

Projects in Wireless Domain

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WIRELESS INTRUSION CONTROL PANEL

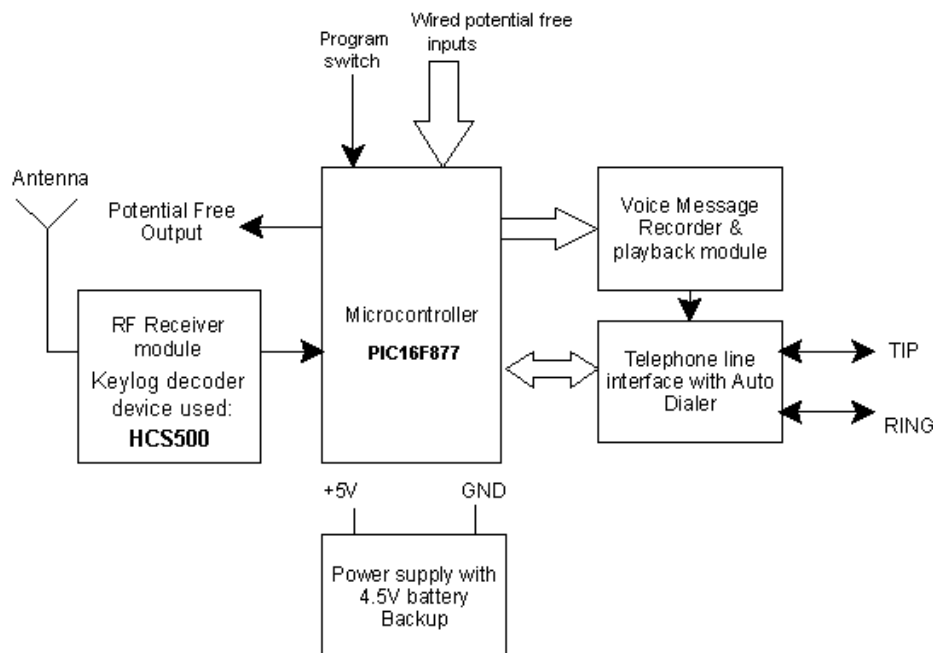
Solution

System consists of this Intrusion panel, which senses the emergency and contacts the Central Monitoring Station. Various types of wireless sensors like Magnetic Contacts, Smoke/LPG Detectors, Vibration Sensors; Emergency/Panic Switches etc. can connect to Intrusion Panel. Sensors are of either wired type or equipped with wireless transmitters.

Emergency can be also reported to the intrusion panel with the small pendent. This pendent is a small data input unit, which is developed on microchip platform, which uses the microchip's Keeloq technology using OOK (On/ OFF keying technology). When user presses the button on the pendent, the pendent code will be transmitted to the intrusion panel over the RF link.

Intrusion Panel consists of Microprocessor based circuit, which accepts the signals over RF link or wires. Depending upon user programming, it resolves sensor inputs and activates Siren. It also has inbuilt auto dialer facility, which dials automatically over PSTN or GSM.

Intrusion Panel provides several other features like programmable entry/exit delay, audio indications, digital display etc.



Features

- 4 wired zones (2 delayed and 2 panic).
- 1 wired smoke detector input.
- Keypad based arming/disarming.
- 15 Wireless Sensor Zones (Uses Microchip Keeloq technology to secure).
- Uses 433.92MHz RF transmitter/receiver pair.
- Battery Backup with battery charger.
- Telephone dialer with multiple voice messages.
- Other features like: Tamper Switch, Telephone line sensing.
- Seven Segment LED indications.
- Design & development of tamperproof enclosure.

ZIGBEE BASED SECURITY SOLUTION

Solution

We have developed Microchip based ZigBee security solution for senior citizen residential complex. We have used Microchip ZigBee stack. Basic stack remains same for node and gateway. But the application layer is different.

The node hardware is having panic button on it and it remains with the user. There are different gateways fitted at different locations. Whenever the user moves from one cell to another, and if he presses the panic button on the node then the node sends some signal to the gateway which in turn communicates to the coordinator. The coordinator is connected to the PC. There is a PC based software, which displays all the information of the node from where the signal has been generated.

