

## Fluid level Detector in Refrigerator

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### Abstract:

Fluid level detector is a very simple device but is very useful in daily life and will help in saving electricity and improving efficiency of refrigerator. Fluid level detector will detect the level of fluid inside the refrigerator and display it outside the refrigerator. We do not need to open refrigerator again and again to check level of fluid stored in refrigerator which will save the energy loss and improve the efficiency of refrigerator. It uses a simple ultrasonic sensor which sense the level of fluid stored in any container inside refrigerator and sends information to microcontroller and further displayed on lcd outside refrigerator.

**Index Terms—** ATmega8, Microcontroller, piezoelectric, IOT

### I. INTRODUCTION

The concept is very simple and useful in new world of technology. This concept is developed to lower the cost of operation of refrigerator by displaying the level of fluid stored in container inside any refrigerator. If the level of fluid is displayed outside the refrigerator then there is no need to open the refrigerator again and again which will lower the operating cost of refrigerator. More over the information will be displayed online using internet. A smart refrigerator circuit is designed using embedded technology, microcontroller is the main component of the hardware and this information is updated on the internet using a webpage that is designed using software PHP. Telemetry enables the transmission of information to the internet by wireless links. Microcontroller enables interfacing of other hardware components. Voltage is supplied using a DC power supply. A Ultrasonic sensor keeps a check on the level of the milk/liquid in the container placed in the refrigerator and continuously sends the information to the microcontroller. Microcontroller compare this value with the desired value .If the value is less than the desired value then the information is displayed on the LCD and also a sound is produced by the buzzer. A notification is also sent on the webpage of the user to notify about the level of liquid in the container. This notification is sent by the microcontroller that is sent on the internet through a network of IoT by GPRS module. IoT is basically a module design to remotely access the devices through web server and cloud computing. There are mainly three server site scripting languages used now-a-days i.e. JSP, ASP, PHP. We preferred to use PHP because it is an open source scripting language, runs on various platforms (Windows, Linux, Unix, Mac OS X, etc.), compatible with almost all servers used today (Apache, IIS, etc.), supports a wide range of databases, runs efficiently on the server side.

There are basically two ways in which we can manage our data i.e. in structured way or in unstructured way. Structured data is often managed using Structured Query Language (SQL) – a programming

language created for managing and querying data in relational database management systems. Unstructured data is all those things that can't be so readily classified and fit into a neat box: photos and graphic images, videos, streaming instrument data, WebPages, PDF files, PowerPoint presentations, emails, blog entries, wikis and word processing documents. We uses MYSQL database for storing our data in a managed way. In our project we will use ATmega8. This microcontroller is a 28-pin device and is one of the popular microcontrollers used in complex applications. The device offers 8192 8K Bytes of In-System Self programmable Flash program , 1K Byte Internal SRAM, 512 Bytes EEPROM, 23 Programmable I/O Pins Two 8-bit Timer/Counters with Separate Prescaler, one compare circuit, and internal and external interrupt facilities.

### II Literature Survey:

(i) The piezoelectric effect was first observed in polyvinylidene fluoride polymer (PVDF) in 1969, and the pyroelectric effect was found several years later. A number of additional ferroelectric polymers have been discovered since that time including the copolymer PVDF with trifluoroethylene (P(VDF/TrFE)), and the odd numbered nylons.

(ii) A large number of applications of piezoelectricity and pyroelectricity have been developed. The magnitudes of the effects in polymers are much lower than those of ferroelectric ceramics (an exception is the piezoelectric effect in porous polymers).

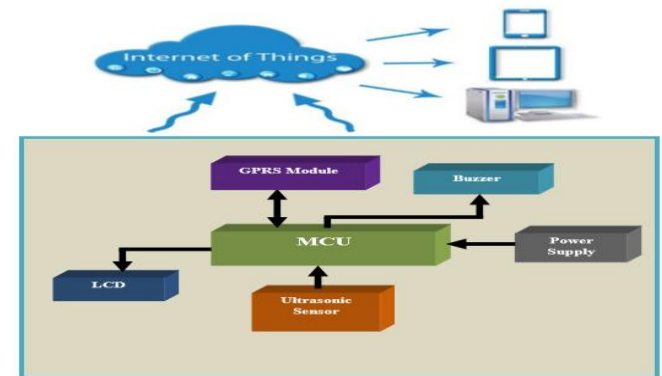
(iii) M.N Muthalif, A.G.A, Mechatronics (ICOM) ,2011 4<sup>th</sup> international conference by Fakhzan : A beam with piezoceramic patches have been used as a method to harvest energy .A unimorph piezoelectric cantilever beam generates electric current or voltage from piezoelectric strain effect.

