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IN THE NAME OF ALLAH, THE BENEFICENT THE MERCIFUL

Microcontroller Based Smart Natural Gas Oven

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ABSTRACT
Natural gas is an important form of energy in the world. The misuse of natural gas increase day by day. In third world country the main cause of misuse is unconsciousness, unawareness e.t.c .This paper aim to show that a microcontroller based system designed to reduce the large amount of natural gas which turn into wastage material for unconsciousness of housewives.

Keywords—Microcontroller; solenoid gas valve; natural gas oven; IR sensor.

1. INTRODUCTION
Energy is the key ingredient for socio-economic development of a country. Economic Development depends on reliable energy supply. In Bangladesh commercial and non commercial energy are 48% and 52% of total energy.

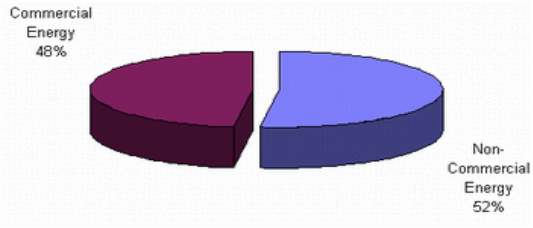

Fig.1: Total energy usage scenario

To meet energy demand at desired level, initiative has been taken to increase gas supply and its optimum utilization. The demand of imported oil is also increasing Part of it is met by condensate (by product of gas). In Bangladesh, natural gas is most important indigenous source of energy that accounts for 75% of the commercial energy of the country. So far in Bangladesh 24 gas fields have been discovered with the rate of success ratio is 3.1:1 of which two of the gas fields are located in off shore area. Gas is produced from 18 gas fields (81 gas wells).Average daily gas production capacity is about 2249 MMCFD .The gas production recorded on 17th April , 2012 was 2155.6 MMCFD. At present the daily approximate projected gas demand throughout the country is more than 2500 MMCFD. Total consumer for gas sector is approximately 2.32 million. The daily lack of gas demand is more than 436 MMCFD in Bangladesh. The demand is increasing day by day. Although the system loss of the gas distribution company was 7.07 per cent according the report of December, 2007.Unawareness is the main cause of misuse of natural gas. In the purpose of cooking many house wives do not stop their oven after completing food. As a result large amount of gas makes into wastage material. If we protect

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this misuse, Insha allah we will reduce our lack of demand.

Fig.2: Natural gas stove

2.DESCRIPTION OF OUR PROPOSED SYSTEM

This is a microcontroller based electrical system. In our proposed system we need an IR sensor, ,LED, a Microcontroller(ATMEGA 8) ,solenoid gas valve.

2.1 IR Sensor

A sensor is a device that produces a measurable response to a change in a physical condition, such as temperature or thermal conductivity, or to a change in chemical concentration. A sensor when coupled with an electronic circuit converts the physical change into a signal which can be read by an observer or by an instrument. The most common use of sensors is to get feedback from external environment. The transmitter of IR is generally of blue color and the receiver can be transparent (without IR filter) or black (with IR filter).In order to verify the operation of the emitting diode the voltage between its pins is 1.5V- 2V, when there is no short circuit .The voltage in the receiver diode must be about 5V in the dark and 0V when it is illuminated directly with the emitter diode.[2]

2.2 The ATmega8 Microcontroller

A microcontroller often serves as the "brain" of a mechatronic system. Like a mini, self-contained computer, it can be programmed to interact with both the hardware of the system and the user. Even the most basic microcontroller can perform simple math operations, control digital outputs, and monitor digital inputs. Most modern controllers have analog-to-digital converters, high-speed timers and counters; interrupt capabilities, outputs that can be pulse-width modulated, serial communication ports, etc. ATMEGA8 is one of the most popular microcontrollers used specially in automotive, industrial appliances and consumer applications. High-performance, Low-power Atmel AVR 8-bit Microcontroller. The low-power Atmel 8-bit AVR RISC-based microcontroller combines 8KB of programmable flash memory, 1KB of SRAM, 512K EEPROM, and a 6 or 8 channel 10-bit A/D converter. The device supports throughput of 16 MIPS at 16 MHz and operates between 2.7-5.5 volts.

Some Key Parameters are given below

Parameter	Value
Flash (Kbytes)	8 Kbytes
Pin Count	32
Max. Operating Frequency	16 MHz
CPU	8-bit AVR
No of Touch Channels	12
Hardware QTouch Acquisition	No
Max I/O Pins	23
Ext Interrupts	2
USB Transceiver	0
Quadrature Decoder Channels	0

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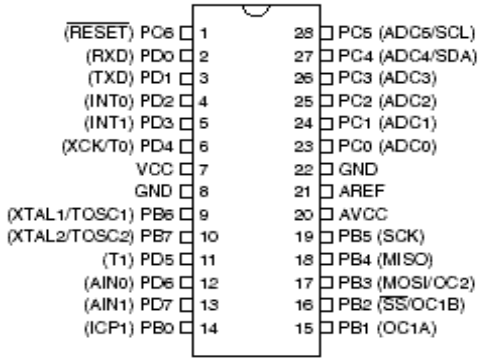