Our contribution

- Hardware development for ZigBee node
- Hardware development for Gateway
- Hardware development for Coordinator
- Firmware (Application layer development for above mentioned hardwares)
- PC side application software

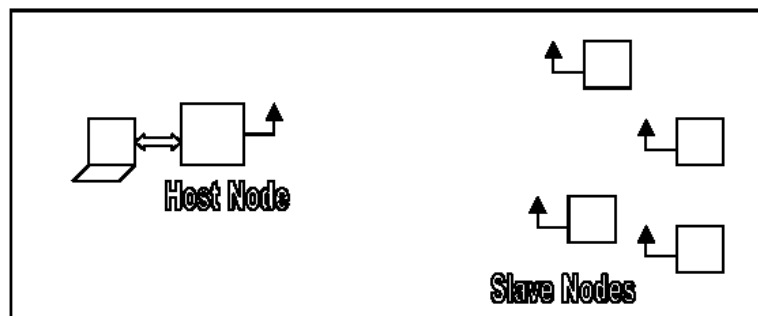
ZIGBEE BASED WIRELESS SENSOR NODE (WSN)

Solution

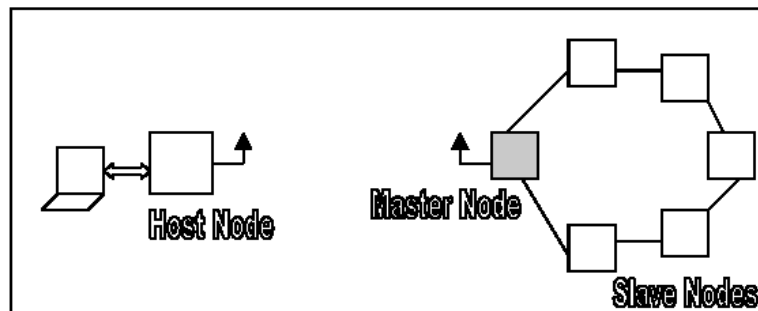
Wireless Sensor Node (WSN) units are used to capture data from sensors and send the data across wireless link to Host PC. The overall system can be configured in two ways as shown below.

WSN hardware in the system is identical for each node, whether configured as Host or Slave. The node connected to the PC is the Host node. Rest of the WSN units are regarded as slaves in configuration 1. There is additional Master node in configuration 2. The firmware in all the nodes is the same.

Configuration 1



Configuration 2



Configuration 1: In configuration 1, the link between each slave node and the master node through wireless

Configuration 2: In configuration 2, all the slave nodes are connected through a Serial multi-dropped link. One node on this link will be the Master Node, which is responsible for receiving commands from the Host Node and transmitting data from any of the slaves on the serial link.

WIRELESS MODEM USING CHIPCON CC1000

Solution

The RF modem uses the CC1000 chip. A pair of RF modems is used as a replacement for RS-232 serial cable.

The RF modem communicates with a PC or other RS-232 devices over an RS-232 link. In transmit mode, the modem reads data from the RS-232 serial interface, creates packets containing the data, and transmits these packets over the RF link. In receive mode, it looks for valid packets. When one is received, the data contained within the packet is extracted and sent to the attached RS-232 device or PC.

This wireless modem is designed around CC1000 IC from Chipcon and is the full implementation of RF transceiver. The designer has to interface the controller with 6 digital lines. On the RF side the module can interface with any 50-ohm antenna.

