RESEARCH ARTICLE

Monitoring Factory Machine Status from Remote Location using GSM Technologies

C. Shiny Jennifer[1], B.V. Baiju[2], K. Anusree[3]

[1]M. Tech Scholar, Department of Information and Technology,
Hindustan University, Chennai, Tamilnadu, India,
shinucharles02@gmail.com

[2]Assistant Professor, Department of Information and Technology,
Hindustan University, Chennai, Tamilnadu, India,
bvbaiju@hindustanuniv.ac.in

[3]M. Tech Scholar, Department of Information and Technology,
Hindustan University, Chennai, Tamilnadu, India,
anusreeanil29@gmail.com

Abstract:

This proposed project keeps on monitoring the switching status of the machine and the data is stored in memory with date and time. This data is sent to the dedicated android tiny database. At the same time a message will be sent to user mobile through GSM.

This project that provides a communication between the machine and android mobile since android is an open source which allows the user to build their own application according to their requirements. If the user wants to access the data he has to log in to the dedicated android app and has to press the fetch button so that the status of the machine is viewed. Finally if the user wants to view the production details in the form of a graphical representation than has to press the generate button so that the entire production details are viewed in a form of a graphical report that could be discussed with the officials. It helps in viewing and making analysis about the production details where ever place the user move so that it allows the right person to take decision at right time and need not to depend upon any supervisor budget report.

Keywords: Android tiny database, android application, machine status, graphical representation.

1. INTRODUCTION

Remote machine monitoring is a process of periodically checking the status of the remote machine to enhance the overall products productivity. The data sent by the remote machine monitoring system is very important for the managers and higher officials to analyses the production factors and also to solve issues such as production delay, production calamity, and improper maintenance as the breakdown takes a long time to get reported and fixed. This delay leads the devices to be unused for many days. Such problems can be solved by this remote monitoring system which monitors the status of the machine from any locations, so that we can able to avoid the above said problems. And this system also provides a clear visibility of the production directly to higher officials instead of relying on the supervisor bug report.

The remote machine monitoring system plays a major role in industrial application and they are to a large extent universally. The potential benefits of remote monitoring are significant: minimizing labor costs, Remote service reduced need for on-site maintenance, Intelligent dispatching of service personnel based on diagnostic machine data, Less repeat repair visits due to missing spares, Improved machine uptime/utilization, Longer machine life due to preventive maintenance, Longer lifetime of critical components.

2. AIM OF THE PAPER

(i)Show usefulness of remote-machine monitoring System.

(ii)Explain benefits for remote-machine monitoring System.

(iii)Explain the proposed system and its Technologies.

These aims have to be achieved thanks to an extensive literature review about remote machine monitoring and other related fields including network technologies GSM, and android tiny database and several programming languages such as flow code it is a programing language for controlling PIC microcontroller, Java, Eclipse for developing an application in android mobile Additionally all contents in the paper must be backed by investigations into the related social, ethical, legal issues and a meticulous investigation of the involved standards that may influence remote-machine monitoring in the actuality.

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3. EXISTING SYSTEMS

Starting from the year 1987 machine status monitoring wasn't implemented based on network or GSM technology instead it was monitored locally by adding some hardware that will output some lights. Based on the color of lights or number it display the machine fault is diagnosed or status is monitored. After the year 2000 the machine status monitoring was little advanced by implementing of transmitting data to local distance of about 300 meters using RF frequency. One has to write the status manually in a log book.

4. PROPOSED SYSTEM

The proposed system is the android based status monitoring which would display the production details where ever you are. Machine status monitoring could be incorporate with many data analysis that could help to reduce the post and predictable production delay and production calamity prevention, machine periodical maintenance. So letting the right person to take right decision does not need to relay on the supervisor bugged report. This tool also does some data analysis which would be use full in addressing meetings and also predicting profit or loss.

5. PROPOSED SYSTEM TECHNOLOGIES

We proposed remote machine monitoring system based on   GSM network technology. Thus, introducing this GSM which helps in providing a communication between machines and mobile. So that this system is capable to give feedback to the user about the condition or status of the industrial machines according to the users requirements [3].The industrial appliance control and monitoring system consists of the following components;

6. Backup GSM Remote Control

GSM stands for Global System for Mobile Communication and is an open, digital cellular technology used for transmitting mobile voice and data services. The GSM provides basic to advanced voice and data services including Roaming service. Roaming is the ability to use your GSM phone number in another GSM network. A GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own time

slot. It operates at either the 900 MHz or 1,800 MHz frequency band. The GSM modem is programed using AT/AT+ commands.

