**“Microcontroller Based Data Acquisition System”**

**(MBDAS)**

Rahul T. Nimje

Electronics

YCCE, RTMNU

Nagpur India

rahulnimje2009@gmail.com

Nikhil N.Barapatre

Electronics

YCCE, RTMNU

Nagpur India

nikhilbarapatre91@gmail.com

Nikheel S.Tijare

Electronics

YCCE, RTMNU

Nagpur India

 tijare.nikheel8@gmail.com

Abstract— This project was aimed so as to develop a highly cost effective, fast, eco-friendly and easy to handle device which can be used to conduct surveys in very short duration of time. It can be customized as per the requirements of the user. This same device can be used for different purposes like market surveys, office records, election surveys and many more. The same device can be further modified for using at different places for different tasks by adding some additional circuit. For example along with a timer circuit it can be used as data entry machine at voting booths, power plants, etc. and results for the collected data can be obtained at computers using appropriate program. It was taken up as final year project and is basically a microcontroller 8051 based project.

 The device is still under testing and software development and we are trying to develop appropriate software for the device.

# **Introduction**

In pre-existing survey system, information is gathered by using Pen and Paper method which is slow and time taking but MBDAS allows gathering information quickly and easily. This project aims at developing a highly effective surveying device which will gather customer’s feedback in fast and reliable way and increases the productivity. It avoids wastage of papers so it is eco friendly. It can be customized as per requirements to suit the need of different surveys and with the help of computer data collection is much faster and less error-prone than traditional survey methodologies.

The utility of MBDAS depends on survey setting, including the type of survey data to be collected, the size of the survey, and conditions for collecting survey data. MBDAS can be used for conducting market surveys that involve collecting survey data for multiple companies including field observation, office records , photo-interpretation etc.

Such a survey mechanism is easy and intuitive to use and lets you create highest quality interactive surveys in just a few steps. No programming knowledge is needed by the person handling this device. Questionnaire can be fed according to the type of survey. Survey devices have several advantages: They are easier to read, easier to store information and can accept any questionnaire design without limitations. Data collected can be easily analyzed in the form of pie chart, histogram, bar diagram etc. Using appropriate software’s.

# **EXISTING SYSTEMS**

Surveys deals with concise and straightforward questionnaires, used to analyze a sample group that represents target market. The larger the sample, the more reliable will be results.

## Pen and Paper

In India, the current survey system is of pen and paper which have lots of drawbacks. In this system, pen and paper is used to collect data then make data entry as per data on papers, hence they are very slow, cumbersome, time taking and not very eco-friendly.

## One-on-One Interviews

In-person surveys are one-on-one interviews typically conducted in high-traffic locations such as shopping malls, colleges, market places, etc. They allow to present people with samples of products, packaging, or advertising and gather immediate feedback. In-person surveys can generate response rates of more than 90 percent, but they are costly. With the time and labor involved and even irritates people.

## Telephone Surveys

Telephone surveys are less expensive than in-person surveys, but costlier than mail. However, due to consumer resistance to relentless telemarketing, convincing people to participate in phone surveys has grown increasingly difficult. Telephone surveys generally yield response rates of 50 to 60 percent.

## Mail Surveys/ Online Surveys

Mail surveys are a relatively inexpensive way to reach a broad audience. They're much cheaper than in-person and phone surveys, but they only generate response rates of 3 percent to 15 percent. Despite the low return, mail surveys remain a cost-effective choice for small businesses. Moreover in India internet is not available in rural areas so feedbacks from rural areas cannot be obtained.

Online surveys usually generate unpredictable response rates and unreliable data, because you have no control over the pool of respondents.

# Advantage of MBDAS over traditional methods

## Easy to carry

## Very Handy and fast

## Environment friendly

## Less workload

## Fast and efficient data collection

## Instant, actionable resultsanytime, anywhere

## Engaging, compelling surveys that keep respondent participation high Cost-efficient

# system overview

## Block Diagram

PC

(VB)

LCD PANEL

(act as output)

KEYPAD

(acts as input)

DEVICE

89V51RD2

MEMORY

24C512

RS

232

Fig : Bock Diagram Of MBDAS

## Working Steps

* Data Collection and Storage

 MBDAS is based on a simple, intuitive user interface allows complex questions to be displayed. Keypad is used to collect data and communicate with data base. Questionnaire is displayed on the screen with multiple options. Accordingly, preferable option to the client is selected. The selected option is stored in the data memory. Multiple reviews for same set of questionnaire are stored.

* Data Transfer

Information can be verified by rolling back to all queries asked and then lock information. Survey Data is stored in MBDAS memory.

