IIOT AND CAN BASED INDUSTRIAL PARAMETERS MONITORING AND CONTROL

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Abstract:- *The implementation of a smart monitoring and controlling system for industrial applications in real time is proposed in this system. Human efforts are minimized using automation system which monitors and shows any fault in the system. In this paper Industrial Internet of Things concept is used. IIOT is a network of physical object or things embedded with electronics, software, sensors, and network connectivity which use this object to collect and exchange data. In industrial automation field the analog parameters like temperature, humidity, water level, fire and light needs to be monitor and control in real time. For that purpose the CAN and AVR controller interfacing used in this project. A Visual Basic application is included in the system which will be controlling all the activities of the system in user controlled mode [manual mode] or system controlled mode [Automatic mode].Through appropriate values workers can make suitable decisions and operation by these parameter monitoring. This improves these parameters monitoring and controlling.*

Key words: *IIOT, Esp8266, Can Bus, AVR Controller, Sensors, V.B. Software.*

Introduction: As we know in day by day use of internet increases. It can be use in various industrial applications to on and turn off applications. By using industrial internet of things (IIOT) we can observe and control the industrial process from anywhere. The Node MCU or ESP8266 plays main roll in this system for data exchanging and connecting this data to internet. In this project the MCP 2551 CAN bus and AVR microcontroller interfacing monitors and control the industrial parameters like, Temperature, Humidity, Water level or Fuel level sensor, light sensor, & fire sensor. Now a days industry needs more manual power to monitor and control these parameters, if these parameters not monitored or control properly then it will tends to be harmful situations. These all sensors or parameters are analog. With automatically monitor or controlling these parameter eliminate the control room concept. But for safety or safe side purpose there are two modes of operation Manual mode and automatic mode on the visual basics software. Through these modes those parameters monitored and controlled through automation or IIOT. This can be helpful for workers to avoiding human mistakes and making satisfactory controlling action. The main aim of this project to make sure that every device communicate with each other with the help of microcontroller and IIOT take controlling actions as well. By using CAN controller there is no need of host computer for communicating these devices with each other but the bus or link needed. If the bus is allowed, any node may begin to transmit. If two or more nodes starts sending messages at the same time, the message with the more central ID will overwrite other nodes' less dominant IDs, so that eventually (after this arbitration on the ID) only the dominant message remains and is received by all nodes. The speed for can controller MCP2551 is 1Mb/S upto 420 meters and it will change with change or variation in length of system.

Objective: objective of this project is to reduce manpower and control room by automatically monitor and control the industrial parameters through the CAN bus and AVR microcontroller. And also control and monitor these data from anywhere through IIOT using ESP 8266. The monitoring and control parameters done with help of manual mode and Automatic mode through visual basics software.

Existing system: In older methods for this objective archived by the various sensors and microcontroller. With can bus system parameters are monitored at same time it can be controlled but with existing system very few parameters monitored and controlled. That parameters are controlled though Arm controller, PIC controller and Raspberry pi controller. In some systems parameters just monitored through 16x2 LCD display, without controlling actions. And in some systems that monitored through p.c. with controlling action. Existing systems are monitored and controlled through the p.c. or microcontroller. But there is nothing any provision for IOT based or IIOT based data monitoring and control that is implemented in this system as well as controlling actions takes place.

Proposed system: In this system, the implementation of CAN bus protocol with AVR microcontroller and generated data monitored and controlled through visual basics software and which can be observed and controlled though IOT. This system

helps to monitor and control overall parameters from one p.c. as well as from internet through IOT. This reduces the high human power requirement for all this purpose and automatic control over all parameters through can bus save time as well. The industrial parameters are, temperature, humidity, water level or fuel level, fire, light control by above systems. These five parameters are analog. The interfacing of can controller and AVR done with Proteus and Ares software.

