

Design of Interactive Voice Response System for Three Phase Motor

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Abstract - Use of control system in industries is increasing as they manage and regulate various systems. Through the control system electrical machine can be operated automatically. Existing systems rely on GSM based Motor Monitoring and speed control to turn On/Off motor from remote place. This system is purely SMS based but many farmers are not aware of SMS. Another system accomplishes this task based on voice call such that by pressing a key motor will become on and off accordingly. The project aims to minimize farmer's efforts, improving use of irrigation, maintaining optimum use of electricity. It will control motor and also detect the fault if any like dry run, under voltage, over voltage, etc. using IVRS system and SMS. User can register his mobile number which brings forth the concept of Unique Mobile Number Identification. Here user's mobile number will serve as his password, thus providing optimal usage of time and money. Three co-owners can be registered at maximum. Battery backup is also provided to notify farmer of light failure conditions. The project aims to control motor from a remote place using mobile DTMF tone and get notified via SMS about it's ON or OFF condition. Thus, this project will serve as an introduction to a new control technique where a three phase motor can be effectively used for industrial application along with providing an SMS based alert system. It will also detect various faults like network error, under voltage etc and ensure safe operation and provide instant status via various ways like SMS on mobile(message status), IVRS.

Key Words: Interactive Voice Response System (IVRS), Unique Mobile Number Identification, Global System for Mobile Communication (GSM), Three Phase Motor, Short Message Service (SMS)

1.INTRODUCTION

India is basically an agricultural country. Therefore, most of its resources depend on the agricultural output. Many automatic technologies have been introduced into agricultural productions with the rapid development of agriculture in India. Control systems have received exceptional attention in the industrial sector as they manage and regulate various systems. Control system is a system

where we can shut down machine whenever we want. That is the difference between controlled and uncontrolled machine. Present systems available for controlling is purely SMS based. Other available systems are based on voice calling but they do not provide any fault detection.

This project is focused on development of an IVR system for three phase motor control, protection and alert. The project aims to control motor from remote place using mobile DTMF tone and notification of motor status being sent back via SMS. The unit can be installed at all places where controlling is needed for three-phase motor. It will monitor and measure all three phase voltages. The controller displays fault occurred in the system through LED's and accordingly send SMS to registered numbers, so that user will be aware of the current status of motor. Also system will be providing information in four regional languages like English, Hindi, Kannada and Telugu so that any ordinary person can handle it.

The Microstart GSM Starter has inbuilt Interactive Voice Response System (IVRS), Unique Mobile Number Identification feature, controlled, remote monitoring and start/stop. The motor can be controlled by user through voice call and SMS only by entering the password, so it provides security to the user. The unit can be installed at all places where controlling is needed for three-phase motor. It will monitor and measure all three phase voltages. The controller displays fault occurred in the system through LED's and accordingly sends SMS to registered numbers, so that user will be aware of the current status of motor.

1.1 Unique Mobile Number Identification

The mobile identification number (MIN) is a number that is derived from the 10-digit directory telephone number assigned to a mobile station. MIN is used to identify a mobile station. In the case of analog cellular, the MIN is used to route the call. In most second generation systems, temporary numbers are assigned to the handset when routing calls as a security precaution [4].

Unique Mobile number is being used in the project as advancement to existing systems. Existing system depends on password entry and its verification which takes lot of

time and wastes money. Implementing this feature saves both time and money of farmer.

2. LITERATURE SURVEY

Since time, different technologies have been used for motor monitoring. Earlier it was purely SMS based. But many of uneducated farmers were unaware of SMS. Gradually, IVR system came into existence which made motor monitoring voice controlled. This system overcomes limitation of pure SMS based system. However it does not provide any fault detection like dry run, over voltage, under voltage etc. The project undertaken makes motor monitoring remotely controlled and also provides fault detection.

Below is the literature review on motor control using IVRS and GSM by some authors and their main observations.

