Lightweight Mash up Middleware for Coal Mine Safety Monitoring and Control Automation

(Ug Student, Department Of Ece, Dscet, Anna University, Chennai)
(Assistant Professor, Department Of Ece, Dscet, Anna University, Chennai)


I. Existing System:

• In The Existing Method The Atmospheric Conditions Inside The Coal Mines Are Monitored Manually Or By Using Sensors But The Sensed Data Cannot Be Sent To The Control Room Every Time.
• Also The Alert Intimation Will Be Sent Manually To The Miners Which Are Time Consuming And Within This Period Of Time The People Inside The Mine Will Be Affected. Due This Method There Is No Safety To The People To Move Inside The Mines.

II. Proposed System:

The Proposed System Consists Of Three Module Namely Mobile Station, Base Station And Master Node. In The Proposed Method We Are Using Zigbee As A Wireless Technology Which Is Used To Send The Sensed Data To The Base Station Node And. The Values From Base Station Will Be Sent Using Zigbee To The Control Server. The Mobile Station Isbelow ,

Block Diagram

Mobile Station

Power supply 5v

Gas Sensor

Humidity sensor

Temperature Sensor

IR Sensor

PIC 16F877A Micro Controller

Buzzer

MAX232

LCD display

LIFI

Zigbee

International Conference On Progressive Research In Applied Sciences, Engineering And Technology  40 | Page (ICPRASET 2K18)
Base Station

Hardware Requirement:
1. Pic16f877a Microcontroller
2. Lcd Display
3. Gas Sensor
4. Temperature Sensor
5. Humidity Sensor
6. Rfid Tag & Reader
7. Zigbee Transceiver
8. 5v Power Supply
9. Pc
10. Buzzer

Software Requirement:
1. Mplab(Microcontroller Programming)
2. Pickit2((Programmer)
3. Embedded C Program
4. Proteus Circuit Designer

Software Program Testing

III. Hardware Description
Pic16f877a:
It Is High Performance Risc Cpu Machine. Only Have 35 Simple Word Instructions. Operating Speed: Clock Input (200mhz), Instruction Cycle (200ns).Up To 368×8bit Of Ram (Data Memory), 256×8 Of Eeprom (Data Memory), 8k×14 Of Flash Memory. Wide Operating Voltage Range (2.0 – 5.56) Volts.2 8 Bit Timer And One 16 Bit Timer Is Available 10bit Multi-Channel A/D Converter Synchronous Serial Port (Ssp) With Spi
Lightweight Mashup Middleware For Coal Mine Safety Monitoring And Control Automation

(Master Code) And I2c (Master/Slave). 100000 Times Erase/Write Cycle Enhanced Memory.1000000 Times Erase/Write Cycle Data Eeprom Memory.

- **Power Supply Circuit**
  The Hardware Of Project Requires Different Power Supplies. 5 V. The Interfacing Devices Will Get The Supply From Main Microcontroller

- **Led:**
  Lcd (Liquid Crystal Display) Screen Is An Electronic Display Module And Find A Wide Range Of Applications. A 16x2 Lcd Display Is Very Basic Module And Is Very Commonly Used In Various Devices And Circuits. A 16x2 Lcd Means It Can Display 16 Characters Per Line And There Are 2 Such Lines. In This Lcd Each Character Is Displayed In 5x7 Pixel Matrix. This Lcd Has Two Registers, Namely, Command And Data.

Max232

Max232 Is Used To Convert Ttl Into Rs232 Logic Level Converter Used Between The Microcontroller And The Gsm Board Or Pc. Our Controller Is Operated At 5v But Interfacing Devices Are Worked With 12 V. So This Ic Will Convert The Level Of 5v To 12 V For Transmitting. While Receiving Convert 12v Into 5v To The Microcontroller.

Rfid


Li-Fi

Li-Fi Technology Proposed And Provides Transmission Of Data Through Illumination By Sending Data Through An Led Light Bulb That Varies In Intensity Faster Than The Human Eye Can Follow. Li-Fi Provides Better Bandwidth, Efficiency, Availability And Security Than Wi-Fi And Has Already Achieved Blisteringly High Speed In The Lab.