(iv) Kumar, Anil. International Journal of scientific and engineering research, vol- 2, issue 5,May-2011,Electrical power generation using Piezoelectric Crystal: The usefulness of most high technology devices such as cell phones, computers, and sensors is limited by the storage capacity of batteries. In the future, these limitations will become more pronounced as the demand for wireless power outpaces battery development which is already nearly optimized. Thus, new power generation techniques are required for the next generation of wearable computers, wireless sensors, and autonomous systems to be feasible. Piezoelectric materials are excellent power generation devices because of their ability to couple mechanical and electrical properties. For example, when an electric field is applied to piezoelectric a strain is generated and the material is deformed. Consequently, when a piezoelectric is strained it produces an electric field; therefore, piezoelectric

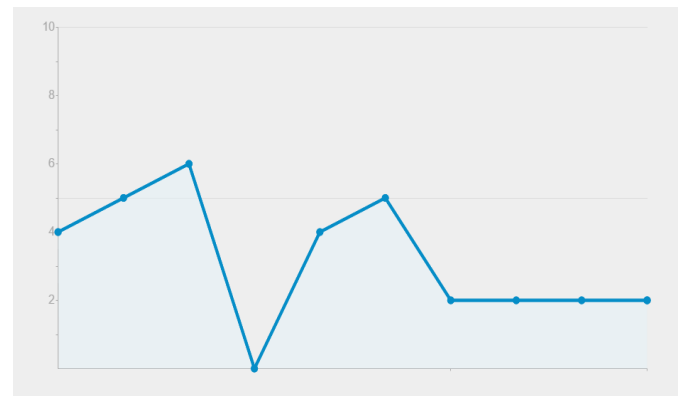
materials can convert ambient vibration into electrical power. Piezoelectric materials have long been used as sensors and actuators; however their use as electrical generators is less established. A piezoelectric power generator has great potential for some remote applications such as in vivo sensors, embedded MEMS devices, and distributed networking. Developing piezoelectric generators is challenging because of their poor source characteristics (high voltage, low current, high impedance) and relatively low power output.

(VI) K.Ramakrishna, Guruswamy Revana and Venu Madhav Gopaka, International Journal of Multidisciplinary and Current Research 20 Sept 2014, Vol.2 Generation of Electrical Power through Foot steps, when a piezoelectric is strained it produces an electric field. Diaphragm movement in certain material will cause generation of electric charge. Piezoelectric materials have long been used as sensors and actuators. Pressure polarizes some crystals, such as quartz.

The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design. IOT is basically a module design to remotely access the devices through web server and cloud computing. There are mainly three server site scripting languages used now-a-days i.e. JSP, ASP, PHP. We preferred to use PHP because it is an open source scripting language, runs on various platforms.



#### IV Result



The above graph depicts the level of fluid where x axis represents time and y axis represents level of fluid in container. The variation in the above graph is due to variation in liquid level. As we can see in the graph the initial level of liquid is 4 and after sometimes liquid level increased. We can also see that at one point the value of liquid reached to point 0 which denotes low level of liquid.

#### V Conclusion

The Smart Refrigerator module is able to remotely notify the user about the low contents inside the refrigerator. It also facilitates purchase of the scarce food items from an online vendor. The link to the online vendor is incorporated inside the notification that is sent to the user via SMS (Short Message Service) and email. This module allows the user to indicate a placed order and the other users to acknowledge the placed order.

### III Design concept

IOT based refrigerator using ultrasonic sensor is designed with the help of regulated power supply, display unit, ultrasonic sensor, buzzer, microcontroller ATmega8, GSM900a.

Regulated power supply is used to breakdown high voltage mains to low voltage for electronic circuits. Liquid crystal display is used for its ability to display numbers, characters and also the ease of programming for numbers and characters. LMB162 A LCD is used for this purpose. The main features of this LCD are: 16 X 2 display, intelligent LCD, used for alphanumeric characters & based on ASCII codes. This LCD contains 16 pins, in which 8 pins are used as 8-bit data I/O, which are extended ASCII. Three pins are used as control lines these are Read/Write pin, Enable pin and Register select pin. Two pins are used for Backlight and LCD voltage, another two pins are for Backlight & LCD ground and one pin is used for contrast change.

A buzzer or beeper is an audio signaling device. A piezoelectric buzzer is used in this project. An ultrasonic sensor is used to detect the level of fluid. Ultrasonic sensor produces a wave from below the container in which fluid is stored as the wave touches the fluid surface an echo is produced. Measuring how long it takes to reach the echo to the receiver the level of fluid is calculated. The sensor used in this is having range of 10cm to 400cm, with error of +1 or -1, 5v DC supply, serial data of 9600bps.

Microcontroller has a CPU (a microprocessor) in addition to the fixed amount of RAM, ROM, I/O ports, and timers are all embedded together on the chip: therefore, the designer cannot add any external memory, I/O, or timer to it. Microcontroller Unit is the heart of our system. It controls all the major activities of our system. The Microcontroller unit used in our work is based on AVR family. This microcontroller is a 28-pin device and is one of the popular microcontrollers used in complex applications. The device offers 8192 8K Bytes of In-System Self programmable Flash program, 1K Byte Internal SRAM, 512 Bytes EEPROM, 23 Programmable I/O Pins Two 8-bit Timer/Counters with Separate Prescaler, one compare circuit, and internal and external interrupt facilities.

The ultrasonic sensors can be placed at a certain level and it acts as level sensors. When the contents go below this set level a trigger is generated which is sent in the form of message to the user. The test conducted was to check for Soft drinks and milk, As milk and soft drinks are opaque and doesn't allow light to pass through it, ultrasonic sensors are used as level sensors in the container.

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