Making of India's Largest Telehealth Solutions in Covid Era: Some Insights

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Driven by Corona virus induced restrictions on movement of people, need for avoiding in-person patient to physician consultations, the Telehealth solutions have come of age. What could not be achieved in last two decades has become feasible in couple of months.

The author leads a team for development of eSanjeevani, an Indian National Telemedicine Solution. The solution so put together, has on-boarded more than 7000 physicians and other healthcare user in a short span. More than 8,00,000 consultations have been provided using this solution. During the implantation, the challenges of choosing the right architecture of the solution, the tools to be used, the process flow which can be followed by masses, the education of healthcare workers, the hosting of solutions were worked out.

The API logger for recording the time elapsed between response time of different events so as achieve database and code optimization were developed. The algorithms for services related to patient registration, token generation, audio video chat, prescription generation and the like were also developed. It is found th=at migration from Monolithic to Micro Services Architecture will be a better choice else the services become unavailable though shorter durations. The multiple third-party integrations are also a challenge. Micro services architecture also makes available services in multiple zones with immense advantage of fail-safe recovery from disaster.

Batching operations using caching offers optimization in code and database which improves response time although hard real time realization takes a back seat.

The paper elaborates the insights into development into an emerging largest implementation of a telehealth solution in India. Several innovative use cases have also been discussed.

Brief Bio-data

Dr PK Khosla passed M.Tech in Electronics & Communication from National Institute of Technology, Kurukshetra. He was awarded University Medal for being a topper. He passed PhD in Electronics & Communication from Thapar University. He has also undergone courses at

- IIT Delhi & IIT Kanpur, India
- Engineering Staff College of India
- Administrative Staff College of India
- IIM, Ahmedabad, India
- Advanced AI in Cyber Security, Carnegie Mellon University, USA

He joined DRDO in 1986 as Scientist B. He is the founder of Embedded Systems Division and remained its head for 5 ½ years. The embedded products developed by him and his team have been successfully inducted into on-board systems such as missiles and aircraft. He has

conducted experiments on the rails by achieving vehicle velocities of the order of 2000 km/hr. He is recipient of a number of awards namely

- National Technology Day Award 2012.
- Most **prestigious award has been the Scientist of the year award - 2015**
- He is also recipient of Engineer of the year award – 2017 of Chandigarh University, India

Till 2018 he was working as Scientist G and Associate Director of Terminal Ballistics Research Lab (TBRL), DRDO, India. He was head of premier test facility named Rail Track Rocket Sled Facility, Head of Automation and Networking Division and also Head of Communication Division. He has expertise in Embedded Systems, Networks, ERP, Telemetry, Instrumentation, Velocimetry, Virtual reality and IOT.

His relentless efforts have enabled scientists to unravel the previously unforeseen and latent issues in defence systems. On 18th Dec 2018, took over C-DAC Mohali as Executive Director. Here he heads teams working in areas of Cyber Security, eGovernance, Telemedicine, Medical devices and Agri -Electronics.