AT commands are used to control MODEMs.AT is the abbreviation for Attention. These commands come from Hayes commands that were used by the Hayes smart modems[2].The Hayes commands started with AT to indicate the attention from the MODEM. The dial up and wireless MODEMs (devices that involve machine to machine communication) need AT commands to interact with a computer. These include the Hayes command set as a subset, along with other extended AT commands.

ABOUT LM1117: 1A Adjustable/Fixed Low Dropout Linear Regulator. This voltage regulator is used to supply 3.3v to the GSM circuit. The GSM circuit needs only 3.3v. This regulator will be connected from 7805 output to get 3.3v.

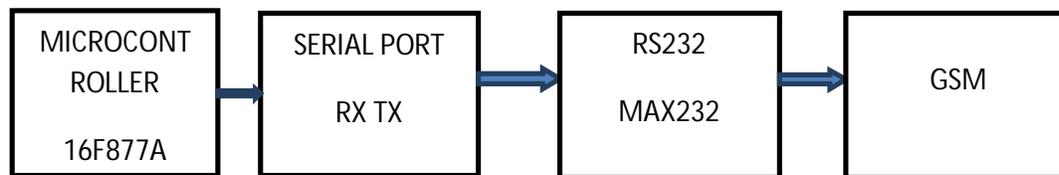| MICROCONT ROLLER 16F877A | → | SERIAL PORT RX TX | → | RS232 MAX232 | → | GSM |

Fig1. Microcontroller communicate with GSM

The microcontroller has built in serial port to communicate with external device. The data are sent through TX pin to GSM via level translator, the level translator is necessary as microcontroller cannot be connected directly to GSM or any computer, the level translator does not change the characteristics of data it only increase the amplitude of the data to get match for GSM voltage level.

7. IMPLEMENTATION

7.1 Microcontroller hardware (transmitter)

Hardware of PIC16F877A and GSM included, assembling, testing the transmitter. two switches considered as machine and by their on/off action (machine on/off) the data is given to the controller input, there is a program which will compare the arriving data with programmed

one if any of the status match then another data is sent to serial port of the controller to the GSM module along with the AT command and special code where this data has to be transmitted.

7.2 PIC Micro controller:

The 16F877A is one of the most popular PIC microcontrollers and it's easy to see why - it comes in a 40 pin DIP pin out and it has many internal peripherals [1].

Pin Description: The 40 pins make it easier to use the peripherals as the functions are spread out over the pins. This makes it easier to decide what external devices to attach without worrying too much if there enough pins to do the job [7] .
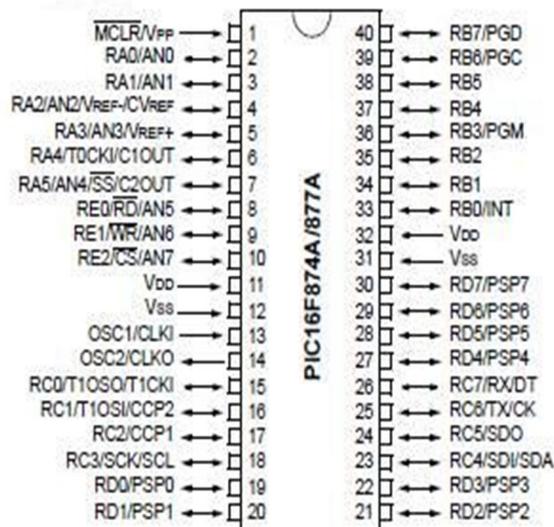

Fig2.Pin diagram

7.2.1 About power supply

Power supply is important to operate the hardware where microcontroller needs +5vonly, to get this voltage the AC voltage is converted to DC and regulated to +5v using 7805 voltage regulator.

7.2.2 About Lm7805

The LM7805 is a three-terminal positive regulator. Available in the TO-220/D- PAK package and with several fixed output voltages, although designed primarily as fixed voltage regulators,

these devices can be used with external components to obtain adjustable voltages and currents. LM7805 employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver an output current of over 1A.

