EMBEDDED SYSTEM BASED DISASTER MANAGEMENT

PROJECT REPORT
ON

EMBEDDED SYSTEM BASED DISASTER MANAGEMENT

BY

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This is to certify that the Project report entitled

"*EMBEDDED SYSTEM BASED DISASTER MANAGEMENT*"

Submitted by:

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Students of **Electronics and Telecommunication Engineering** have successfully completed their **Project** required for the fulfillment of **B. E. Degree** as per the norms prescribed by the **University of Mumbai** during the first half of the year 2007. The project report has been assessed and found to be satisfactory.

_____ _____

Internal *Guide* ***External Guide***

_____ _____

Head of Department ***Principal***

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Internal Examiner ***External Examiner***

Preface

Now a day's Embedded system has captured the field of industry as well as domestic or practical life of human beings. Glancing at recent development in the field or electronics and computers, we can just say that they have captured practically every mode of human's life and have given a new way to it. Taking into consideration, the need to save living beings has inspired us to develop a Disaster Management System that remotely controls wide range of appliance, in and around the affected area, with the help of a Embedded System.

Finally we feel very much satisfied in presenting this project, which would be of great use to our society.

Acknowledgment

We take great pleasure to present this project report on "Embedded System based Disaster Management". We have taken great care that the information provided by us is incorrect, but even then we welcome any suggestions or corrections.

When we look up this task it was really difficult to workout but the variable guidance given by our project guide Prof. Mr. Sanjay .B. Deshmukh has made this project successful.

We are very grateful to our H.O.D Prof.Mr. Kishore S. Kinage, whose constant encouragement, precious guidance and full-fledged co-operation has led to the success of this project.

We would like to express our thanks to eGURU programme (Project ekalavya Team at IIT BOMBAY) for all the significant co-operation and friendly treatment given to us during preparation for the project.

Our special thanks for laboratory assistance to Mr. Ashok Tanna and Company (Tanna Electronics) for their co-operation for various instruments and some helpful tips.

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INTRODUCTION

Introduction :

Year after years devastating disasters ravage the land mass and leave behind countless victims. Pre-disaster planning can have a significant impact on minimizing the effect of tragedy and sufferings, and may result in a more efficient and coordinated (non-panicked) response in saving lives and properties. With seismic studies revealing sizable portions of the Indian Sub-continent prone to earthquake(s), it is desirable for India to be equipped with disaster management equipment at all times. The country is also prone to other calamities like cyclones, droughts, floods, fires etc. In a report by UN Office for the Coordination of Humanitarian Affairs (OCHA) on Gujarat earthquake, it is mentioned that in such situations for saving of lives and rehabilitation to be taken on a war footing, it is imperative to develop disaster management equipments on priority such as detecting cutting concrete slabs, mobile communication equipment etc. which can be deployed for clearing debris.

General Working of System

Here the system continuously obeys the commands given by the PC and moves the vehicle in desired direction. The control to move the vehicle can be given using a program written in C / C++. This takes place wirelessly using a transmitting and a receiving antenna. The transmitting antenna is interfaced to PC using embedded hardware.

The embedded system placed on the vehicle is interfaced to PC via RS232 serial port. It uses microcontroller to handle the command issued by the operator to find out the temp of the living element. Here a temperature sensor mounted on the motor is used for this purpose. After it senses the desired temperature , program can move the vehicle in desired direction.

Graphically the direction of the living element is shown on the monitor screen along with the temperature and hence the vehicle can be moved to that position.

Here a camera may be mounted and hence controlled to provide visual display of the surrounding which may be included as an additional application.

Block Diagram :

Figure A :