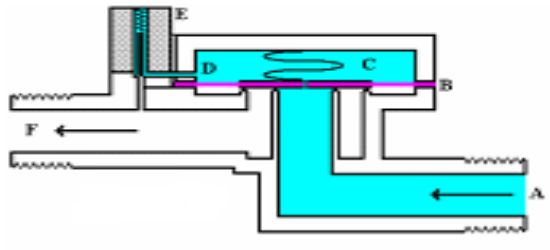
Fig 3. ATmega8 Pin-out Diagram

2.3 Solenoid valve

Solenoid valves are the most frequently used control elements in fluidics.A solenoid valve is an electromechanical valve for use with liquid or gas. The valve is controlled by an electric current through a solenoid. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically.

Fig 4. Solenoid Gas Valve

A solenoid valve has two main parts: the solenoid and the valve. Solenoid valves may use metal seals or rubber seals, and may also have electrical interfaces to allow for easy crontol. A spring may be used to hold the valve opened or closed while the valve is not activated.Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.



A-Input side
B- Diaphragm
C- Pressure chamber
D- Pressure relief conduit
E- Solenoid
F- Output side

3. WORKING PROCEDURE

At first we need to set the IR sensor at two opposite side of oven.IR transmitter sets at one side and receiver at another side.IR receiver acts as an input of the microcontroller.

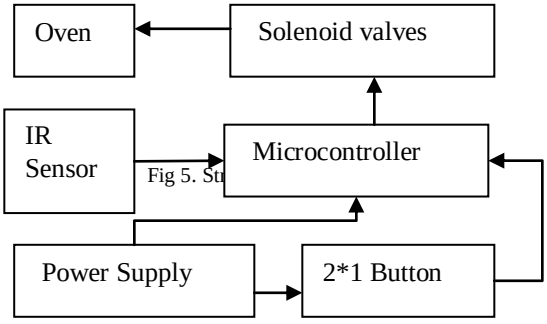


Fig 6: Block Diagram

Then IR receiver gives 5v as output which act as an input of the microcontroller. Then microcontroller controls the solenoid valve as on In the presence of any object on the oven there is a restriction between IR transmitter and IR receiver. mode.In the absence of any object on the oven there is no

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restriction between IR transmitter and IR receiver. so receiver is illuminated directly with the transmitter. Then IR receiver gives 0v as output to the microcontroller. After getting 0v it waits 3 minutes for 5v .if microcontroller does not get 5v under 3 minutes it controls the solenoid valve as off mode. There is a control switch with microcontroller which controls the solenoid valve without object sensing. Two LEDs also interface with microcontroller to indicate the mode of solenoid valve .Green LED represents the on mode and Red LED represents the off mode also. Software is needed to operate this control circuit. The flow chart of software is given below

4. LIMITATIONS

A. The IR sensor is not placed at the near of the oven because of thermal effect.
B. At the period of load shedding the oven will do not work because of electrical based control unit.
C. If rechargeable battery is connected to the control unit for supporting at load shedding. Battery should be needed to recharge.

5. CONCLUSION

Our proposed device is a locally designed system. One innovative and effective idea can change a nation. We are now towards the goal to give the people life more comfortable and easy. In this system we are trying to save the large amount of gas which make desolate for unconsciousness of the housewives. So this effective idea is very helpful to reduce the subsidy in the gas sector of Bangladesh.

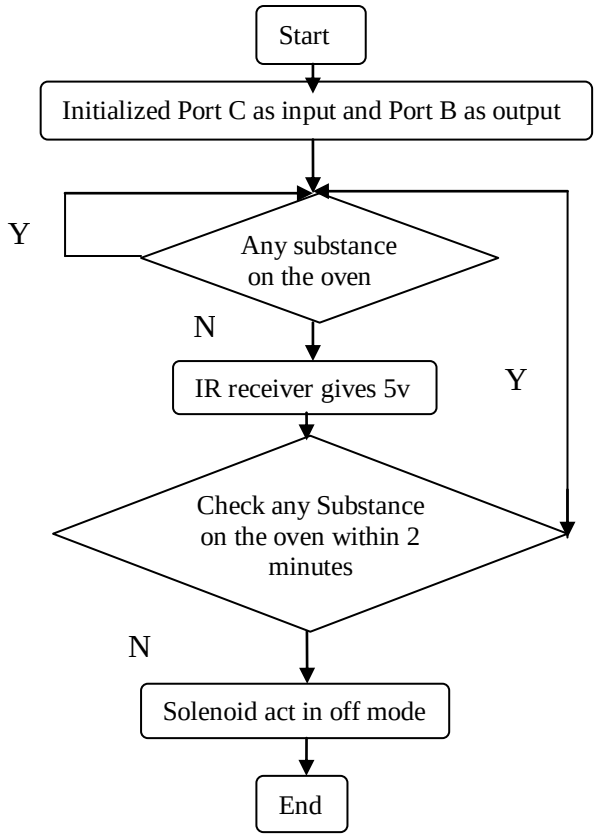

Fig 7: Flow chart

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