International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 03 | Mar-2016 www.irjet.net p-ISSN: 2395-0072

# System Engineering to deploy Albatross like Envirobat

**Anamika Sinha[1], Harshila Jagtap[2], Jagtap Deepti[3], Prof.S.A.Dhole[4]**

*[1,2,3] Student, Dept. of Electronics and Telecommunication, Bharati Vidyapeeth's College of Engineering, Pune, Maharashtra, India*
*[4]Professor, Dept. of Electronics and Telecommunication, Bharati Vidyapeeth's College of Engineering, Pune, Maharashtra, India*

---

***Abstract - We present a device named Envirobat which is portable, light in weight, smaller in size. It is an urban air pollution monitoring device. The name Envirobat is derived from two words viz. 'Environment' and 'Bat' so that the device could sense the gases 24hrs.To monitor the gases in the environment, the device integrates commercially available gas sensors. These sensors are interfaced with the controller. The data collected by the sensors is transmitted to the receiving end by the help of GSM module. Also, if there is shortage of power supply, we use solar panel as alternative. So it makes Envirobat eco-friendly. The location is known by the usage of GPS in the device at the transmitting end. The designed system makes use of wireless communication. At the receiving end, we get the sensed data values on LCD display, by SMS, and also on laptop using Docklight version 2.The sensors used in the system are for humidity, temperature, CO2 and CH4. The device could be used for many indoor and outdoor applications.***

***Keywords : sensors, air pollution monitoring device, wireless communication.***

## 1.INTRODUCTION

System which will monitor the quality of air of our environment and Content of different gases present in air or area around us. Air pollution has become a serious problem in densely populated and industrialized cities. In India, the problem is caused by the increasing number of pollution sources like number of motorized vehicles and various process industries. Many air pollution monitor systems in urban areas and cities that utilize smart sensor networks and wireless systems were reported in recent literature. To prevent or minimize the damage caused by atmospheric pollution, suitable monitoring systems are urgently require that can rapidly and reliably detect and quantify polluting sources. It would be ideal if we can place them at every traffic intersection in a city like Pune. This data will help regulating authorities to prevent further deterioration of the current air pollution levels. The current air pollution monitoring systems, used by pollution boards are very costly and bulky and hence not scalable. Envirobat is system design specifically to address this issue, to design a low cost hand held device that can be mounted at multiple city in an area to monitor air pollution at regular intervals of time. The device has the capability to sense location , temperature , humidity. CO2, CH4. The procedure for continuous monitoring method is as follows : use of sensors to monitor parameters, and then usage of ADC to transform the sensed signal from an analog to digital signal. Further give the data to processor to process the data and send to GUI using GSM and GPS. Its an automatic micro-scaled air quality monitoring system for areas with a high density of population and vehicles. We could statistically compare the various results of sensed gases and further authorities could take preventive measures by survey at various places in the city and also take preventive measures to reduce air pollution.

## 2.0 HARDWARE

### 2.1 Block Diagram

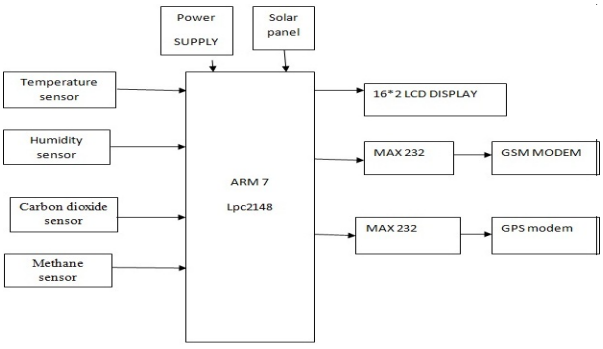


Fig 1. Block diagram of device (transmitting end)

Fig. 1 shows the block diagram of the Envirobat device at the transmitting end. Envirobat comprises of three different modules : a. Sensor module b. Controller module c. Communication module(GSM/GPRS).

