

# GSM Based Smart Data Logger System

K. Immanuel Arokia James, M. Jagabar Sathik, M. Praveen

**Abstract:** The aim of this paper is the faculty should maintain the punctuality to enter the class rooms. In any organization, the staff monitoring can be done by a manually or with help of finger print. It requires like Personal computer, more man power, man power cost and time delay. In this paper discussed about automatic monitoring system. The device will send the pre-message to the faculty about class time, if the fail to present on class starting time or if they leave the class room the before class end time it will send the message to the higher authorities of the institutions and we can maintain the database with help of external memory card slot. We have designed only for Educational Institutions.

**Index Terms:** PIC Microcontroller (16F877A), GSM Module, Finger Print Module, External memory card slot.



## 1. INTRODUCTION

The Overall process of our project gives a real time data entry and also gives responding on time information to the preferred person. Whenever we need the information we can collect it from the database of the device. Our proposed project was mainly based on GSM networks and microcontroller.

This application can be implemented for all sorts of institutions, factories, industries. Proper operation can be achieved through this project. The advantage of our project is used to eliminate manual checking and operation. It also used to maintain the time consciousness.

### 1.0 EXISTING METHOD

Two types of classical methods,(i) The staff monitoring will be more manual work to maintain the monthly report and more difficult for instant update about the presence of staff and it will give more manual work as well as wastage of papers. (ii) By using the Finger Print method we need a PC to get an update of present employee attendance, suppose the PC corrupted the database will destroy. To avoid this, we have designed new device to overcome the above said problems.

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## 2.0 PROPOSED SYSTEM

Our Proposing idea for on time staff entry report is mainly based on GSM networks and Microcontroller. In my proposed system we have GSM module used to transferring the message through Network, Finger Print to check whether the concern faculty entered the class room or not. External Memory slot used to maintain the database.

The designed modular kit contains GSM network for Wireless communication and USB slot is used for neglecting computer and other devices. The only wire is for power supply.

The designed device will intimate through SMS to the concern faculty before class time. Once the faculty entered the class room they should give finger print access.

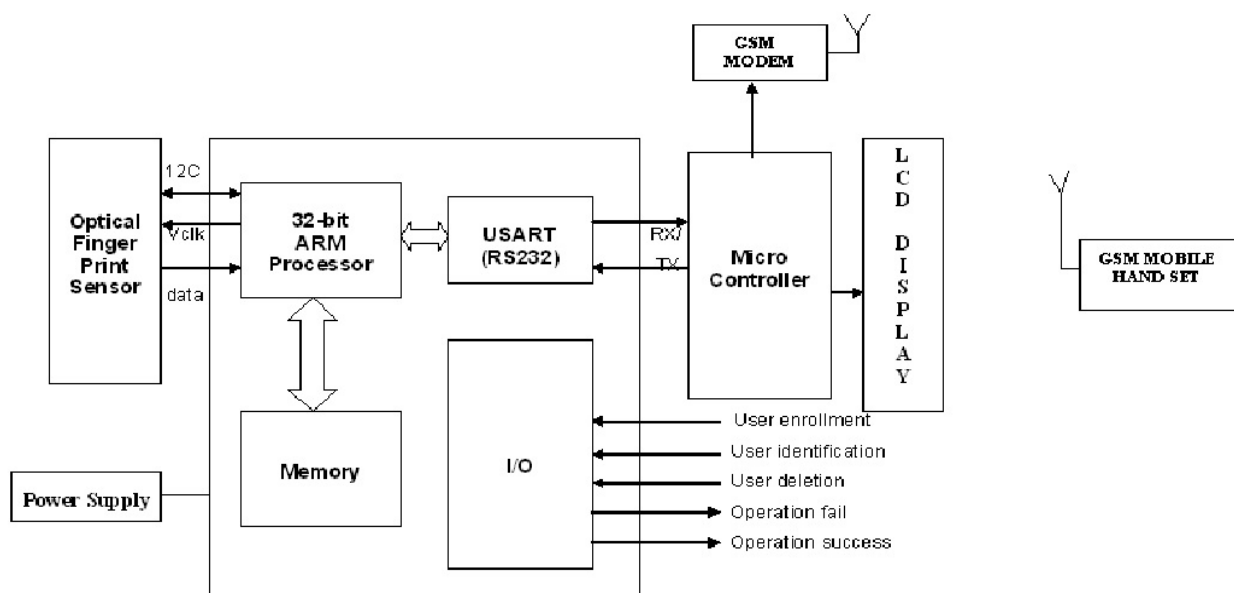
If staff not entered in time the device will send the SMS to higher authorities on staff not present in a class and also it will keep the database about staff entry time, name and altered staff details. The concern faculty cannot move from the class room until the class time is complete. Whenever we need a report we can collect data from the database of device through Memory Slot.