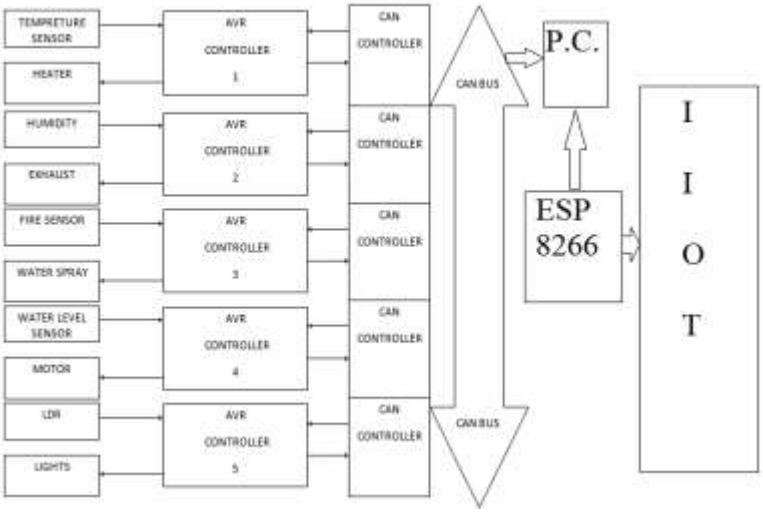

Fig-1: Proposed system block diagram

In this system on board 7 parameters are interfaced with each other. The parameters are, CAN controller MCP 2551, AVR, SSR (Solid State Relay) and TTL converter C.P., Sensor, ESP 8266(for IOT), P.C.(for visual basics software). The main advantage of these all parameter interfacing is consist of on board programming. There is no need of removing the AVR IC for programming. Mainly we set one threshold value for each parameter, if the parameter value increases over the threshold value then the value firstly sensed by microcontrollers and controlling actions take place through SSR, and all system monitored and controlled though internet, and can show these on LCD display and visual basics software. The industrial internet of thing takes a look and control actions as well through IOT servers. The data is uploaded on internet though the Node MCU ESP8266. This is connected with internet through the WIFI and uploads these data on IOT server (thinkspeak.com). All parameters monitor and control in real time.

Problem statement: This days industry needs more human efforts to monitor and control the industrial parameters like, water level or fuel level, temperature, light, humidity and fir, with the help of separate microcontrollers and display in various location of industries. In this project different sensors are used for sensing those parameters. In case the industrial parameters will not monitor and controlled safely and properly at the time of crisis condition, it will tends to be a hazardous condition for system.

That's why we are using the technique for monitoring the overall industrial parameters with help of internet and with help of single p.c. method for eliminating the efforts required for all this purpose. In this system industrial parameters observed and controlled like, temperature monitored by using LM35 sensor, humidity sensor monitored by using HS220 sensor, fire monitored by flame based I.R. sensor, light monitored by using LDR sensor and water level indicate by level sensor. Each sensor monitored by separate AVR and Can MCP 2551 interfacing microcontroller, and showed in individual displays in different industrial locations. After the sensor and microcontroller interfacing then the monitoring done through single p.c. with can bus communication system. With he help of visual basics software the parameters value showed on p.c. through RS232 communicating cable. At the same time these data sent on internet though the Node MCU (ESP 8266). This ESP8266 module connected to internet through the WIFI, it is also called as WIFI module. This device uploads all parameters value on Internet Things server in real time. Only the authorized persons can see these data from this server and can take controlling actions as well from over the internet and from the P.C. as well. These internet servers used in industries so it called as the industrial internet of things.

Material required for this project:

- Humidity sensor: HS220; Control valve ;water sprayer
- Temperature sensor: LM35; heater
- Fire sensor: flame based IR sensor; water sprinkler
- Light sensor: Light Dependent Resistor; Lamp
- Water level sensor: level indicator; Water pump
- CAN controller: MCP2551
- AVR controller: AVR IC
- TTL C.P.
- Solid State Relay
- ESP 8266: WIFI module
- IIOT Server
- RS232 Cable
- P.C.
- Visual basics Software
- LCD display
- Arduino IDE software

Operation and Working of Project: The main purpose of this project is to monitoring and controls the industrial parameters using internet of things and can protocol interfacing with microcontroller and visual basics software. This project is used to reduce the human power with monitoring overall parameters through one p.c. an internet with help of can bus communication system and increase the industrial safety as well. After monitoring these parameters the controlling action takes place without help of human worker of manual operations. The operation of each sensor interfaced with separate microcontroller and can controller as well. The can controller give provision to controlling devices to communicate with each other, the can controller work on the priority base so it automatically make priority for control each parameter. The maximum speed for this operation is 1Mb/S. then these data transmitted to the computer through RS232 cable and with help of ESP 8266 data transmitted to internet server so we can monitor and take controlling actions though the internet over anywhere.

