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Implementation of Status Monitoring For Central Unit In Radar System

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Abstract: A status monitoring scheme is proposed to monitor the status of flexible function for central unit in Radar System. The performance of the system is evaluated continuously and if the system is faulty, the fault is detected, isolated and displayed for further immediate action. A system is proposed to monitor the status of the Central unit and it consists of a knowledge-base, an inference engine and a coding algorithm. The coding algorithm model estimates are used to compute the performance and stability measures predict detect faults.

Keywords - Exciter Receiver; Host PC; Status Monitoring

I. INTRODUCTION

With an ever increasing trend towards autonomous operation of flexible status, there is a need to include a performance monitoring and fault diagnostic scheme as an integral part of a controller in Radar System. This parameter identification approach which is widely used to monitor system status. The parameter identification techniques to flexible status are fraught with difficulties as their transfer functions are of very high order with frequency response covering for central unit. The influence of these diagnostic parameters on the feature status is captured in a Host PC. The interface between Exciter Receiver and the Host PC are analyzed to diagnose faults. The proposed scheme is simulation of actual control systems in the Radar System.

II. STRUCTURE OF STATUS MONITORING FOR CENTRAL UNIT

Central Unit: is a subsystem in Radar which consists of central unit controller. The central unit controller is a single board computer which is the master board of the system. It coordinates the functions and the signals from the other slave boards in the system (central unit). It tells the computer memory, arithmetic & logic unit and input and output devices how to respond to program instructions. It directs the operation of the other units by providing timing and control signals. It directs the flow of data between the slave boards and the other systems.

Host PC (WorkStation): a network host is a computer or other device connected to computer network. A network host may offer information resources, services, and applications to users or other nodes on the network. A network host is a network node that is assigned a network address. The host PC includes development tools that help you implement your algorithm efficiently.

Cross over Ethernet Cable: An Ethernet crossover cable is a cable for Ethernet used to connect computing devices together directly. It is most often used to connect two devices of the same type: e.g. two computers (via their network interface controllers) or two switches to each other. By contrast, patch cables or straight through cables are used to connect devices of different types, such as a computer to a network switch or Ethernet hub. Intentionally crossed wiring in the crossover cable connects the transmit signals at one end to the receive signals at the other end. Many devices today support Auto MDI-X capability, wherein a patch cable can be used in place of a crossover cable, or vice versa, and the receive and transmit signals are reconfigured automatically within the devices to yield this desired result.

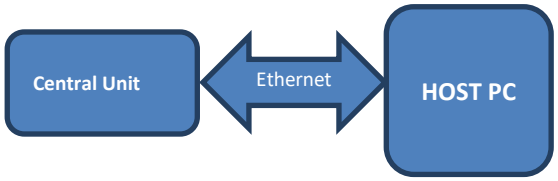


Fig 1. Internal Structure Status Monitoring For Central Unit

Central Unit performs the Exciter Receiver function which is a subsystem of a Radar system and it consists of several Sub Boards for performing different functions. The sub boards are:

a. Processor (Power PC): It is a single board computer. PowerPC is a RISC instruction set architecture designed by IBM. The name is a acronym for Performance Optimization With Enhanced RISC. PowerPC is largely based on IBM's POWER architecture, and retains a high level of compatibility with it; the architectures have remained close enough that the same programs and operating systems will run on both if some care is taken in preparation.32-bit and 64-bit PowerPC processors have been a favorite of embedded computer designers. To keep costs low on high-volume competitive

products, the CPU core is usually bundled into a system-on-chip (SOC) integrated circuit.

b. Timing Module System (IOT): Radar consisting of number of sub-systems a like Exciter, Receiver, Radar Controller, Timing Module, and Duplexer Antenna etc. All these sub-systems are being controlled, with phase coherence, with the help of Timing Module system. This phase coherency is realized by devote a sinusoidal clock signal to Timing Module, which is being trace from the exciter unit. The main performance of this Timing Control Signal Generator is to control the agency of the RADAR by synchronizing all the sub-system. The synchronization of all the sub-systems is completed by generating a pulse called 'Inter Pulse Period'. Other timing signal like Transmit pulse, Gating pulse, Blanking pulse, T/R pulse etc., are also generated by the IOT.

