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HOME AUTOMATION SYSTEM USING MOBILE PHONES

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ABSTRACT:

The main objective of this project is to make the user's sophistication with a update i:e user can control their home with their mobile phone itself. We can control our air conditioner, motor and also we will get alert message from your home for gas leakage, fire, and thief. This all operations can be done with your mobile phone from where ever you are. If you want to know the current status of your AC, motor, water level and all safety sensors (gas, fire, IR). The all components which I have used will interface with a microcontroller and also a GSM. So, the user and controller will be interface via GSM. Hence, the user can alert while controller giving a danger message and user can operate his/her AC and motor from where ever they want. This all functions will done by that microcontroller with the help of my coding that I have fused in it.

INTRODUCTION:

Now we are in 21st century, we know that our world is getting update each and every day in the sense of developing in technology of all areas. As in such situation my contribution for this society in this "HOME AUTOMATION SYSTEM".

Firstly, what is meant by automation?--**Automation** or **automatic control**, is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications with minimal or reduced human intervention. Some processes have been completely automated.

The biggest benefit of automation is that it saves labor, however, it is also used to save energy and materials and to improve quality, accuracy and precision.

According to the meaning of the term automation, this paper synchronize that automation with our homes. Let's see about it in detail.

BASIC BLOCKS IN THIS PROJECT:

- MICROCONTROLLER (PIC16F887/PIC16F887A)

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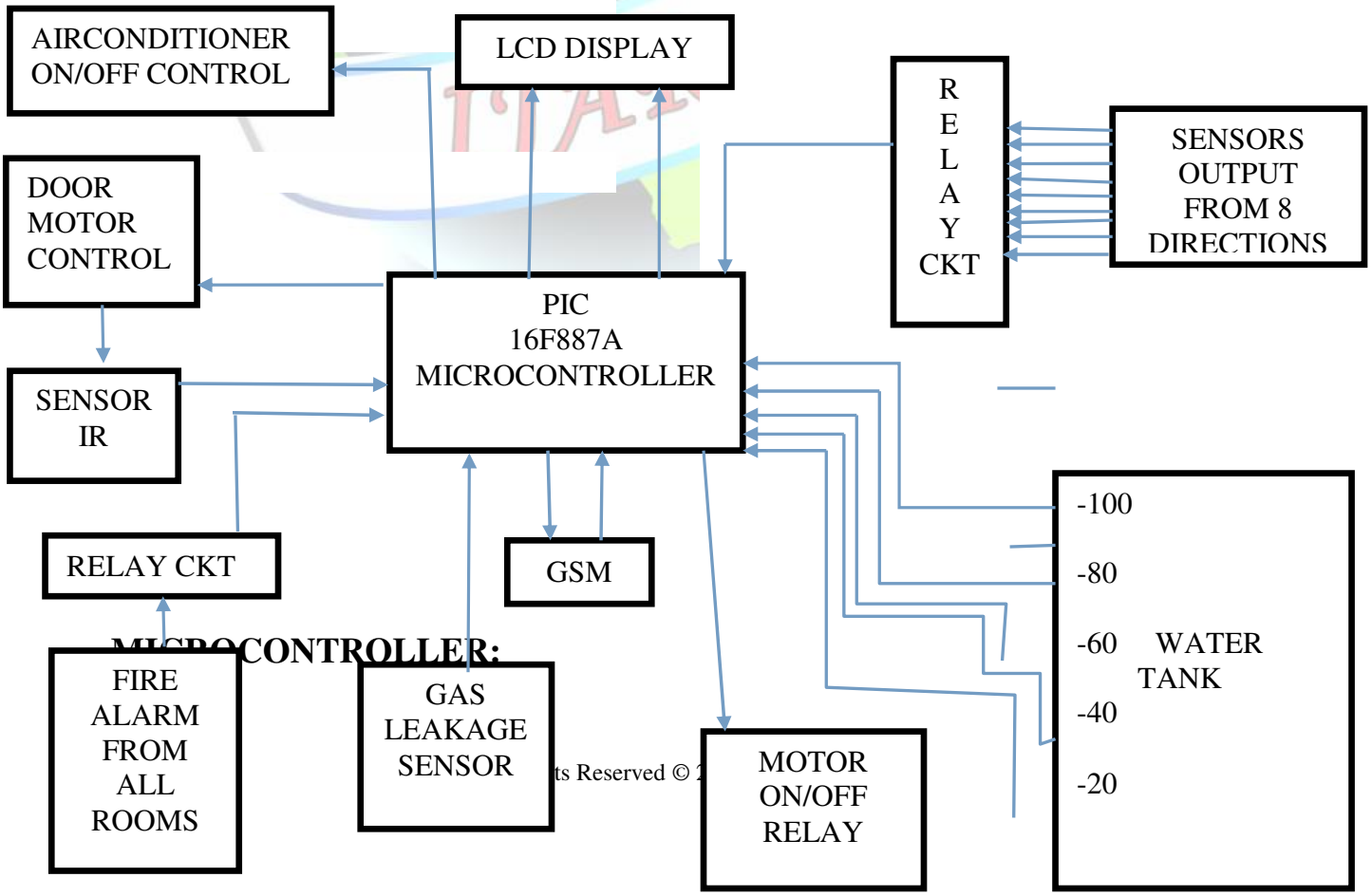
- 8-IR SENSORS FROM 8 DIRECTIONS.
- RELAY CIRCUIT (2).
- LCD DISPLAY.
- GSM.
- MOTOR ON/OFF RELAY.
- WATER TANK (JUST FOR DEMO).
- GAS LEAKAGE SENSOR.
- FIRE ALARM FROM ALL ROOMS.
- DOOR MOTOR CONTROL.
- IR SENSOR FOR DOOR.
- AC-ON/OFF CONTROL.
- POWER SUPPLIES