WIRELESS CONTROL OF HELICOPTER PARKING PLATFORM

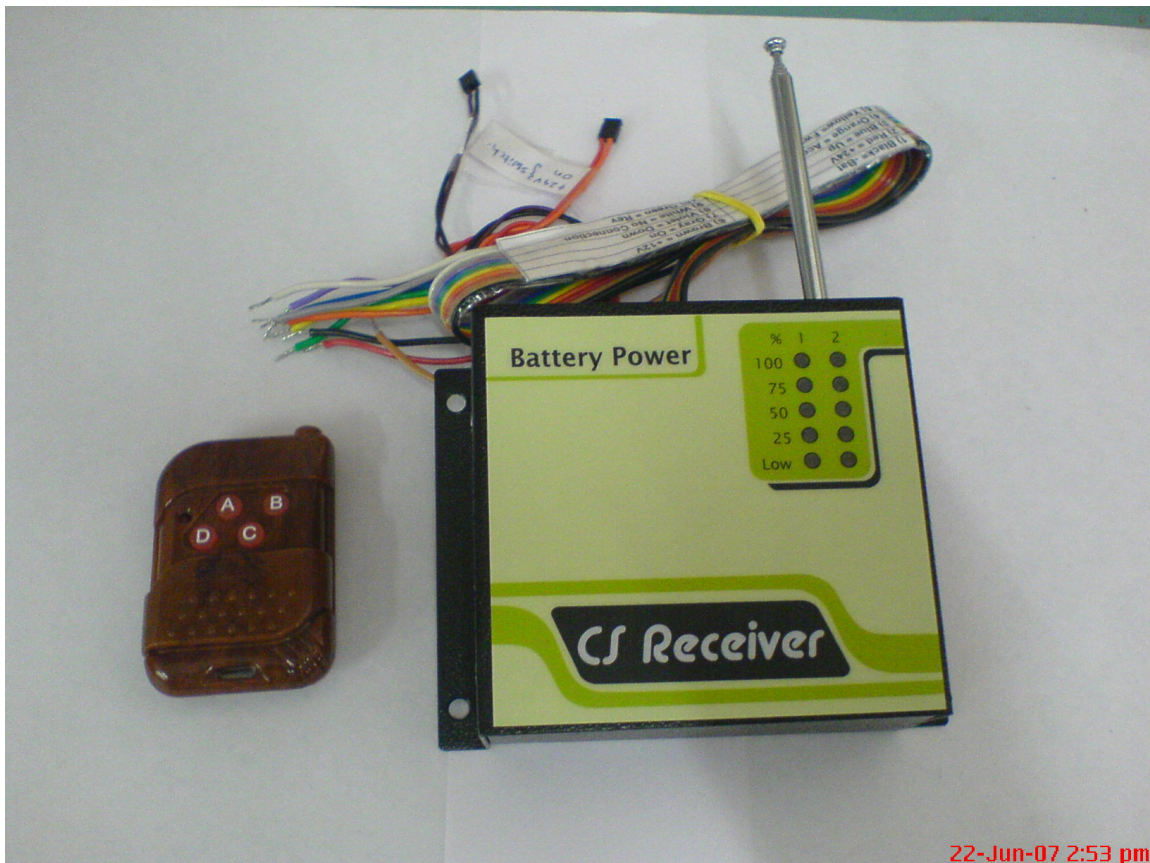
Objective:

The requirement project is to replace the wired hand held control unit by wireless remote. Hardware comprise of two units, remote control transmitter and receiver cum platform control unit. Transmitter is four-button RF wireless key-fob, having Up, Down, Forward and reverse keys. Receiver comprise of a RF receiver circuit, which is interfaced with the motor control unit of helicopter platform.

Customer:

Reputed US based manufacturer of Helicopter Parking Platforms

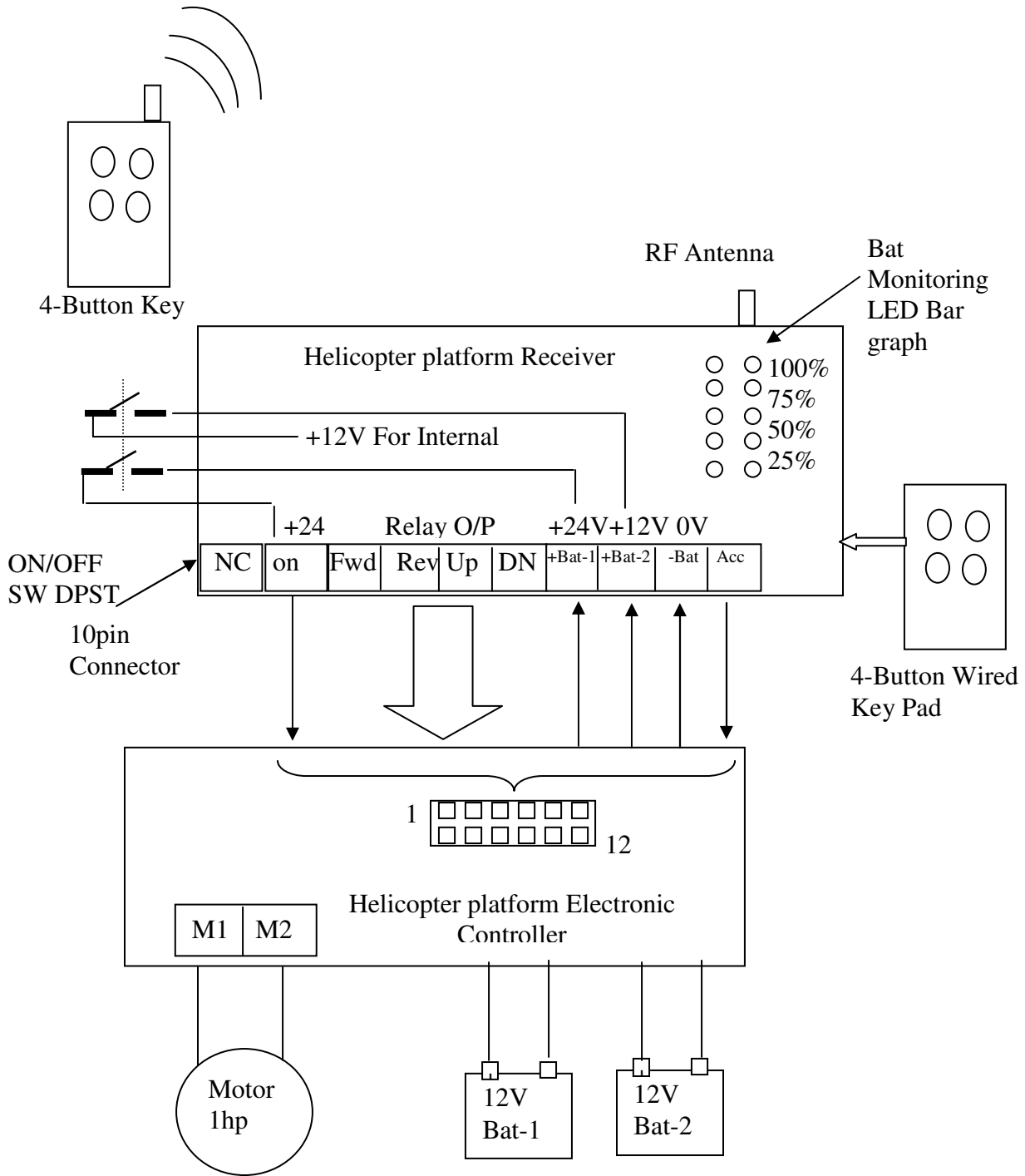
Device:



Design Challenges:

Design of RF Transmitter with rolling code generator. Design of RF Receiver and translation of signals received to give respective commands to electronic control.

Block Diagram:





Product functionality:

The user can control the helicopter platform with the help of a remote control. There are 4 buttons on the remote control. **UP/DN/FOR/REV**. The receiver on the helicopter platform can sense these signals and take action accordingly.

The **UP** signal make the hydraulic valves active, the liquid start flowing in the piston and due to the pressure of the liquid from the downward direction the valves lift the helicopter, while the **DN** signal allow the liquid to flow from upward direction and due to the pressure of the liquid from upward direction the valves put down the helicopter.

The **FOR** signal move the helicopter platform forward. Clicking it each time increases its speed accordingly. Maximum the helicopter platform can move with 4th level of speed that means we need to click the forward button four times to reach the 4th level of speed.