7.2.3 Flow code Algorithm

Flow code is a development environment commercially produced by Matrix Multimedia for programming embedded devices such as PIC, AVR (including Arduino) and ARM using flowcharts instead of a textual programming language [1].Flow code is a high level programming language dedicated to simplifying complex functionality such as Bluetooth, Mobile Phones Communications, and USB.
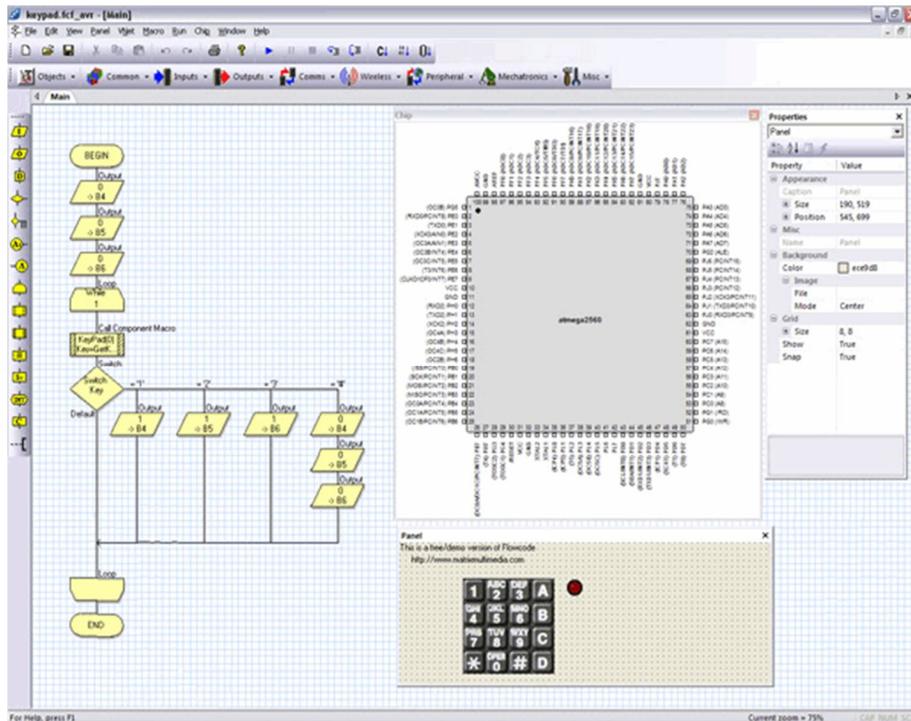

Fig3.Flow code example

7.2.3 Working Method of Flowcode

STEP1: Create a new flowchart, specifying the microcontroller that you wish to target.

STEP2: Drag and drop icons from the toolbar onto the flowchart to program the application.

STEP3: Add external devices by clicking on the buttons in the components toolbar, editing their properties, how they are connected to the microcontroller and call macros within the device.

STEP 4: Run the simulation to check that the application behaves as expected.

STEP5: Transfer the application to the microcontroller by compiling the flowchart to C, then to assembler code and finally to object code.

7.3 Microcontroller hardware (Receiver)

Hardware of PIC16F877A and GSM included, assembling, testing the receiver [6]. The data captured by this GSM is send directly to the user's android tiny database where the date and time is denoted with the status of the machine.

7.3.1 Android Tiny database

Storing Data in an App's Long-Term Memory: Using the TinyDB and TinyWebDB Components. The data in the database is called persistent data because even when you close the app and re-open it, the data is still available-- it persists. As an example, consider an app those auto-responds to texts the phone receives by sending back a "sorry, am busy" message. Such an app should let the user customize the response message. When the user enters a new custom message, the expectation is that the new message will be saved persistently--in a database. If the user changes the custom message to, "I am busy, stop bugging me," then closes the app, when the app is reopened the message should still be "I am busy, stop bugging me. Persistent data is different than the variables and properties an app uses for its computations. That data is transient or short-term memory, and when you close an app the data stored there is lost.

8. ANDROID DESIGN

This module is android design interface with native message functions and chart design. Thus an application is been designed in android so that the status and profit or loss analyses is made easily.

8.1 Android

For this remote machine system we are targeting Android platform since it has huge market and open source. Android is a software stack for mobile devices that includes an operating system, middleware and key applications [4]. The Android OS is based on Linux.

Android Applications are made in a Java-like language running on a virtual machine called 'Dalvik' created by Google. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Accessory mode is a feature of Android OS since version 2.3.4 Gingerbread and 3.1 Honeycomb and above [4].