Suppose the concern faculty not presented to the institution. In generally any faculty can alter the classes, but in our proposed system the only particular class staffs can alter the class, if fail it will inform to the higher authorities.

The following details we can read from the database:

- The number of class's calculation per subject
- The faculty absentee's details
- The alter faculty details
- Class entry time
- Exit time.

## BLOCK DIAGRAM



### 3.0 DEVICE OVERVIEW

This document contains device specific information. Additional information may be found in the PICmicro Mid-Range Reference Manual (DS33023), which may be obtained from your local Microchip Sales Representative or downloaded from the Microchip website. The Reference Manual should be considered a complementary document to this data sheet, and is highly recommended reading.

### 3.1 GSM

#### 3.1.1 Signaling in GSM

The various entities in the GSM network are connected to one another through signaling networks. Signaling is used for example, for subscriber mobility, subscriber registration, call establishment etc. The connections to the various entities are known as 'reference points'. Examples include:

Various signaling protocols are used over the reference points. Some of these protocols for GSM are the following:

- *Mobile application part (MAP)* – MAP is used for call control, subscriber registration, short message service, etc.; MAP is used over many of the GSM network interfaces;
- *Base station system application part (BSSAP)* – BSSAP is used over the A interface;
- *Direct transfer application part (DTAP)* – DTAP is used between MS and MSC; DTAP is carried over the Abis and the A interface. DTAP is specified in GSM TS 04.08.
- *ISDN user part (ISUP)* – ISUP is the protocol for establishing and releasing circuit switched calls. ISUP is also used in landline Integrated Services Digital Network (ISDN).

A *circuit* is the data channel that is established between two users in the network. Within ISDN, the data channel is generally a 64 kbit/s channel. The circuit is used for the transfer of the encoded speech or other data. ISUP is specified in ITU-T Q.763.

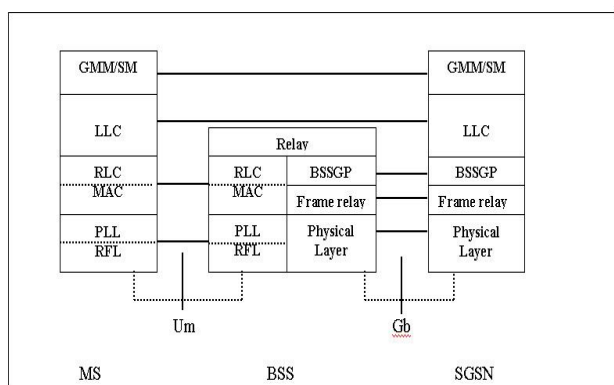
When it comes to call establishment, GSM makes a distinction between *signaling* and *payload*.

Signaling refers to the exchange of information for call set up; payload refers to the data that is transferred within a call, i.e. voice, video, fax etc.