c. Digital Receiver (Digital Rx): The digital receiver is state-of-the-art of modern radars. A digital receiver samples the intermediate frequency (IF) signal of a radar receiver converts into baseband signal. Matched filtering, baseband conversion and phase referencing for coherent-on-receive operation are realized by digital signal processing hardware and software. Logarithmic amplifiers, analog I/Q demodulators and phase-locked coherent oscillators (COHO) are obsolete. For the first time it is possible to realize dynamic range figures with linear signal reception which were reserved to logarithmic receivers until then.

d. Exciter Unit: It generates the low level transmit drive signal for antenna and generates the required Coherent (COHO) and Local oscillator (LO) signal.

e. Analog Receiver: The Analog Receiver which is basically worked on the basis of Down Conversion for coherent on receives operation. It performs down conversion from RF signal to IF signal.

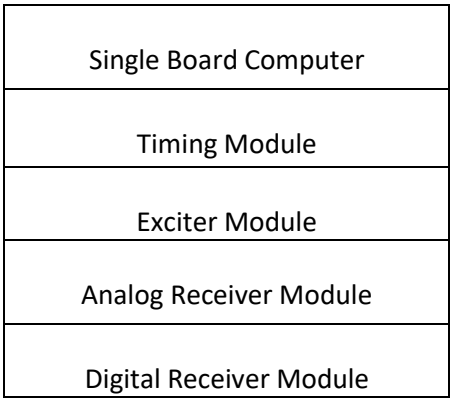


Fig 2. Sub Units of Exciter Receiver

III. Methodology and Discussion

If the central unit is not functioning properly, lot of time will be consumed in identifying the Fault, (i.e. to identify which subunit is not functioning and to cross check all the interfaces of the subunits). This problem can be solved by Status monitoring for central unit. Visual studio in Host PC is used to develop the GUI using C++ Programming; the GUI interacts with the processor in Central unit through UDP protocol by sending and receiving messages. The response message from central unit is displayed as the status of the central unit in GUI.

IV. Applications

- Automotive
- Aviation
- Integrated circuit manufacturing
- Unattended machinery
- Military

V. Flow of Process

Step 1 Switch on the Host PC.

Step 2 Switch ON the Central Unit.

Step 3 Allow the power PC to boot.

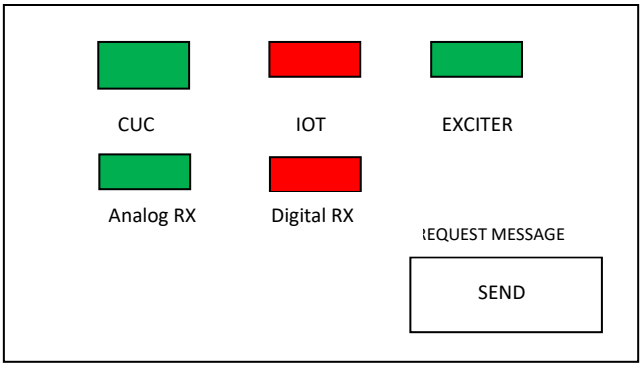
Step 4 Open the GUI in Host PC.

Step 5 Send the request message to processor in central unit through Ethernet by clicking the button in GUI of Host PC.

Step 6 The response from processor of Central unit changes the coloring of the buttons in GUI based on the faults detected when the button is clicked.

Step 7 The button will be displayed in red color if faulty or else in green color.

VI. RESULT



VII. CONCLUSION

Thus the status of the Central Unit is monitored by identifying the faults which is resulted by developing a tool called GUI using Visual C++ Programming language; the GUI interacts with the processor in Central unit through UDP (User Datagram Protocol) by sending and receiving messages. The response message from central unit is displayed as the status of the central unit in GUI.

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