BLOCK DIAGRAM:



MICROCONTROLLER:

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. Reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to

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digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems. So in this project we are using PIC16F887/PIC16F887A, It is the most famous IC now a days, and my code is according to this PIC16F887A IC.

Features of PIC16F887/PIC16F887A:

- RISC architecture
  - Only 35 instructions to learn
  - All single-cycle instructions except branches
- Operating frequency 0-20 MHz
- Precision internal oscillator
  - Factory calibrated
  - Software selectable frequency range of 8MHz to 31KHz
- Power supply voltage 2.0-5.5V
  - Consumption: 220uA (2.0V, 4MHz), 11uA (2.0 V, 32 KHz) 50nA (stand-by mode)
- Power-Saving Sleep Mode
- Brown-out Reset (BOR) with software control option
- 35 input/output pins
  - High current source/sink for direct LED drive
  - software and individually programmable pull-up resistor
  - Interrupt-on-Change pin
- 8K ROM memory in FLASH technology
  - Chip can be reprogrammed up to 100.000 times
- In-Circuit Serial Programming Option
  - Chip can be programmed even embedded in the target device
- 256 bytes EEPROM memory
  - Data can be written more than 1.000.000 times
- 368 bytes RAM memory
- A/D converter:
  - 14-channels
  - 10-bit resolution
- 3 independent timers/counters
- Watch-dog timer
- Analogue comparator module with
  - Two analogue comparators
  - Fixed voltage reference (0.6V)
  - Programmable on-chip voltage reference
- PWM output steering control
- Enhanced USART module
  - Supports RS-485, RS-232 and LIN2.0
  - Auto-Baud Detect
- Master Synchronous Serial Port (MSSP)
  - supports SPI and I2C mode

GSM:

GSM is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones, first deployed in Finland in July 1991. As of 2014 it has become the default global standard for mobile

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communications - with over 90% market share, operating in over 219 countries and territories.