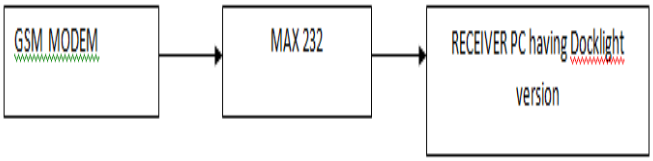


Fig 2. Receiver Section

Fig. 2 shows the block diagram at the receiving end. It consists of a GSM modem , Max232, laptop having Docklight version2 installed.

### 2.2 Hardware Implementation

**Lpc2148:** The LPC2148 microcontroller is based on a 16-bit or 32- bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with an embedded high speed flash memory ranging from 32 KB to 512 KB. Due to their small in size and low power consumption, LPC2148 are ideal for applications where miniaturization is a key requirement. Serial communication interfacing ranging from USB 2.0 Full-speed devices, multiple UARTs, SPI, SSP to I2C bus and on-chip SRAM of 8 KB to 40 KB, make these device very well suited for communication gateway and protocol converters, soft modems and low end imaging provides both large buffer size and high processing power. Many 32-bit timers, single/dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make it suitable for industrial control and medical systems.

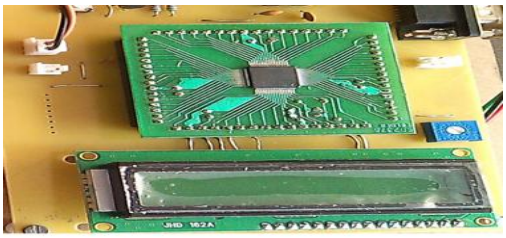

Fig 3. Lpc2148 mounted on PCB

**Power Supply :** The Micrcontroller required 5V dc power supply. We designed a 5V power supply on PCB. In our project, we are using a adapter which would provide 12V at its output. We are using IC7805 in order to get a constant regulated DC voltage of 5V. This 5V is given to Microcontroller, LCD, and MAX232.

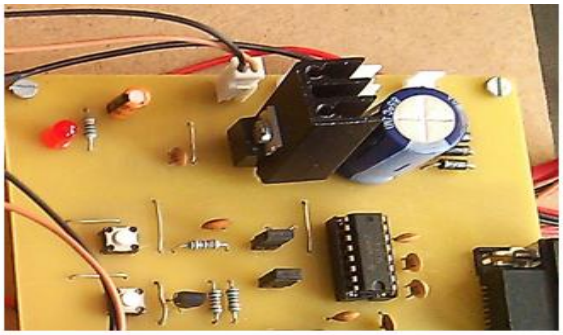

Fig. 4. Design of Power Supply on PCB

**Solar Panel :** High Efficiency and low cost Miniature Solar Cell can easily be arranged for larger load applications including higher voltage and current loads. Miniature small in size with solid attractive casing: Epoxy resin. We are using polycrystalline solar cell in our project. Polycrystalline cells are bluish in color and have a characteristic metal shard pattern on the surface.

**GSM :** The GSM modem used for the project is SIM300. SIM900 and SIM300 modem operates from .3.4V to 4.5V supply range. Same AT commands used for call and sms in SIM300 can be used with the SIM900 modem.SIM 300 provide RF antenna interface with two alternatives 1.antenna connector and antenna pad. The SIM300 is integrated with the TCP/IP protocol. It is designed with the power saving technique; the current consumption is as low as 2.5mA in SLEEP mode.

Fig 5. GSM modem

**GPS :** The Global Positioning System is known as navigation system that provides location and time information in all weather conditions, anywhere on or near the earth. In our project different gases are sensed by their respective sensors and then given to ADC to transform the sensed signal from an analog to digital signal. Further give the data to processor to process the data and send to GUI using GSM and GPS. It's an automatic micro-scaled air quality monitoring system for areas with a high density of population and vehicles. GPS tracking is the surveillance of location through use of the GPS to track the location of the object remotely.