The same operation is done for reverse movement with the help of **REV** signal. In reverse motion also the maximum speed is of the 4th level.

FLOW METER DATA LOGGER

Objective of the Project:

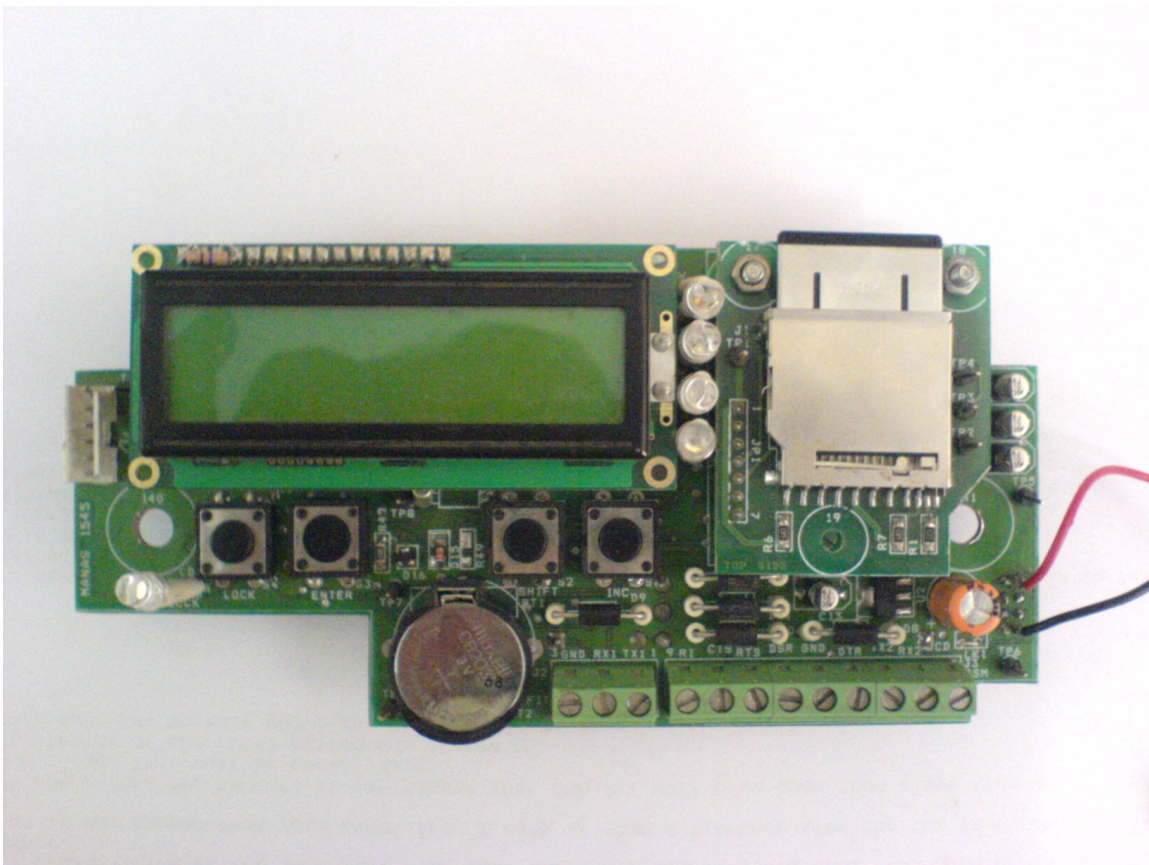
This Project involves development of a Device which collects the Data from a Magnetic Flow Meter on RS232 and stores this Data on an SD Card. The Device can also send SMS at certain predefined time intervals to a Remote Station at which a PC Utility is running. All the SMS are logged in the PC Utility. The Data stored in the SD Card can also be read using this Utility and Data can be stored in well formatted Excel Sheet.