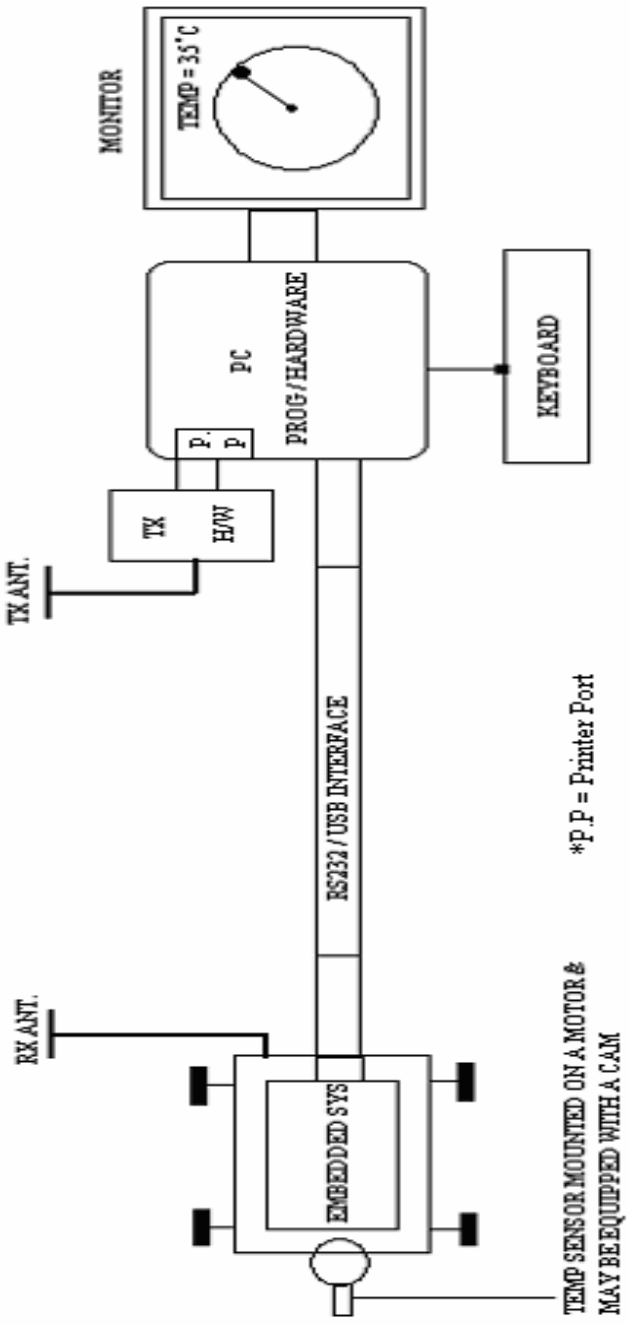
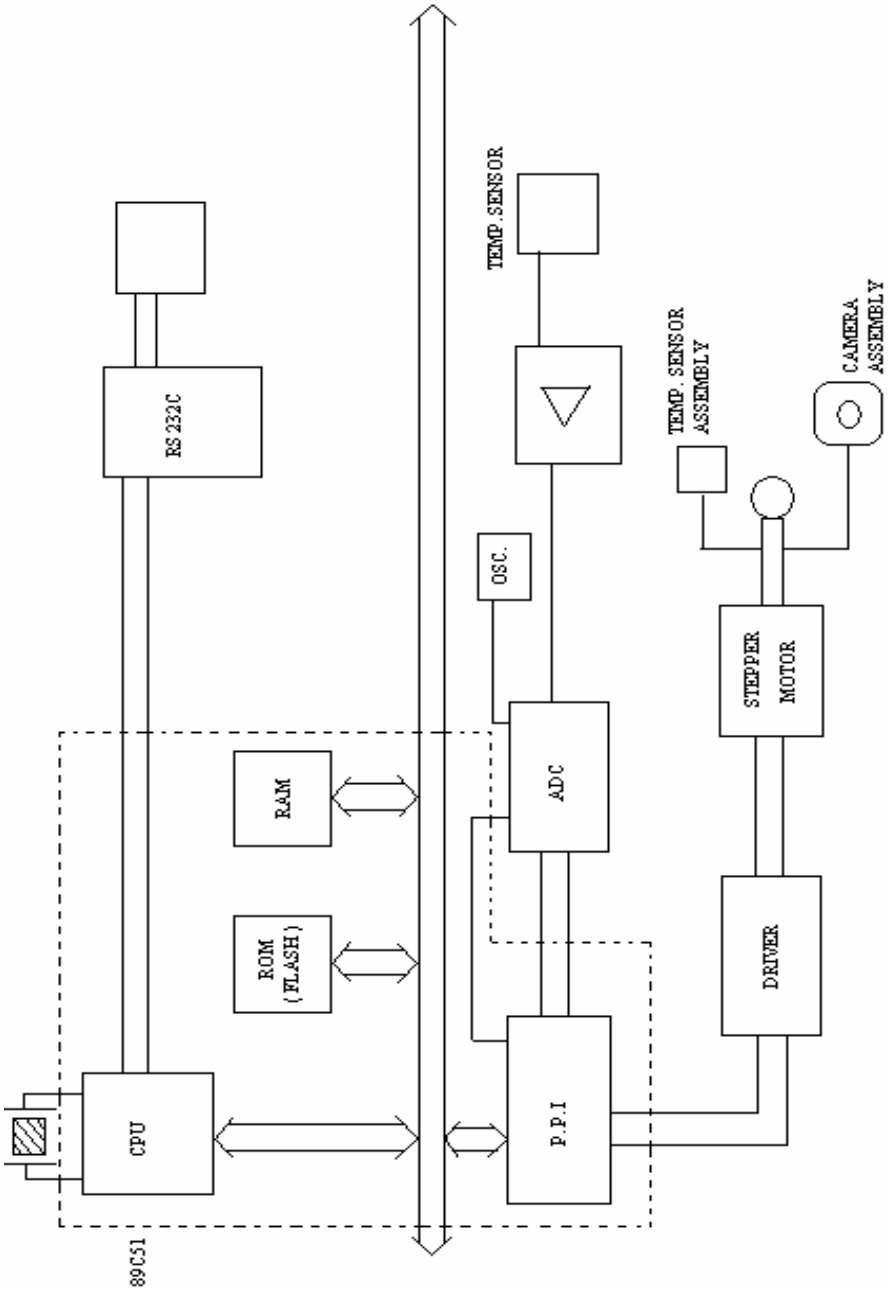