Fig 6. GPS tracker

**Sensors :** Sensor module consists of humidity sensor, temperature sensor, CO2sensor and CH4 sensor.

| Sensor | CO2 | CH4 | Temperature | Humidity |
|---|---|---|---|---|
| **Type** | Metal - oxide | Metal - oxide | - | - |
| **Make** | Figaro TGS-4161 | MQ4 | National semi<br>LM35 | Honeywell<br>HIH5031 |
| **Range** | 350-10000ppm | 100-10000ppm | -55C – 150C | 0%-100%RH |

Table 1: List of sensors used in the device


Fig 7. Sensors used in the design

## 3.ACTUAL DESIGNED SYSTEM

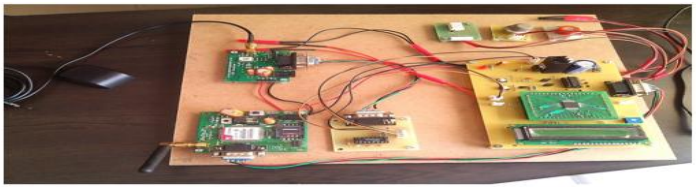

Fig 8. Complete hardware design of the system

## 4. SOFTWARE

Software used for the design is

- Keil uVision,
- Proteus
- Docklight version2.

## 5. RESULT

Temperature T=34 (medium)

Humidity H=80 (high)

Carbon dioxide CO2=563

Methane CH4= 023

Location = Katraj

## 6. FUTURE WORK

Interface other sensors to know detail information of all gases available in air. Create Webpage and upload the information on webpage with date, time and location. Interface SD Card to store information. In future application of Envirobat system would include a touch screen technology to give user a better performance. Design android application for user for better performance.

## 7. CONCLUSION

Envirobat device is designed with easy user interface with display and keyboard for setting up various parameters during measurement. This version of Envirobat demonstrates monitoring urban air pollutants and logging the acquired data for online

access. There is a great flexibility for user to access the data from the device. The GUI provides better user experience by visualizing the graphs. The future version of Envirobat would include a touch screen to give user a better experience.

**8.REFERENCES**

[1] Suraj Hebbar, Karuppasamy V, Kiran G K,et , " System Engineering and Deployment of Envirobat " , IEEECONNECT2014 .

[2] Dang Hai Hoang, Thorsten Stufe, et, "Processing and Visualizing Traffic Pollution Data inHanoi City from a Wireless Sensor Network" ,IEEE Workshop on Practical issues in Building Sensor Network Applications 2013.

[3] Vijay Sivaraman, et, "HazeWatch: A Participatory Sensor System for Monitoring Air Pollution in Sydney", Eighth IEEE Workshop on Practical issues in Building Sensor Network Applications 2013.

[4] Darshana N. Tambe and Ms. Nikita Chavan , "Detection of Air Pollution using ZigBee ", International Journal of Ad hoc, Sensor & Ubiquitous Computing(IJASUC) Vol.4, No.4, August 2013.

[5] Raja Vara Prasad Y, Mirza Sami Baig, Rahul k. Mishra, P.Rajalakshmi, U.B.Desai and S.N.Merchant , " Real Time Air Pollution Monitoring System", ICTACT Journal on Communication Technology , June 2011.

[6] R.A.Roseline, Dr.M.Devapriya, Dr. P. Sumathi , " Pollution Monitoring using sensors and Wireless Sensor Networks : A survey", International Journal of Application or Innovation in Engineering and Management ( IJAIEM ) Volume 2, Issue 7, July 2013.

[7] Kavi K. Khedo, Rajiv Perseedoss and AvinashMungur , " A Wireless Sensor Network Air Pollution Monitoring System", International Journal of Wireless & Mobile Networks(IJWMN), Volume 2 , No. 2, May 2010.`

[8] GodblessSwagarya, ShubiKaijage and Ramadhani S. Shinde, "Air pollution Monitoring System based on Wireless Networks- Simulation" , Inoovative Systems Design and Engineering ISSN 2222-1727(Paper), Vol. 5, No. 8,2014.

[9] Amol R. Kasar, Dnyandeo S. Khemnar and Nagesh P. Tembhurnikar, " WSN based Air Pollution Monitoring System", International Journal of Science and Engineering Applications(IJSEA), Vol. 2, Issue 4, 2013.

[10] Young Jin Jung, Yang Koo Lee, Dong Gyu Lee, Keun Ho Ryu and Silvia Nittel, " Air Pollution Monitoring System Based on Geosensor Network", IGARRS 2008, Boston.