GPS Based Synchronised Digital Clock

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Abstract—The GPS based digital wall clock that will help the user to find out the recent time in other country in low costing. The emerging importance of maintaining a stable, accurate time base in distributed systems requires a supporting infrastructure to distribute the common wall clock time to the nodes. The main objective of this GPS based digital wall clock is automatic updating of time and the user can specify this module which is easy to move in all worlds without any error. In case any error is occur or signals from satellite are weak that time we used RTC which is used to show the right time. RTC is used for backup purpose. Here we are using switches to check the time by switching or pressing the keys.

Keywords—LED panel, RTC, AVR, GPS, Microcontroller

I. INTRODUCTION

“Time is money” is the saying. If your facility do not maintain correct time how your staff or your officials can. Improper time will cause lots of loss in the working hours of the staff and the whole facility will work like an unorganized sector. So it is very important to maintain the perfect time in any business or office. In fact, proper time consciousness among the employees, staff or workers will enhance the Productivity and also the personal working output of your facility. Imagine all clocks in your facility perfectly synchronized, all keeping accurate time. Every official work is time bound. So it is necessary to keep the time synchronized in your facility to achieve the maximum goal of your facility. To achieve the goals in a specified time frame, it is necessary to keep right time in your facility all-round the year. To achieve this uniform time code throughout the facility or campus or factory, it is necessary to install GPS based Digital clocks in your facility.

II. LITERATURE REVIEW

For designing of GPS based digital wall clock we referred various literature, papers etc. The review of previous method used given below:[1]In this PTP the “Precision Clock Synchronization Protocol for Networked Measurement and Control Systems” is designed to synchronize clocks across packet based networks.

PTP allows for synchronization of distributed clocks to sub-Microsecond accuracy with devices that may have differing precision, resolution and stability. PTP provides for transparent clocks to measure and account for this delay in a time-interval field within timing packets, thus making the switches temporally transparent to master and slave nodes. Transparent clocks must perform this operation very accurately and at the communication speed without introducing more delays. The end-to-end transparent clock forwards all messages just as a normal switch. [2] Global synchronization is crucial to many sensor network applications that require precise mapping of the collected sensor data with the time of the events, for example in tracking and surveillance. This method does not scale well because it requires the nodes in the whole network to participate in the synchronization process at the same time. [3] This white paper will discuss mitigation options for interference to GPS installations and introduce a new packet-based primary reference source from Symmetricom called Time Provider 1500 as a viable alternative to protect from GPS Vulnerabilities.

III. PROPOSED METHOD

We design “GPS based digital wall clock”, in which we are using microcontroller, RTC, Keypad, LED panel, ARM IC. The digital clock system is design provides time information using global poisoning satellite system or stand-alone high stability oscillator. This system provides synchronized time data.
The fig. shows the block diagram of “GPS based digital wall clock”. In this project a GPS module is used for accurate time generation the time received from the GPS module is then saved in the RTC. The output of the GPS module is RS232 so it cannot be directly interfaced to the microcontroller hence we have used MAX232 IC. We will be communicating with the RTC using I2C protocol. The RTC is basically used as a backup & if in case no signal or the GPM module gets corrupted the controller will get time from the RTC. A 3v battery is provided with the RTC for backup so even after power down the time is saved in the RTC.

IV. HOW GPS WORKS

The Global Positioning System (GPS) is a satellite-based navigation system that consists of 24 orbiting satellite, each of which makes two circuits around the earth every 24 hours. These satellites transmit three bits of information—the satellite number, its position in space, and the time the information is sent. These signals are picked up by the GPS receiver, which uses this information to calculate the distance between it and the GPS satellites. With signals from three or more satellite, a GPS receiver can triangulate its location on the ground (i.e. longitude and latitude) from the known position of the satellite. With four or more satellites, a GPS receiver can determine a 3D position (i.e. Latitude, longitude and elevation). In addition, a GPS receiver can provide data on your speed and direction of travel. Anyone with a GPS receiver can access the system. Because GPS provides real-time, three-dimensional positioning, navigation, and timing 24 hours a day, 7 days a week, all over the world, it is used in numerous applications, including GIS data collection, surveying, and mapping.

V. HARDWARE USED

A. GPS Receiver

It is used to receive the signals from satellite. These satellites transmit three bits of information — the satellite's number, its position in space, and the time the information is sent.

B. RTC

The RTC is basically used as a backup & if in case no signal or the GPM module gets corrupted the controller will get time from the RTC. A 3v battery is provided with the RTC for backup so even after power down the time is saved in the RTC.

C. LED Panel

LED display is also used in store signs and billboards. LED panels are used for illumination rather than displaying purposes. An LED panel consists of number of LEDs and a typical LED display consists of many LED panels. Surface mounted device (SMD) panel and conventional LED panel are the two classes of LED panels found in the market.
VI. OVERVIEW

The digital clock system is designed to provide time information using the global positioning satellite system (GPS) or stand-alone high stability oscillator. The system provides synchronized time data for all activities in power plants, process industries, railway stations, airports, all India radio and Durdarshan etc. Where several computers or systems are installed. The common reference time is obtained from the GPS orbiting around the earth from a high stability oscillator. In case of non-availability of satellite signal, the master runs in free running mode by using its own RTC and oven controlled crystal oscillator. Some of the target systems are synchronized through contacts inputs; therefore system provides relay contact outputs.

VII. CONCLUSION

In the power generation industry, accurate time-keeping by supervisory control systems is of utmost importance. When power plant systems run on different time clocks, determining the sequential order of process upsets or trips is virtually impossible.

The inability to determine when, and how, an upset occurred also increases the odds of a repeat failure, thus compounding the loss of uptime and the expense of equipment repairs. To minimize operational failures and improved reliability by implementing an innovative Global Positioning Satellite (GPS) based time synchronization solution at the facility. For this purpose we are implementing GPS based digital synchronized wall clock for accurate time.

REFERENCES