Figure B:


TEMP.SENSOR
CAMERA ASSEMBLY
TEMP. SENSOR ASSEMBLY
RS 232C
OSC.
STEPPER MOTOR
RAM
ADC
ROM (FLASH)
DRIVER
CPU
P.P.I
89C51

General Description:

RF Chipset:

This chipset has the capability of communicating over radio frequencies (TX / RX vehicle).

Micro controller based circuit:

This module will perform various functions such as communicating with RF chipset, *processing the inputs and triggering various outputs like hooter or transmitting RF signal.*

Power supply:

This module will provide power supply to all the modules as mentioned :

RF chipset : 9v .

Microcontroller : 5v, 150mA.

It will draw the necessary supply from the connected battery, which can fulfill the power requirement for 24 hours.

DESCRIPTION OF BLOCK DIAGRAM:

The Unit Consists Of Following Blocks:

Power Supply:

It provides regulated power supply to micro controller,ADC, reset circuits, and the sensors.

Analog To Digital Converter***:***

It accepts temperature inputs and inputs from sensors and generates the digital code.

Micro controller:

It accepts digital code from ADC i. e temperature value and transmits it to the host.

Signal conditioner:

Analog signals are amplified to get 0 to 5 volts swing and to make it compatible with ADC.

Relay driver or stepper motor driver is used to move stepper motor.

At receiving end a computer is used to give the desired commands.

SYSTEM OPERATING ENVIRONMENT:

The project is 89c51 micro controller based and implemented using assembly language at the transmitter side. At the receiver side a PC is interfaced to detect various faults in different mini pillars. The operating platform is windows and the language used is C/C++ (Graphics).

1) C LANGUAGE:

a. Graphics is easier to implement with aid of c language.

b. Data input is possible from the COM ports.

c. File handling is easy.

2) ASM code optimization

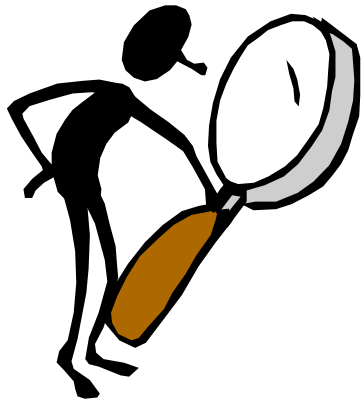
a. Micro controller executes only machine language.

b. Machine code takes less space as compared to language.

c. Easy to debug.

d. Close to hardware hence fault finding is easy.

CIRCUIT DIAGRAM AND CIRCUIT WORKING



Circuit Diagram :

Circuit Working :

Temperature Sensor :

The LM35 series are precision integrated circuit temperature sensors, whose output voltage is linearly proportional to Celsius temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in degree Kelvin as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling.The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to read out all control circuitry especially easy. The LM35 is rated to operate over -55 to +150 degree C temperature range.

The LM35 is mounted on the motor and used to sense the temperature of the alive bodies. The embedded system placed on the vehicle is interfaced to PC via RS232 serial port. It uses microcontroller to handle the command issued by the operator. The vehicle is moved to the desired location via the PC command and the motor is used to rotate the temperature sensor in steps of 1.8 degrees. Since dead bodies do not produce heat, the LM35 senses the temperature of the alive bodies and conveys the information to the PC where graphically the precise location of the living body is shown on the monitor screen along with the temperature and hence the vehicle can be moved to the desired position to retrieve the located alive bodies.

Analog to Digital Convertor:

IC 809 is an 8-channel analog to digital convertor.It is designed to give fast,accurate and repeatable conversions over

a wide range of temperatures.it accepts temperature inputs and inputs from sensors and generates corresponding digital code.

