

Digitalisation of Agriculture in India: Application of IoT, Robotics and Informatics to establish Farm Extension 4.0*

Moni Madaswamy

Professor Emeritus & Chairman

Centre for Agricultural Informatics and e-Governance Research Studies (CARIS)

Shobhit Institute of Engineering & Technology, Meerut

(A NAAC Accredited Deemed to-be University)

Meerut, Uttar Pradesh

eMail: moni@shobhituniversity.ac.in

Abstract

Information Theory of Claude Elwood Shannon (1948) to Internet of Things (IOT) of Kevin Ashton (1999) have impacted digital technological applications very decisively, in various development fields. The emerging GRIN (Genomics, Robotics, Informatics and Nanotechnology) Paradigm facilitates digitalisation process in agricultural system intensively, and therefore demand for agricultural informatics professionals for this paradigm is echoing, to bridge gap of increasing and evolving human resources IT StartUps in farming sector throughout the Country. Robotics Process Automation (RPA), through Virtual Software Agents and physical robots, provide enormous opportunities for products developments by emerging technology StartUps. Digital Signal Processing (DSP), IOTs and Robotics are the essential components of Industry 4.0 applications. Quantum Computing is increasingly finding its applications in biological (agricultural) computing (Systems Biology), through “qubit” information processing.

India has been achieving its milestones on digitalisation, through its national level programmes viz., e-Government – NICNET and DISNIC (1986), Digital Networks for Farmers (ISDA-1995), SMART Village Scheme (2002-07), e-Governance Programme (2005), e-Kranti Renewed Strategy (2014), Digital India Programme (2015), and now consultation paper on National Open Digital Ecosystem - NODE (2020). The Doubling Farmers' Income by 2022 Report (2018), discusses seven mission mode projects for digital technology in Agriculture (Vol-12B, Chapters 7-10). The white consultation paper on Agriculture NODE has to trace its roots in 1986 and wings spread in 1995.

Intelligent systems, Pervasive computing, SMART Systems, Industry 4.0, Medical IOT, Industrial IOT, Web of Things (WoT), M2M, Internet of Everything and Embedded Internet are IOT applications, impacting decisively digitalisation of Agriculture. IoTs are described as “sensors” and “actuators” embedded in physical objects linked through wired and wireless networks, using Internet Protocol (IP) that connects the Internet. Long Range Radio (LoRa) is the wireless technology mainly targeted for M2M and IoT networks. IoT in Agriculture has become one of the fastest growing fields in the M2M Communication. IBM terms it as “Agriculture Internet of Things (AgIoT)”.

Agricultural Data has become a major source of competitive advantage. The “**Future of Agriculture**” Technology includes **IOT**, **BigData Analytics** and **Smart farming**, having potential impact on Agricultural Resources Management and Agricultural Value System, through farm extension delivery mechanism. Achieving Farm Extension 4.0 at village level, leads to development of SMART Farmer, Smart Farming and SMART Village in an agricultural eco system leading to a National Open Digital Eco System (NODE) in the country. Our Country is an Agrarian economy and hence requires to be a digitalised agricultural economy.

This Paper describes Farm Extension 4.0 for empowering 13 Crores Farming families of the country, by adopting technologies viz., IOTs, Robotics and Smart Farming in villages, through Agri StartUps, Farmer Producer Organisations (FPOs), Agricultural Polytechnics and Agricultural ITIs at Block levels.

Keywords: Agriculture, Digital Technology, Farm Extension 4.0, GRIN, Industry 4.0, IOT, ISDA, Robotics, SMART Village, DFI2022

* Abstract sent to the International Conference on Artificial Intelligence and e-Leadership, 15-16 October 2020, at Plovdiv (Bulgaria), organised by M/s Plovdiv Tech Park (<http://optela.com/>).