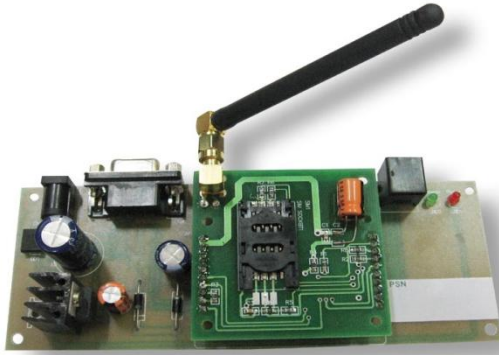
For a mobile terminated GSM call, the signaling consists of exchange of MAP messages between GMSC, HLR and visited MSC (VMSC). The payload is transferred by the ISUP connection between GMSC and VMSC.

- *A interface* – the connection between MSC and BSC;
- *Abis interface* – the connection between BSC and BTS;
- *D interface* – the connection between MSC and HLR;
- *Um interface* – the radio connection between MS and BTS.

It is a continual aim to optimize the payload transfer through the network, as payload transfer has a direct cost aspect associated with it. Some network services are designed to optimize the payload transfer. One example is optimal routing.



### 3.1.2 GSM Modem



### 3.1.3 GSM Network

The GSM network consists mainly of the following functional parts:

- **MSC** – the mobile service switching centre (MSC) is the core switching entity in the network. The MSC is connected to the radio access network (RAN); the RAN is formed by the BSCs and BTSs within the Public Land Mobile Network (PLMN). Users of the GSM network are registered with an MSC; all calls to and from the user are controlled by the MSC. A GSM network has one or more MSCs, geographically distributed.

- **VLR** – the visitor location register (VLR) contains subscriber data for subscribers registered in an MSC. Every MSC contains a VLR. Although MSC and VLR are individually addressable, they are always contained in one integrated node.

- **GMSC** – The Gateway MSC (GMSC) is the switching entity that controls mobile terminating calls. When a call is established towards a GSM subscriber, a GMSC contacts the HLR of that subscriber, to obtain the address of the MSC where that subscriber is currently registered. That MSC address is used to route the call to that subscriber.

- **HLR** – The Home Location Register (HLR) is the database that contains a subscription record for each subscriber of the network. A GSM subscriber is normally associated with one particular HLR. The HLR is responsible for the sending of subscription data to the VLR (during registration) or GMSC (during mobile terminating call handling).

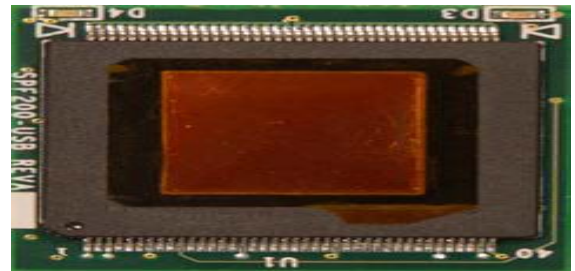
- **CN** – The Core Network (CN) consists of, amongst other things, MSC(s), GMSC(s) and HLR(s). These entities are the main components for call handling and subscriber management. Other main entities in the CN are the equipment identification register (EIR) and authentication centre (AUC). CAMEL has no interaction with the EIR and AUC; hence EIR and AUC are not further discussed.

- **BSS** – The Base Station System (BSS) is composed of one or more base station controllers (BSC) and one or more base transceiver stations (BTS). The BTS contains one or more

transceivers (TRX). The TRX is responsible for radio signal transmission and reception. BTS and BSC are connected through the Abis interface. The BSS is connected to the MSC through the A interface.