8.2 Software Design

As discussed earlier we are developing Android application. The application consists of main function like monitoring the machine status and analyzing the profit or loss. The main screen has a list of function like machine1, machine2, machine3 for the user to select, suppose if the user needs to view the condition of machine1 then need to select it so that the condition of that particular machine can be viewed.   The system is smart enough to analyses the profit or loss by entering into the application and pressing the generate button so that it denotes the products production in a graphical representation
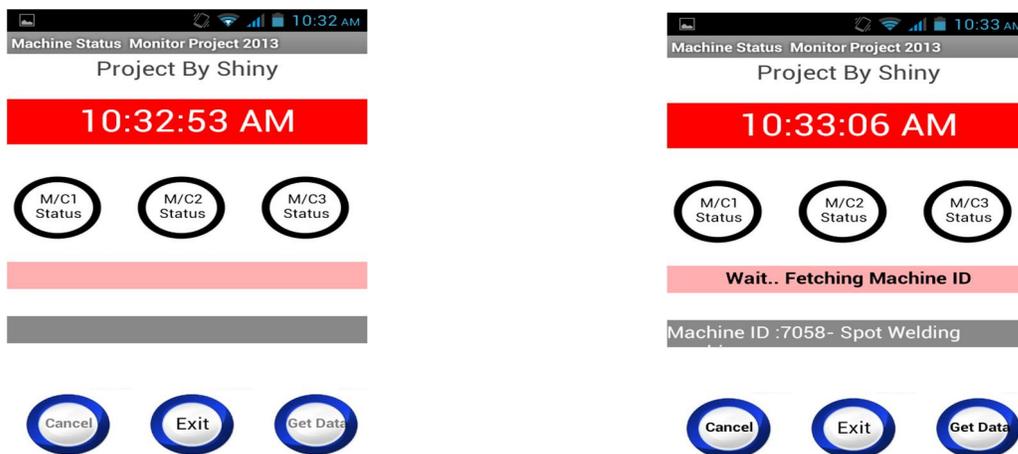
Fig4.Screen shots

8. 3 Uses

Following are the uses of Remote machine monitoring system

1.The managers or higher officials can able to view the status of the machines wherever place they move

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2.They can also able to analyses the profit or loss of the products production

3.So that the managers of the particular organization need not to depend upon any supervisors bug report.

4.It is very use full in avoiding the production delay, production calamity and provides periodic machine maintenance.

5.It is helpful for a right person to take decisions at right time.

9. FUTURE WORK

The security cameras can be introduced which allows the user to observe the activity around the industry. And suppose if the machine stops working due to the occurrence of certain problem immediately a message can be send directly from the machine to the respected service center. Scope of this project can be expanded to not only to industry but also to other areas.

10. CONCLUSION

This is an ongoing project. Our prime objective is to avoid the production delay. This paper gives basic idea of how to control and monitor various machine in the industries. This project is based on Android and GSM technology which is used to make a communication between the android and embedded device. So the overall implementation cost is very cheap and it is affordable by a common person. Looking at the current scenario we have chosen Android platform so that most of the people can get benefit. The design consists of Android phone with industrial automation application, PIC micro controller for controlling the machines and GSM modem. We have discussed a simple prototype in this paper but in future it can be expanded to many other areas.

REFERENCES

1. Md. Belayat Hossain, Md. Nahid Hossain, Dept. of APECE University of Dhaka, Bangladesh "Design and Development of Microcontroller Based Electronic Queue Control Systems". Proceeding of the 2011 IEEE Students' Technology Symposium14-16 January, 2011, lIT Kharagpur.

2. Deepali Javale Assistant Professor Dept. of Computer Engg MAEER's MITCOE Pune, India "Home Automation and Security System Using Android ADK".

3. Armando Roy Delgado, Rich Picking and Vic Grout Centre for Applied Internet Research (CAIR), University of Wales, NEWI, Wrexham"Controlled Home Automation Systems with Different Network Technologies".

4. Wanbin Wang. Peter W. TseJay Lee"Remote machine maintenance system through Internet and mobile communication".

5. Ch. Naga Koti Kumar, Y.V. Raghu Babu, A. Gamya, P.Jainath, M. Vijay / International Journal of Engineering Research and Applications (IJERA) "Design and Development of Activation and Controlling Of Home Automation System VIA SMS through Microcontroller".

6. N. P.Jawarkar, V.Ahmed, S. A. Lad hake, R. D. Thakare, (2008). Microcontroller based Remote Monitoring using Mobile through Spoken Commands. Journal of Networks, 3(2), 58-63.