remote availability will be implemented to the framework, by controlling the Wi-Fi modules. The entire framework can be manufactured as commercial business equipment bundle.

6. DISCUSSIONS AND CONCLUSIONS

A novel engineering for a financial bidirectional Visitor Counter, automated electrical devices controller along with humidity and temperature detector with security alarm is proposed and executed in this paper. It gives an essential thought of how to run the bidirectional guest counter and room light controller utilizing Arduino circuit and Arduino IDE). The cost of this innovation is exceptionally prudent.

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