Another thing is to make control action over the parameters and devices. The parameter senses the analog values, and then this value scanned with help of the microcontroller and same value display on the LCD. The main function is to set threshold value of a parameter. If the parameter value increases from certain value or set value then several devices take action on it. For example, if the temperature increases to 55^{o}c and the set threshold point is 50^{o} then the cooling fan turn on and making that temperature below 50^{o}. This same system applied for all equipment. For humidity sensor water sprayers are there, for light sensor light intensity controller are there, for fire sensor water sprinklers are there, for water level indicator level indicators are there. This controlling action takes place from visual basics software from the p.c. which having manual control mode and automatic control mode as well as from internet of things server. The generated data linked with the server and data showed in the form of graph system.

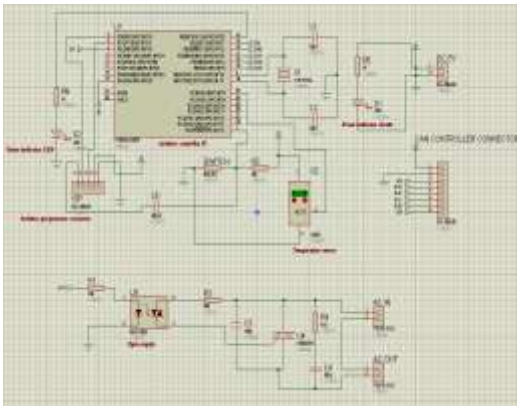

Fig-2: Circuit diagram for temperature sensor

With the help of this monitoring and controlling the industrial parameters the manual mistakes made by the workers are avoided. Therefore the workers in industry will work on the safety areas. And the big control room concept will be avoided by

using CAN communication protocol and industrial internet of things. The industrial database and servers have to be in safe zone for avoiding its misuse. Since can bus is wired network so its use in limited areas but with help of IIOT we increased its area of operation and control.

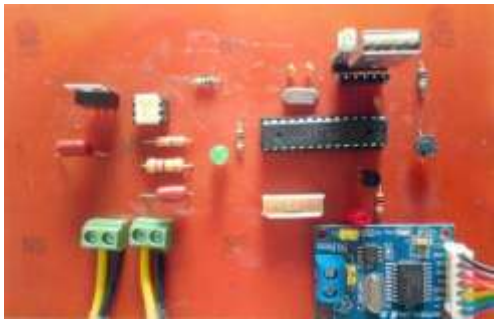

Fig-3: Board for temperature sensor with CAN and AVR interfacing

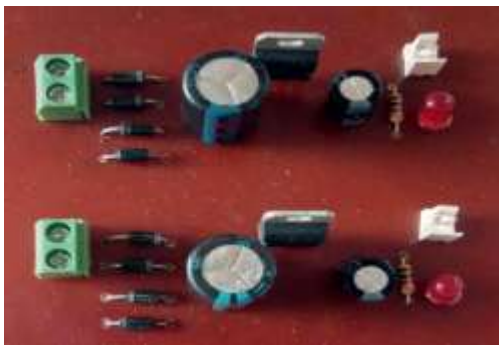

Fig-4: Power supply board for temperature sensor board.

Fig-5: Monitoring and Controlling from V.B. software

Fig-6: Temperature monitoring through IIOT

Conclusion: in this work we can conclude that by monitoring and controlling the industrial parameters like temperature, humidity, water level or fuel level, fire and light with help of single computer and internet server. Our objective is to eliminate the concept of huge control room required for monitoring and controlling above parameters, this can control from anywhere through the internet and from one computer at the field. This system also provides automatic control over the parameters increases over safe value, so the harmful situation may overcome through this project.

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