The Overall scope of Project Development of Flow Meter Data Logger included:

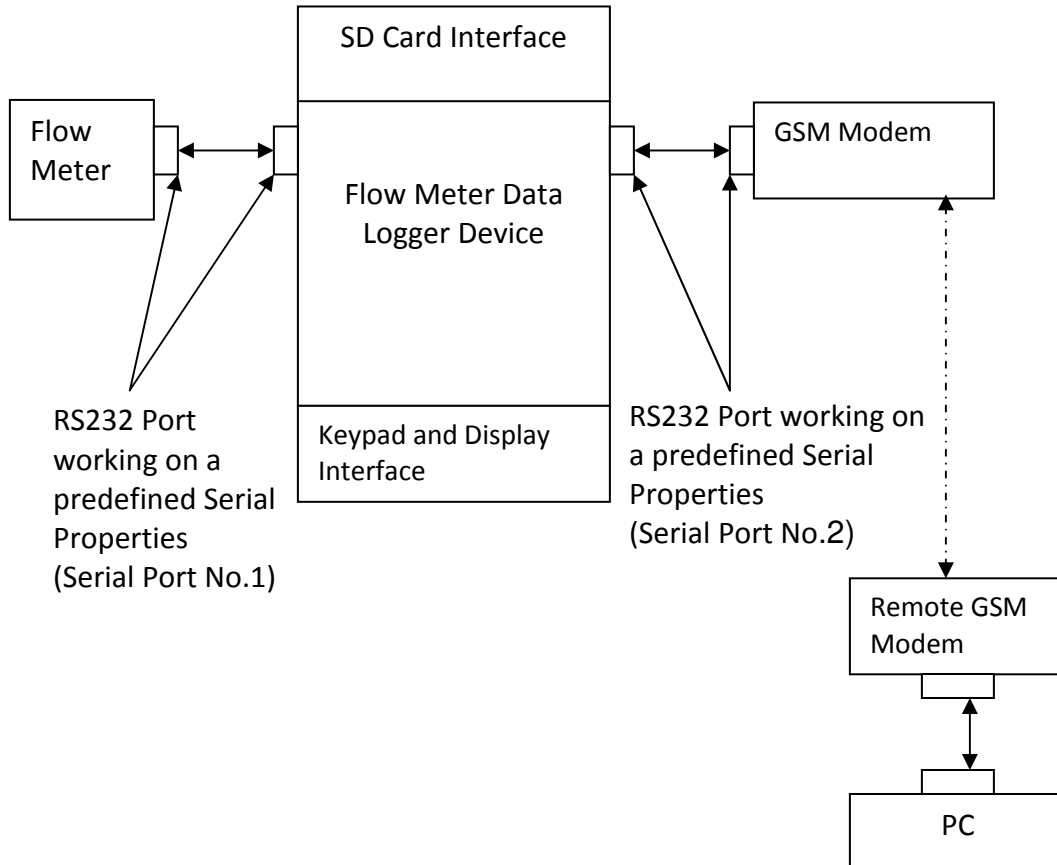
1. Development of Hardware Prototype Units.
2. Development of Firmware for FMD.

Customer: Reputed Flow Meter Manufacturer

General Overview:



Block Diagram



The Device is meant to collect Data from a Magnetic Flow Meter on RS232 Serial Port on MODBUS and store the same Data to a SD Card of a specific Memory in an encrypted format. Then SD Card can be then connected to a PC using a SD Card Reader and the data will get read using a PC Based Utility. The card can be then reformatted and reused.

The Device has an optional second serial communication port to connect GSM Modem and be able to communicate with another GSM Modem by sending a number of SMS and store the data at other end PC. Data stored in the SD Card can be printed through a Printer using the second RS232 Port.

The Device also has an LCD Display and a Keypad with 4 Keys for configuration of parameters such as Baud Rate, Date/Time, Polling Frequency, SMS sending Frequency etc.

Project also involved development of PC side utility to read the received SMS from the GSM Modem and store in database or xls file.

Firmware Modules Developed

1. FAT32 File System.
2. Modbus Master Library.
3. GSM AT Command Library.
4. Real Time Clock Library.
5. SD Card Interface Module.