Once survey is complete, the survey information can be transferred to the computer for output using cable RS232 the beep indicates the successful storage of information

* Analysis Display on PC

The statistic of survey is produced in no time. Analysis can be displayed on computer in the form of pie chart histogram etc. The software is designed to manage the survey data through the survey instrument. Thus the reports on PC can be generated and conclusion can be found about a specific survey.

## Hardware

* 89V51RD2(Microcontroller)

This device is a Single-Chip 8-Bit Microcontroller manufactured in advanced CMOS process and is a derivative of the 80C51 microcontroller family. The device also has four 8-bit I/O ports, three 16-bit timer/event counters, a multi-source, and four-priority-level, nested interrupt structure, an enhanced UART and on-chip oscillator and timing circuits[10][12][13].

* M24C16

This is electrically erasable programmable read only memory with features such as auto increment addresses capacity & 40 years of data retention[10][12][13].

* MAX232

The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals.

The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case.

The receivers reduce RS-232 inputs (which may be as high as ± 25 V), to standard 5 V TTL levels.

When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15V, and changes TTL Logic 1 to between -3 to -15V, and vice versa for converting from RS232 to TTL[10].

* LM7805

The LM7805 is three terminal positive regulators available in the TO-220 package and with several fixed output voltages, making it useful in a wide range of applications. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents[10].

* RS232

RS-232 is defined as the “Interface between data terminal equipment and data communications equipment using serial binary data exchange”. This definition defines data terminal equipment (DTE) as the computer, while data communications equipment (DCE) is the modem. A modem cable has pin-to-pin connections, and is designed to connect a DTE device to a DCE device[9][10].

* Alphanumeric keypad matrix

Breakout-Module for 3x4 matrix keypad can be easily interfaces with any microcontroller. This module can be used for the representation of alphabets and numbers. This module has no isolation between on the solder side (bottom side). You should avoid contact of solder side and your body while using it. This will reduce the ESD risk.

* Display:

 Used lcd display has 16 pins. It represents 16 characters per line. A display is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals does not emit light directly[10][13].

* Computer

A computer is a programmable machine that receives input, stores and manipulates data/information, and provides output in a useful format. It is used to display overall output of survey.

## Software

* Flash magic

Flash Magic is a PC tool for programming flash based microcontrollers. Flash magic is software which manages the transfer of data between pc and microcontroller in serial fashion.

* Ride software

RIDE is a fully featured Integrated Development Environment that provides seamless integration and easy access to all development tools. From editing to compiling, linking, debugging and back to the start, with a Simulator, ICE, Rom Monitor or other debugging tool. RIDE conveniently manages all aspects of the Embedded Systems development with a single user interface. Hence it can be used for compilation of microcontroller programming.

* VB

Visual Basics the third-generation event-driven programming language and integrated development environment (IDE) from Microsoft for its COM programming model. VB is also considered a relatively easy to learn and use programming language, because of its graphical development features and BASIC heritage.

 First set of questionnaire will be loaded in the device by using a program written in VB. When the survey is completed all the collected information will be transferred to PC. Reports will be generated with the help of this information. These reports will be in the form of pie charts, bar diagrams etc.[11].

# Applications

* Market Survey

The availability of accurate data is important in industries where personal service largely influences the business success. Also the data gathering should take less time in this competitive market. Traditional methods are tedious and time consuming whereas MBDAS can save lot of time without irritating customers[5].

* Office Records

Gather feedback from your students, faculty, parents and staff in a new way with paperless method . The interactive environment of MBDAS powered surveys is engaging and encourages participation.

* Remote Areas Survey

Even though world is developing so rapidly still there are some areas where modern technology are not accessible. So conducting surveys in such areas with modern methods is not possible. Moreover there are many places where internet is available but modern survey methods fail because of load shedding problems. So we have to go for traditional pen paper method. But data collected with pen paper method can be easily lost may be because of rain and damage to paper. So MBDAS is best alternative.

* Voting Survey

This device can be used as a substitute for polling with some additional circuitry. It can also be used for normal polls conducted by government. This device can further be used for conducting health surveys, sex ratio counting, literacy rate counting etc..

* Visitor Feedback Surveys

Visitor feedback surveys are conducted in Museums, Art Galleries, Aquariums, Zoos, and similar venues where feedback gathering involves unnecessary human labour. This labour can be saved by using some sophisticated electronic devices. But installing such devices at public places is costly and not preferable. So an electronic device which is user friendly and cost effective is needed. At such places MBDAS can serve the purpose.

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