Zigbee

Zigbee Is A Wireless Technology Developed As An Open Global Standard To Address The Unique Needs Of Low-Cost, Low-Power Wireless M2m Networks. The Zigbee Standard Operates On The Ieee 802.15.4 Physical Radio Specification And Operates In Unlicensed Bands Including 2.4 Ghz, 900 Mhz And 868 Mhz. The Zigbee Protocol Was Designed To Provide An Easy-To-Use Wireless Data Solution Characterized By Secure, Reliable Wireless Network Architectures. Support For Multiple Network Topologies Such As Point-To-Point, Point-To-Multipoint And Mesh Networks.
Low Duty Cycle – Provides Long Battery Life
Low Latency
Direct Sequence Spread Spectrum (Dsss)
Up To 65,000 Nodes Per Network
128-Bit Aes Encryption For Secure Data Connections
Collision Avoidance, Retries And Acknowledgements

Buzzer
A Buzzer Or Beeper Is An Audio Signaling Device, Which May Be Mechanical, Electromechanical, Or Piezoelectric. A Buzzer Or Beeper Is A Signaling Device, Usually Electronic, Typically Used In Automobiles, Household Appliances Such As A Microwave Oven, Or Game Shows.

IV. Temperature Sensor
The Lm35 Series Are Precision Integrated-Circuit Temperature Sensors, Whose Output Voltage Is Linearly Proportional To The Celsius (Centigrade) Temperature. The Lm35 Is Rated To Operate Over A −55˚ To +150˚C Temperature Range. A Digital Thermometer Can Be Easily Created By Using Lm35 Temperature Sensor And Can Be Interfaced Any Microcontrollers.

V. Gas Sensor
The Sensors Contain Two Or Three Electrodes, Occasionally Four, In Contact With An Electrolyte. The Electrodes Are Typically Fabricated By Fixing A High Surface Area Precious Metal On To The Porous Hydrophobic Membrane. The Working Electrode Contacts Both The Electrolyte And The Ambient Air To Be Monitored Usually Via A Porous Membrane. The Electrolyte Most Commonly Used Is A Mineral Acid, But Organic Electrolytes Are Also Used For Some Sensors. The Electrodes And Housing Are Usually In A Plastic Housing Which Contains A Gas Entry Hole For The Gas And Electrical Contacts.

VI. Humidity Sensor
Humidity Is Defined As The Water Vapour Content In Air Or Other Gases. Humidity Is Usually Measured In Terms Of Absolute Humidity (The Ratio Of The Mass Of Water Vapour To The Volume Of Air Or Gas), Dew Point (The Temperature And Pressure At Which A Gas Begins To Condense Into A Liquid), And Relative Humidity, Or Rh (The Ratio Of The Moisture Content Of Air Compared To The Saturated Moisture Level At The Same Temperature Or Pressure).

VII. Ir Sensor
The Ir Sensor Is A Very Simple Device That Works By Reflecting Infrared Light Off Of An Object And Detecting The Reflecting With A Photo-Transistor That Is Tuned To The Same Frequency Of Light. The Led Is Mounted Next To The Photo-Transistor; However, The Emitted Light From The Led Does Not Directly Shine Into The Photo-Transistor. Appropriate Values For Resistance Are In Series With Both The Led To Limit Current And The Photo-Transistor In Order To Show A Voltage Drop Based On Distance To The Object In Front Of The Sensor. The Effective Range Of The Sensor Is A Few Centimeters. Object Detection Can Be Enhanced By Placing A Reflective Surface Between The Object And The Sensor. When The Object Passes Between The Sensor And Reflective Surface, A Large Drop Will Be Observed In The Output Signal.

VIII. Conclusions:
References:


International Conference On Progressive Research In Applied Sciences, Engineering And Technology (ICPRASET 2K18)