2G networks developed as a replacement for first generation (1G) analog cellular networks, and the GSM standard originally described a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).

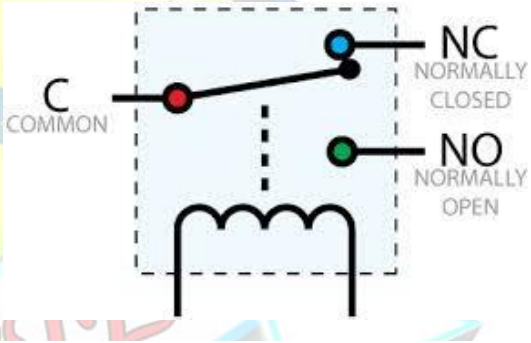
Subsequently, the 3GPP developed third-generation (3G) UMTS standards followed by fourth-generation (4G) LTE Advanced standards, which do not form part of the ETSI GSM standard.

"GSM" is a trademark owned by the GSM Association. It may also refer to the (initially) most common voice codec used, Full Rate.

In our project, this GSM act as intermediate between the controller and the user. Communicating via text messages from and to controller and user.

RELAY:

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts.



(8+1)-IR SENSORS and ITS RELAY CIRCUIT:

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity,

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which we already know can be detected using a threshold.

In our project we have going to use 9 IR sensors one for door purpose we will see it later. Now we going to see how we will interface the rest IR. Now we will connect the 8-IR'S output to the input of 8 relays in a circuit which has been connected as such if any one IR gives output then relay circuit gives signal to the microcontroller.

And one thing we have to place the 8-IR'S according to our need i:e user's requirement.

MOTOR ON/OFF RELAY AND CONDITION OF WATER IN TANK:

It is used to on/off the motor according to our requirement i:e if user wants to fill the tank with water either (20%, 40%, 60%,80% ,100%) just he/she can text to the microcontroller what % he/she requires, then automatically the controller on/off the motor using relay according to the water level in the tank

And the condition of water in the tank will be always monitored by controller also the controller will intimate the user via text whether the motor cant able to suck the water.

As a result the motor control becomes full automation with the user's mobile phone.

LCD DISPLAY:

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.

An LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed. Polymeric layers are present

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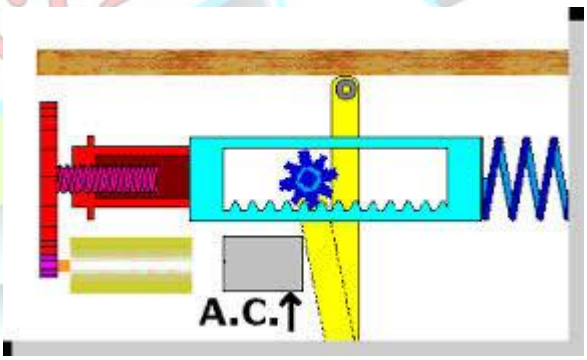
in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. One each polarizer's are pasted outside the two glass panels. This polarizer's would rotate the light rays passing through them to a definite angle, in a particular direction. When the LCD is in the off state, light rays are rotated by the two polarizer's and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. ETC……,.

Just if we have to say the role of LCD in our project is just displaying the working of microcontroller i:e current progress of microcontroller.

AIRCONDITIONER ON/OFF CONTROL, DOOR MOTOR AND ITS IR SENSOR:

As same as we control the motor is same as for AC but it has one difference apart from it that is, the door to be closed while if the AC to be ON. So it has to check whether the door of the room is closed or not. For that we are using that 9th IR sensor to check the door is closed or not? And also the controller will closes the door if it opens using door control motor, after it closes that is when sensor giving the information to the controller that the door was closed then controller will switch on the AC. If there may be a chance of getting external disturbance while door motor closing the door, for that also I have coded that if the door motor gets on, if up to a 5 min sensor didn't gives output means suddenly it stops all the operation and sends the message for the user as that your door was unable to close so u can't able to switch on the AC.