The temperature sensor LM35, used to detect the temperature of alive bodies, is connected to ADC 0809 and inputs the temperature reading to the analog to digital convertor. The output of ADC 0809 is connected to the microcontroller 89C51.Thus, the ADC 0809 will take the temperature inputs from the LM35 and convert analog data to digital form and provide digital output to the microcontroller.

RS232C :

RS232C is a telecommunication standard for binary serial communication between devices. It supplies the roadmap for the way devices speak to each other using serial ports. The devices are commonly referred to as DTE (data terminal equipment) and DCE (data communication equipment); for example, a computer and modem, respectively.

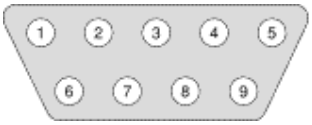
It sets acceptable voltage and signal levels, along with common pin designations or configurations, for wiring serial connector ports. It also specifies protocol for the control information passed between devices which include events such as indicating the beginning or end of a data stream. Without standards like this, manufacturers would have no roadmap to build compatible product lines for technology.

The RS232C serial port is used to interface PC to the embedded system placed on the vehicle which uses the microcontroller 89C51 to handle the command issued by the operator. The TXD and RXD pins of Port 3 of 89C51 are connected to the serial port. The future scope of the system says that the serial port

can be replaced with Wireless or Bluetooth Technology to eliminate the use of hardwired connections.

RS232 Pinout

The RS232 specification only defines the pin-out for a 25 pin D connector; how ever, the 9 pin is used more often (defined by EIA-574). The serial port found on Personal Computers uses a 9-pin connector. Normally the RS232 serial port is used for external modems, and in older systems for the mouse and printer interfaces. Most computer systems have only one serial port. The RS232 pinout is provided below.



DB-9 Connector Pin Out

Pin #	Signal Name	Signal Description
1	CD	Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground / Common
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

RS232 Serial Port Signal Description

TXD: Transmit Data; The data sent from the Data Terminal and received by the
Data Set.

RXD: Receive Data; The data sent from the Data Set and received by the Data

Terminal.

DTR: Data Terminal Ready; Used by the Data Terminal to signal to the Data Set
that it is ready for operation, active high.

DSR: Data Set Ready; Used by the Data Set to signal to the Data Terminal that
it is ready for operation and ready to receive data, active high.

RTS: Request To Send; Used by the Data Terminal to signal the Data Set that it
may begin sending data. The Data Set will not send out data with out this signal, active high.

CTS: Clear To Send; Used by the Data Set to signal the Data Terminal that it may
begin sending data. The Data Terminal will not send out data with out this signal, active high.

CD: Carrier Detect; Used by the Data Set to indicate to the Data Terminal that
the Data set has detected a carrier (of another device).

RI: Ring Indicator; Used by the Data Set to indicate to the Data Terminal that a
ringing condition has been detected.

GND: Ground; The common return for all signals on the interface.

When using Software Flow Control(XON, XOFF); you only need 3 lines, TX (data),

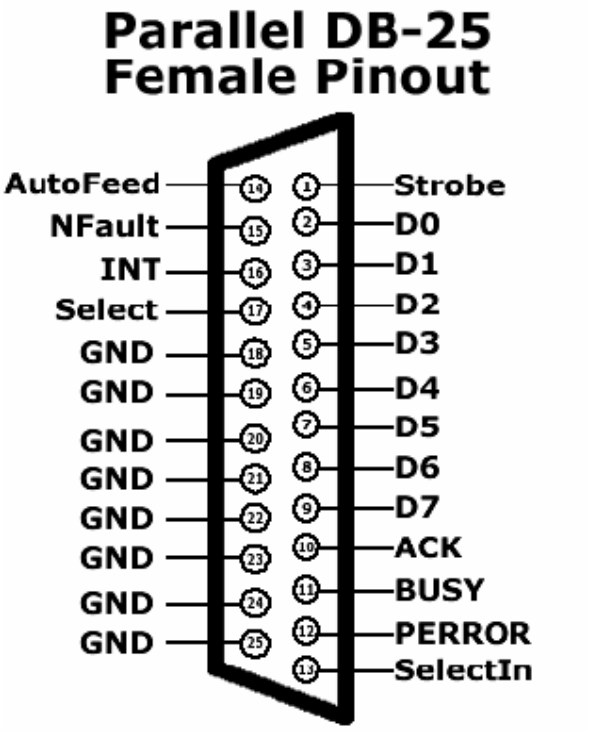
RX (data), and GND. XON being equal to ready, XOFF equal to not ready.