- **MS** – the mobile station (MS) is the GSM handset. The structure of the MS will be described in more detail in a next section. A GSM network is a *public land mobile network* (PLMN). Other types of PLMN are the time division multiple access (TDMA) network or code division multiple access (CDMA) network. GSM Uses the following sub-division of the PLMN:

### 4.0 FINGERPRINT SENSOR

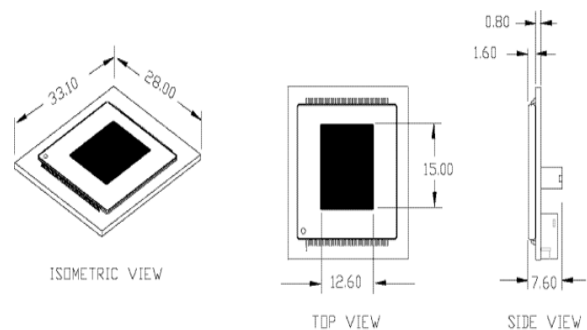


#### Description

The Fujitsu SPF200-USB is an all-in-one USB device. Simply connect it to your USB cable and you have a working fingerprint sensor.

The SPF200-USB is ideal for integrating into devices where USB is the communication interface such as computer peripherals and embedded applications.

Mount the SPF200-USB into your device and you have a completed product without going through the expense of board layout and debug. Users will no longer be required to remember and enter cumbersome passwords or PIN codes.



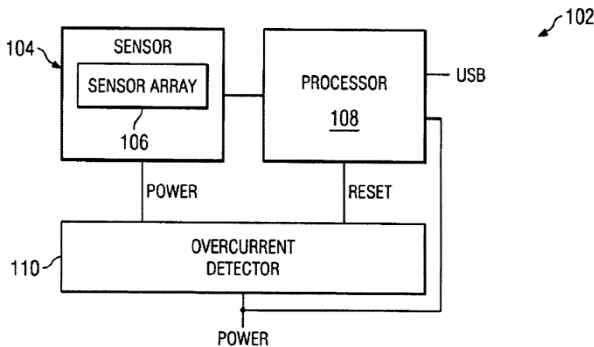
NOTE: ALL DIMENSIONS IN MILLIMETER

Fingerprint authentication provides a reliable, quick and user friendly alternative to passwords. The SPF200-USB fingerprint sensor has the USB 1.1 controller logic built right into the sensor, no external hardware is required. Merely plug the sensor into the USB cable, the power and data communications is managed by the USB protocol. The Fujitsu SPF200-USB fingerprint sensor quickly captures the image of the fingerprint, analyzes it and compares it to a pre-

viously registered fingerprint template.

The Fujitsu SPF200- USB fingerprint sensor consists of a 256 column x 300 row array of tiny metal electrodes. Each electrode acts as one plate in a capacitor and the finger acts as the second plate in a capacitor. A passivation layer on the

4. Breaking into Embedded – *Jack G.Gansle.*
5. Programming Embedded Systems – *Micheal Bar.*
6. A Survey of Technologies *Philip D. Wasserman.*
7. USB Mass Storage Designing and Programming Devices and Embedded Hosts-*Jan Axelsson*



surface of the device forms a tough outer shell, protecting the device from abrasion, chemicals, moisture and other forms of damage. The SPF200-USB is manufactured in standard CMOS technology, a mature and cost effective manufacturing method.

#### 4.1.1 Circuit Design

##### Specification:

- Operating Current: 18 milli amps
- Standby Current: 500 micro amps
- Fingerprint Sensor: MBF200
- Operating Temperature: 0 to 60°C
- Storage Temperature: -65 to 150°C and

Resolution: 500 DPI, 8-bit grayscale

#### CONCLUSION

This project mainly focuses the on time report entry and perfect to maintain the database of the particular employee. Implementation of this project is simple and very economical. This application can be implemented for all sorts of institutions, factories, industries. Proper operation can be achieved through this project. The advantage of our project is used to eliminate manual checking and operation. It also used to maintain the time consciousness. Only the concerned staff can be altered. This project saves more manual power and cost.

#### FUTURE ENHANCEMENT

- More supportive to the industries, factories, which improves their overall discipline performance (punctuality).
- Instant Feedback.
- Easy way of getting database.

#### REFERENCE

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2. Programming and customizing the PIC microcontroller – *Micheal predco.*
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