Hence this was the major advantage in this, now after this concern AC also becomes automation.



FIRE ALARM AND ITS RELAY:

A **fire alarm system** is number of devices working together to detect and warn people through visual and audio

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appliances when smoke, fire, carbon monoxide or other emergencies are present. These alarms may be activated from smoke detectors, and heat detectors. Alarms can be either motor raised bells or wall mountable sounders or horns. They can also be speaker strobes which sound an alarm, followed by a voice evacuation message which usually state in the lines of "Attention, Attention. A fire emergency has been reported. Please leave the building via the nearest exit. DO NOT use elevators!" They may also be activated via Manual fire alarm activation devices such as manual call points or pull stations. Fire alarm sounders can be set to certain frequencies and different tones including low, medium and high depending on the country and manufacturer of the device. Most fire alarm systems in Europe sound like a siren with alternating frequencies. Fire alarm sounders in the United States can be either continuous or set to different codes such as Code 3. Fire alarm warning devices can also be set to different volume levels. Smaller buildings may have the alarm set to a lower volume and larger buildings may have alarms set to a higher level. And these fire alarm sensors will be on each user specified places and then that output of all sensors will connect to the inputs of relay circuit and finally it will give the interrupt to the controller and it gives the message to the user that your house in fire.

GAS LEAKAGE SENSOR:

A **gas detector** is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.

Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting.

Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually

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employ an audible alarm to alert people when a dangerous gas has been detected. Common sensors include infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and semiconductor sensors. More recently, infrared imaging sensors have come into use. All of these sensors are used for a wide range of applications and can be found in industrial plants, refineries, waste-water treatment facilities, vehicles, and homes.

Same as that in fire alarm concept here we will connect the output of gas sensor directly to the controller and once it receives the signal from gas sensor it will send message via GSM to user that in your home gas is in leakage.

CONCLUSION:

As from above declarations and definition of individual components and also its working with controller in my project have been seen clearly, so. According to my point of view it is clear that if we implement my project the user's home becomes secured and automated

The another main advantage in it, but it will be depends upon user's requirement if he/she needs, we can also control the light, fan, night lamp, etc…,using our mobile phone itself also other discovered automated objects can also be synchronize with it depends upon the user needs.

Hence I concluding it with that probably I have covered up to above 5 application in my one module itself so it will be so compact, fixed, accurate good performance.

FUTURE DEVELOPMENT:

Here we can control our needs via mobile phones, but we can't give the temperature of AC to be with, only we can on/off it. So, I will going to overcome that on my updating of this project.

Also we can develop it further by covering more than 7 to 8 applications in this same IC.

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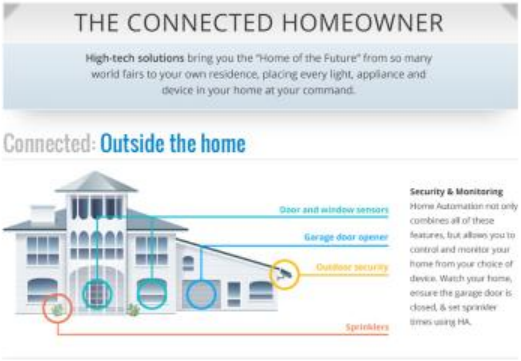

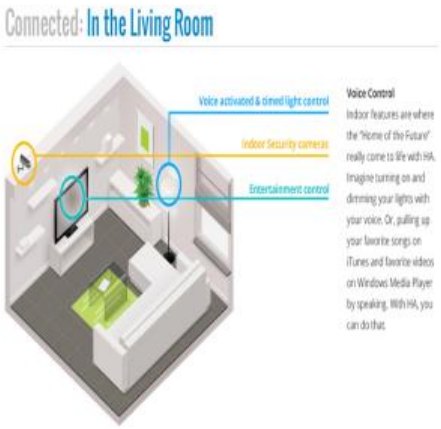

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