Parallel Port :

LPT (Parallel) port

Pins layout

Connector : female DB25



D	Description	Name	Pin	Pin	Name	Description	D
- I/O	Strobe	STROBE	1	14	AUTO FEED	Auto-Feed	- O
I/O	Data Bit 0	D0	2	15	ERROR	Error	- I
I/O	Data Bit 1	D1	3	16	INIT	Init (Reset)	- O
I/O	Data Bit 2	D2	4	17	SLCT IN	Select In	- O
I/O	Data Bit 3	D3	5	18	GND	Ground	/
I/O	Data Bit 4	D4	6	19	GND	Ground	/
I/O	Data Bit 5	D5	7	20	GND	Ground	/
I/O	Data Bit 6	D6	8	21	GND	Ground	/
I/O	Data Bit 7	D7	9	22	GND	Ground	/
- I	Acknoledge	ACK	10	23	GND	Ground	/
I	Busy	BUSY	11	24	GND	Ground	/
I	Paper End	PE	12	25	GND	Ground	/
I	Select Out	SLCT	13	S	GND	Chasis Ground	/

Signals

STROBE *(Strobe)* active low output
Notify the printer that data available on D0 o D7 are valid.

D0 - D7 *(Data Bus)* outputs Data byte send to the printer, output only in "compatible" mode and bi-directionnal in newer modes.

ACK *(Acknoledge)* active low input
Notify the computer that the printer is ready to receive the next data.

BUSY *(Busy)* active low input
Printer buffer full or printer busy, the computer must wait for this signal to get high again to continue sending data.

PE *(Paper End)* active high input
Printer out of paper.

SLCT *(Select Out)* active high input
Printer ready (On-line).

AUTO-FEED *(Auto-Feed)* active high output
Printer Line feed.

ERROR *(Error)* active low input
Error detected by the printer.

INIT *(Reset)* active low output
Initialize the printer (reset).

SLCT IN *(Select In)* active low output
Send a on-line request to the printer.

Programming

Standard Resources :

LPT1	I/O 0378-037A/037F	IRQ 7	DMA 3
LPT2	I/O 0278-027A/027F	IRQ 5	DMA 3
LPT3	I/O 03BC-03BE	IRQ 7	/

LPT ports can use only I/O (3 adresses) in standard mode ; both I/O (3 adresses) and an IRQ, dunno what's that mode ; or I/O (8 adresses), IRQ and DMA in ECP mode.

I/O Resources :

Address	Bits positions								Description
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
Base+0	D7	D6	D5	D4	D3	D2	D1	D0	<- Data output
Base+1	BUSY	ACK	PE	SLCT	ERROR	/	/	*Time-out*	<- Status register
Base+2	/	/	/	*IRQ**	SLCT IN	INIT	AUTO FEED	STROBE	<- Control register

- IRQ enable the IRQ for ACK, 1=enabled, 0=disabled.

  Note: dunno yet what are the 5 other addresses used on ECP for.

  "Base" is the first I/O Address used by the parallel port, 0378 for LPT1 for exemple.

  "?" are signals, but I have to check witch ones.

  "/" are undefined bits, they must be ignored.

Voltage Regulator :

The +5 volts supply is useful for both analog and digital circuits.DTL,TTL and CMOS IC's will all operate nicely from a +5 volts supply.The +5 volts power supply is based on the commercial 7805 voltage regulator IC.This IC contains all the circuitry needed to accept any input voltage from 8 to 18 volts and produce a steady +5 volt output,accurate to within 5%(0.25 V).It also contains current limiting circuitry and thermal overload protection,so that the IC wont be damaged in case of excessive load current;it will reduce its output voltage instead. The two 100 micro Farad capacitors serves as a 'reservoir' which maintains a reasonable input voltage to the 7805 throughout the entire cycle of the ac line voltage.it helps to keep the the power supply output voltage constant when load conditiond change.

Microcontroller 89C51 :

The AT89c51 is a low power, high performance CMOS 8bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using ATMEL's high-density nonvolatile memory technology and is compatible with industry standard MCS-51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit cpu with Flash on a monolithic chip; the ATMEL AT89C51 is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications.

The AT89CS1 provides the following standard features:

- *4Kbytes of flash*
- *128 bytes of RAM*
- *32 10 lines*
- *32 10 lines*
- *2-16 bit timer/counter*
- *a 5vector 21evel interrupt architecture*
- *a full duplex serial port*
- *chip oscillator and clock circuit*

In addition the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The ideal mode stops the cpu while allowing the RAM, timer/counters,. serial port and interrupt systems to continue functioning. The power down mode saves the RAM content but freezes the oscillator disabling all other chip functions until the next hardware resets.