EXPERT SYSTEMS AND SOLUTIONS
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MICROCONTROLLER based control panel for Industrial machines

The project demonstrates the following motor operations using MICROCONTROLLER

1. Speed control
   - A.C motors
   - D.C motor
2. Start delta starter
3. Fail safe protection systems
4. Two phase operation of three phase motor.

Unlike general-purpose computers, the MICROCONTROLLER is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operation are typically stored in battery-backed or non-volatile memory. A MICROCONTROLLER is an example of a real time system since output results must be produced in response to input conditions within a bounded time, otherwise unintended operation will result.

The main difference from other computers is that MICROCONTROLLERs are armored for severe condition (dust, moisture, heat, cold, etc) and have the facility for extensive input/output (I/O) arrangements. These connect the MICROCONTROLLER to sensors and actuators. MICROCONTROLLERs read limit switches, analog process variables (such as temperature and pressure), and the positions of complex positioning systems. Some even use machine vision. On the actuator side, MICROCONTROLLERs operate electric motors, pneumatic or hydraulic cylinders, magnetic relays or solenoids, or analog outputs. The input/output arrangements may be built into a simple

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MICROCONTROLLER, or the MICROCONTROLLER may have external I/O modules attached to a computer network that plugs into the MICROCONTROLLER.

MICROCONTROLLERs were invented as replacements for automated systems that would use hundreds or thousands of ICS timers, and drum sequencers. Often, a single MICROCONTROLLER can be programmed to replace thousands of ICs. Programmable controllers were initially adopted by the automotive manufacturing industry, where software revision replaced the re-wiring of hard-wired control panels when production models changed.

General features

1) Allows for the output to be a value other than 100% or 0%.
2) Speed can be controlled without oscillations around the set point.

Historically MICROCONTROLLERs were usually configured with only a few analog control loops; where processes required hundreds or thousands of loops, a distributed control system (DCS) would instead be used. However, as MICROCONTROLLERs have become more powerful, the boundary between DCS and MICROCONTROLLER applications has become less clear-cut.

Disadvantages of a classic Motor control panels

- Too much work required in connecting wires.
- Difficulty with changes or replacements.
- Difficulty in finding errors; requiring skillful work force.
- When a problem occurs, hold-up time is indefinite, usually long.

Advantages of control panel using MICROCONTROLLER controller

1. Compared to a conventional process control system, number of wires needed for connections is reduced by 80%

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2. Consumption is greatly reduced because a MICROCONTROLLER consumes less than a bunch of ICS

3. Diagnostic functions of a MICROCONTROLLER controller allow for fast and easy error detection.

4. Change in operating sequence or application of a MICROCONTROLLER controller to a different operating process can easily be accomplished by replacing a program through a console or using a PC software (not requiring changes in wiring, unless addition of some input or output device is required).

5. Needs fewer spare parts

6. It is much cheaper compared to a conventional system, especially in cases where a large number of I/O instruments are needed and when operational functions are complex.

7. Reliability of a MICROCONTROLLER is greater than that of an analog circuit or a timer. Latching and Reporting Alarms

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