ENGINEERING

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ABSTRACTS

Bioelectromagnetic Absorption Measurement Methods. David D. Chesak, Saint Joseph's College, Rensselaer, Indiana 47978.——The absorption of non-ionizing electromagnetic radiation by humans continues to be of concern as the sources of radiation proliferate in both the civilian and military sectors. This presentation deals with measuring techniques for determining the effect of this radiation within simulated human subjects. The instrumentation for this is discussed.

Application of Low Rate Speech Coding Techniques to the Production of Synthetic Pipe Organ Sounds. Joel R. Crosmer, Valparaiso University, Valparaiso, Indiana 46383.——A method of generating pipe organ-like sounds with techniques used in low rate speech coding is described in this paper. In this method, the similarities between an organ pipe and the human vocal tract are exploited to produce more natural sounding musical notes. The author demonstrates that the filter/excitation sound production model is useful for giving each note in a keyboard scale unique characteristics. This is accomplished by modifying its steady state spectral characteristics, as well as the attack and decay properties, through changes in time varying synthesis filters. It is also shown that subtle phase variations in acoustically generated sounds can be introduced by small perturbations of the filter parameters.

Microcomputer Course for All Engineering Students. Richard L. Gonzales, Department of Engineering, Purdue University, Calumet, Hammond, Indiana 46323.——A new sophomore lecture and laboratory course in microcomputer and microcontroller applications for all engineering students is being developed and implemented at Purdue University Calumet. The equipment required is partially supported by an NSF CSIP grant. The course contains a significant laboratory component and uses software and hardware that is uniquely suited to the project. The outstanding feature of the course is the plan to take students, without prior knowledge of the subject, to a point where they can produce, in the laboratory, a turn key microcontroller system. This is considered the minimal level of knowledge necessary for all engineering students.

A Scientist's Perspective on the Strategic Defense Initiative. William A. Hollerman, Nichols Research Corporation, 4040 S. Memorial Parkway, Huntsville, Alabama 35802.——Since President Reagan created the Strategic Defense Initiative (SDI) in 1983, political issues have played a large role in the development of a defense system which would shield the United States from the threat of nuclear armageddon. For the average scientist working in the SDI arena, political issues do not enter into the day-to-day development of particular shield elements. This report will present an overview of current SDI concepts and technologies from a scientist's perspective. A careful attempt will be made to avoid *all* political issues.

Use of Bottom Ashes in Indiana Highway Construction. Wei-Hsing Huang and Charles W. Lovell, School of Civil Engineering, Purdue University, West Lafayette, Indiana 47907.——Indiana coal-fired power plants produce large quantities of bottom ash. These materials are often wasted, but are potentially useable in highway construction for embankment, subgrade and subbase material. In order to use them in this manner, they must be experimentally characterized both physically and chemically. A total of 11 bottom ashes were collected from all parts of the state and tested for (1) grain size distribution, (2) specific gravity, (3) complete chemical analysis, and (4) X-ray diffraction. This paper presents the results of laboratory studies determining the physical and chemical properties of the material.