



Name of the Department: Electronics & Instrumentation Engineering

Name of the Department Research and Education Centre (DREC):

<u>Research & Education Centre</u> Industrial IoT	<u>Room No.</u> B-I-104
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About the DREC:	The industrial internet of things (IIoT) refers to interconnected sensors, instruments, and other devices networked together with computers' industrial applications, including manufacturing and energy management. This connectivity allows for data collection, exchange, and analysis, potentially facilitating improvements in productivity and efficiency as well as other economic benefits. The IIoT is an evolution of a distributed control system (DCS) that allows for a higher degree of automation by using cloud computing to refine and optimize the process controls.
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Primary functions of the DREC:	<p>The primary functions of a Research & Education Centre of Industrial IoT (Internet of Things) typically revolve around advancing knowledge, research, and education in the field of Industrial IoT technologies. Here are some primary functions such a center might serve</p> <ul style="list-style-type: none"> • Research and Development • Technology Evaluation and Testing • Education and Training • Collaborative Projects and Partnerships • Prototype Development and Testing • Knowledge Dissemination and Outreach • Incubation and Innovation Hub <p>Overall, the Research & Education Centre of Industrial IoT plays a crucial role in advancing the adoption and understanding of IoT technologies in industrial settings through research, education, collaboration, and innovation.</p>
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Major equipment available in DREC:

Sl. No.	Name of the Major Equipment	Description of equipment	Cost
01	Raspberry Pi3 B Board	It is based on the BCM2837 system-on-chip (SoC), which includes a 1.2 GHz quad-core ARMv8 64bit processor and a powerful Video Core IV GPU. The Raspberry Pi can run a full range of ARM GNU/Linux distributions, including Snappy Ubuntu Core, Debian, Fedora, and Arch Linux, as well as Microsoft Windows 10 IoT Core.	89,000.00
02	Arduino Boards	Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read	15000.00



		inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.	
03	Xbee modules with explorer and shield	The Digi XBee ecosystem offers device developers a full range of rapidly deployable drop-in networking solutions for wireless communication between devices, adaptors and gateways. One socket allows you to connect to device networks around the globe	3000.00
04	LoRaWAN module	LoRaWAN® modules are secure, regulatory-certified, Arm® Mbed™ programmable, low-power RF modules, providing long-range, low bit rate IoT data connectivity to sensors and actuators	4000.00
05	Siemens as410 Smart Controller based DCS Trainer, DCS Software (PCS7-v9.0) (MODOROBS)	DCS controller & distributed I/O modules are fixed on a metal frame. 8 No's of Toggle switches are provided to simulate the digital Inputs. 8 No's of LED's are provided to indicate the digital Outputs status. Two Analog sources (0-5)V DC & (0-20mA) provided for manual checking the Analog Input channels.	14,99,950.00
06	Programmable Logic controller with Real time application trainer	A programmable logic controller (PLC) or programmable controller is an industrial computer that has been ruggedized and adapted for the control of manufacturing processes, such as assembly lines, machines, robotic devices, or any activity that requires high reliability, ease of programming, and process fault diagnosis.	75,000.00
07	Desktop PCs (Dell Intel core i5-8500/8GB, 1TB HDD)	-	3,12,200.00

Picture of DREC


**Software available in DREC:**

Sl. No.	Name of the Software	Purpose of Software	Cost (in Rs.)
1.	NI LabVIEW-2018	LabVIEW, which stands for Laboratory Virtual Instrument Engineering Workbench, is a powerful graphical programming environment developed by National Instruments (now NI). Here are some key purposes and uses of Lab VIEW are Graphical Programming, Instrument Control and Automation, Data Acquisition and Analysis, Embedded System Development, Control Systems Design and Simulation, Education and Research	17,70,000.00
2.	Matlab-2023b	MATLAB is a programming platform designed specifically for engineers and scientists to analyze and design systems and products that transform our world. The heart of MATLAB is the MATLAB language, a matrix-based language allowing the most natural expression of computational mathematics.	48,653.00
3.	Python 3.12.2	Python 3.12 is the newest major release of the Python programming language, and it contains many new features and optimizations. 3.12.2 is the latest maintenance release, containing more than 350 bug fixes, build improvements and documentation changes since 3.12.1	Free

Project / Research carried out in the DREC:

Sl. No.	Name of the Project / Research carried out in the DREC	Outcome of Project / Research carried out
1.	IoT based Smart waste management system	To find a solution for efficiently handling waste generated in urban areas, focusing on the interaction among concessioners and waste generators to monitor the unfilled level of bins.
2.	IoT based Healthcare monitoring system	To design a health monitoring system using the Internet of Things (IoT). The system developed will measure a patient's body temperature, heartbeat, and oxygen saturation (SpO2) levels in the blood and send the data to a mobile application using Bluetooth. IoT-enabled technologies enable the possibility of developing novel and noninvasive clinical support systems.
3.	IoT based Smart farming system	To design a Smart agriculture System that monitor temperature, humidity, moisture and even the movement of animals which may destroy the crops in agricultural field through sensors using Raspberry Pi board and in case of any discrepancy send a SMS notification as well as a notification on the application developed for the same to the farmer's smartphone using Wi-Fi/3G/4G.
4.	A novel IoT-based smart parking (SP) solution	To design an IoT-based smart parking (SP) solution to revolutionize the traditional parking experience by leveraging advanced technologies to optimize parking space utilization, improve traffic flow, and enhance user convenience.



Photographs of working models / application software developed with description:

Sl. No.	Name of the Working model developed in the DREC	Details of working model developed
01	<p>A novel IoT-based smart parking (SP) solution</p>	<p>We designed a novel IoT-based smart parking (SP) solution to provide information on the status of parking spots offered in on-street parking areas. We mostly focused on the following issues of the state of the art solutions: scalability, interoperability to address the heterogeneity of IoT devices, low energy consumption, and timely prediction of the availability of the parking spots. To this we leverage the Social IoT (SloT) Lysis environment to create virtual entities of the real world objects involved in the SP system for on-street parking areas. The usage of the social virtual entities allows for addressing the interoperability issues among different types of IoT devices used by separate solutions deployed in adjacent areas.</p> <p>Keywords: Internet of Things, Vehicle detection, smart Parking.</p>

Details of Faculty in-charge for Research and Education Centre: (Photo, Contact details)

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