2.1 GSM Based Motor Monitoring and Speed Control:

Presently GSM Based Motor Monitoring and Speed Control is available in market. In this paper, author studied design aspects of an embedded device which used specific SMS message from a mobile phone to control devices. It could control 8 devices using the same method. For ON and OFF switching of the devices where no wired connection is available, this controller is proves to be very handy. The system is implemented by connecting GSM modem to a microcontroller. This microcontroller is programmed to receive the SMS from a reference cell phone. The controlling signal from received SMS is extracted and is converted to microcontroller-preferred format. For monitoring and transmission of the control signals to the modem, a PC is used which uses serial communication through RS232 to establish the communication. Same can also be accomplished by interfacing a LCD to the microcontroller. AT commands were used for controlling the functionality of modem (Global Systems for Mobile Communication). This is preferred because of its simplicity in both transmitter and receiver design. It can operate at 900 or 1800MHZ band, is faster, more reliable and globally network. [1]

An authorized mobile number can be used to control motor by sending it control message. Microcontroller controls the overall operation of this system, acting as heart of this system. The system is always alert for receiving SMS from valid number. As soon as message is received, it is displayed on the LCD (Liquid Crystal Display). Under this project work author studied and designed GSM technology based automatic control system to monitor and control speed of an Induction motor/DC motor. It also performed necessary operation like start, stop, reverse the rotation ext.[1] This system is purely SMS based and poses limitation as majority of farmers are still uneducated and not aware of SMS system. not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

2.2 Interactive Irrigation System through Mobile using IVRS Response:

This paper was advancement as compared to earlier where motor was controlled using SMS service. In this paper IVR response was used for ON/OFF control of motor. It is a mobile based remote control system for switching on/off and monitoring the water pumps, by using which a farmer or a person can be free from so many routine problems associated with timely irrigation, saving a lot of water, electricity, fuel, time, making it cost effective. The way it works is, Motor Pump is connected to the device. Mobile is kept near device which can trigger the motor pump to start and stop. Whenever power comes at field, an automatic call is made from system to the user to indicate power status. The person has to just call to Mobile kept near to the Motor pump and has to press his code to Start or Stop the Motor with IVR response. He can also know whether the power is present or not and know the motor status. [2]

Speech and Dual Tone Multiple Frequency [DTMF] comparison was studied. Studies conducted earlier just compared these two modalities. However, the speech system used in this study was a fully functioning natural language system. Working professionals were considered and participated in this study, rather than college students. Results indicate that (a) DTMF was more effective and efficient for linear tasks, whereas speech was better for nonlinear tasks; (b) Majority of users preferred speech to DTMF; (c) speech was found to be as more satisfying, more entertaining, and easier to use than DTMF; and (d) user preference for a particular modality was better predicted by user performance in nonlinear tasks rather than linear ones. Users continuing preference for the speech modality rather than DTMF even after experiencing fairly high recognition errors are discussed in the paper. The study conducted has theoretical, as well as practical, implications for the design of speech user interfaces and interactive voice response applications. Issue regarding designing of IVR interfaces for the developing world was addressed in the paper.

2.3 GSM Based Device Control:

Another system is GSM Based Device Control. As per study, this system will be operated through a voice call such that by pressing a key the motor will become on and off accordingly. This system will also send SMS to the user giving the present status of the motor. The advances in the technologies related to wireless communication has led to the emergence of several engineering designs to aid the human requirements. Agriculture play a significant role in developing country like India, therefore implementing mobile communication for facilitating farmers is the basic idea of this project.[3] This system overcomes limitation of pure SMS based system. However it does not provide any fault detection like dry run, over voltage, under voltage etc. It also lacks Unique Mobile Identification Number feature. As a

result password needs to be entered every time for controlling motor. This unnecessarily wastes both time and money of farmer.

Survey of farms which have induction motor in it was done. Farmers were asked their problem which they faced while working in farm. The main problem of the farmer is proper operating of motor.

- The motor can damage by over/under voltage & current
- If the dry sensing condition is not sense then also the motor can damage
- Load shedding
- Distance between farm & farmer's house

3. CONCLUSIONS

The existing system was based on SMS communication but we tried to use interactive voice response to make it convenient and user friendly. Based on results, it can be concluded that three phase motor can be controlled from remote place using SMS and IVRS system. The key challenge in motor designing is its flexible control and protection which makes it an important tool in industries. Thus, the findings of this research have opened up new fields in the industrial level motor control area.

If there is problem with GSM range in some area, then controlling three phase motor using GSM becomes difficult. Zigbee can be used at such places. If user wants to see current operation and status live then Digital Camera can be used. LCD Display can be added to display the parameter. Also app can be developed for different operating system like Windows, Android, Ios.

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