ORT.08 - Potential Model for Improvement of the Data Transmission in Healthcare Systems

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Introduction: Patients from developing countries such as Brazil face large waiting periods in the Unified Health System (SUS) for scheduling and medical care.

Objective: Based on this, the present study aims to implement a DES (Discrete Event Simulation) based model. This model is called CBEDE (Coding of Bits for Entities by means of Discrete Events) and aims to assist SUS by categorizing a broad spectrum of health-related topics as well as improving the transmission of medical data.

Methodology: DES is an effective tool to approach a wide variety of health care issues. This technique has been used to model concepts with a high-level of abstraction in a system, such as patients, nurses, doctors; can be applied from the exchange of emails on a clinical server to the transmission of data packets between devices connected in a hospital network, which also uses the queuing concept and can be used to manage patient data, medical staff, or same emergency departments, intensive care units, surgical procedures, outpatient clinics, ie, the entire extent of a healthcare system. Aiming to solve such problems, the present study implements a model CBEDE applied to a healthcare system, and advanced modulation format DQPSK in a simulation environment, the Simulink simulation environment of the MATLAB software, improving the transmission of data, through a pre-coding process of bits applying discrete events in the signal before the modulation process. This proposal brings a new approach for signal transmission. In this case, the transmission is performed in the discrete domain with the implementation of discrete entities in the bit generation process. This study aims to increase the information capacity for healthcare systems.

Results: Through simulations the model without the proposal consumed 55.5MB which in contrast the proposal had 28.82MB of consumption, in MB (Megabytes). Being the differential of this research the use of discrete events applied in the physical layer of a transmission medium, the bit itself, being this a low-level of abstraction, the results show better computational performance related to memory utilization and to the compression of the information, showing an improvement of 92.6%.

Conclusion: Patients awaiting consultation with a medical specialist, in the context of a system interconnected between hospitals (which nowadays this is already reality). However the systems currently used are slow and consume a lot of system memory, facilitating crashes. With exchange patient data and medical consultations with each other, such scheduling of consultations may become more effective. This demonstrates that the CBEDE has great potential in the improvement of the hospital services. This potential of improvement of already existing processes can increase the performance of communication response between all the devices in the hospital system, because the flow of data will consume fewer resources and, therefore, can improve the interactions between doctor and patient.

Keywords: Healthcare Systems; CBEDE; Discrete Events