PC Side Software Modules Developed

1. SCOPE:

This is for automation of Tank Gauge Controller data logging at a centralized station away from the flow meter. The basic functions will be....

1. Get data from GSM modem periodically in the form of SMS and store in a database
2. Read encrypted data from SD card and store the data in the database
3. Generate the reports per unit and given time period.

2. UTILITY FUNCTIONALITY:

The application is a Data logger which will log data from a FLOW METER and save this on a SD card in an encrypted form. The same data will also be transmitted as SMS via a GSM modem to a remote station where the data is collected on a PC. Periodically, the operator may take the SD card from the logger to the Central monitoring station and read the data collected on the SD card and add to the database. The PC end utility will be connected to one or more such data loggers via GSM modem. The utility will also provide a facility to the user to read a SD card which contains the data stored by data logger in an encrypted format. The data read from the card will be added to the database.

3. OPERATING ENVIRONMENT:

PC with WIN98 or WINDOWS XP, WIN2000NT environment. GSM modem connected to PC via serial port. Also SD card reader should be connected to USB port of PC

4. DESIGN CONSTRAINTS:

The PC utility will be a self extractable package and should be executable independently without loading any other package on the host PC.

If PC is not having serial port, external USB to serial converter will be used and Serial GSM modem is considered to be available. The converter should be supporting PC side virtual COM port utility.

SD card formatting support is out of scope of this utility and SD card should be formatted under normal OS commands.

5. GENERAL REQUIREMENTS:

5.1 NORMAL WORKING

The PC utility to support RS232 port in normal case. In case external converter is required on USB port, virtual com port utility will be used.

Under normal operating condition, the PC will receive data periodically from the FLOW METER connected to it through GSM. The utility will receive the data in the form of formatted SMS. The utility has to continuously poll for this data 24x7

It will be Time and Date stamped. The utility will gather this data and store in a database. If the data with the same location and time stamp is received again, this record is to be ignored.

Every SMS received from the Data Logger will be acknowledged by the PC utility by sending out another SMS message back to logger unit.

An SMS will be received for minimum of one reading

The Operator may periodically get the SD card to the central station for downloading the recorded data. This Data will be in the encrypted form for security purpose and PC utility should decrypt it before saving to database.

This data will be compared to the existing record and the records will be added to the database only if the record is missing. I.e. Duplicate records should not be created.

Once the data from the SD card is retrieved, the data on card can be deleted and card can be reused for any other location.

The utility will have one administrator login which can access the data of configuration change sent to the unit. This data will be accessible only to the administrator.

5.2 QUERY OPERATIONS

The utility can query the data logger for instantaneous recorded values. Utility must provide suitable user interface for the same. User will select the location whose instantaneous data is required.

Once user selects the location, utility will send a query SMS to location GSM and wait for response.

The response of this query will be displayed immediately on getting the response SMS back from remote location GSM

5.3 ALARM CONDITIONS

Whenever any alarm message is received, utility will update its location status. Suitable status view menus to be provided to view the alarm status.

The Alarm condition can be “Low Disk Space” on the SD Card if the space is full at 80%.

If any unit reports an ‘Empty Tube’ this event will get recorded and also get reported. When the same unit reports a healthy condition again (No empty tube condition) , it will again be recorded.

If Data logger records problems while communicating with Flow meter, it will report “Communication Error” SMS

5.4 CONFIGURATION SUPPORT

The Utility will have a facility to send out configuration commands to the Data logger. The parameters that can be configured remotely are: data logging interval and SMS sending interval

A configure menu will be provided by utility and suitable dialog boxes to enter the configurable parameters. Once user selects the desired values, utility will send a configure SMS to remote location.

After the Configuration is done successfully, the concerned Data logger will send ACK SMS.

After receiving the ‘ACK’ the utility will display ‘Configuration successfully changed’ message.

Record the configuration change history.

5.5 REPORTS

The utility will aid report generation for a specified period and for a specified unit. The utility will also cater to generate a report of all alarms for a given period

Error Handling If the utility does not get any response from a particular registered site even once in a day it will report communication error.

There will be a facility to save the report in XLS Format