Name of the Department: Electronics & Instrumentation Engineering

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

PG-Research & Education Centre Research Laboratory	Room No. B-I-217/A

About the DREC:	It seems that the term "Department Research and Education Centre" is quite general, and without specific context or additional details, it's challenging to provide precise information. However, I can offer a general description based on common practices in educational institutions and research organizations. A "Department Research and Education Centre" might refer to a specific unit within an institution that focuses on both research and education-related activities. Here are some general aspects that such a center might encompass: **Research Activities:** • Conducting original research in a specific field or discipline. • Engaging in collaborative research projects with external partners. • Publishing research findings in academic journals and presenting at conferences. **Educational Initiatives:** • Offering educational programs, courses, or training related to the department's field. • Providing academic support, resources, and mentorship for students and researchers. • Organizing workshops, seminars, and conferences to promote knowledge exchange. **Interdisciplinary Collaboration:** • Facilitating interdisciplinary collaboration among researchers, educators, and students. • Encouraging cross-disciplinary initiatives that bridge research and education. **Community Engagement:** • Engaging with the local community through outreach programs and initiatives. • Contributing to community development through research and educational activities. **Technology Transfer and Innovation:** • Supporting the transfer of technology and innovation from research to practical applications. • Collaborating with industry partners for technology-driven initiatives. **Resource Management:** • Managing resources such as laboratories, libraries, and research facilities.

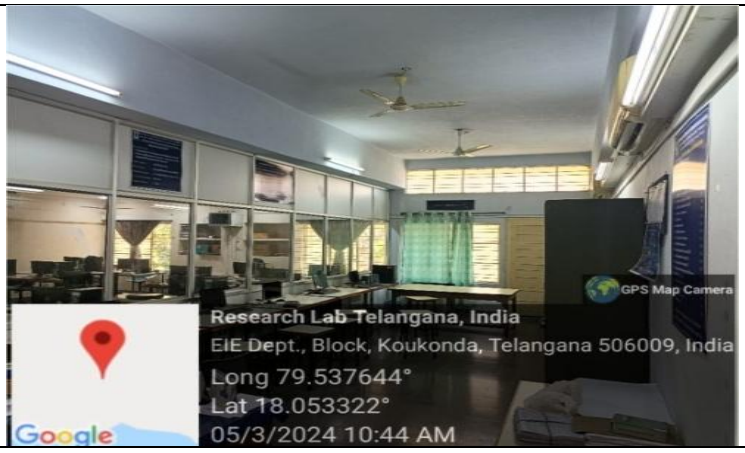
	• Acquiring funding for research projects and educational programs. **Policy Advocacy:** • Contributing to the development of policies related to research and education in the department's field. • Advocating for the department's interests within the institution and the broader community. It's important to note that the specific functions and activities of a "Department Research and Education Centre" can vary widely depending on the policies, goals, and focus of the specific institution or organization. If you have a particular entity in mind, I recommend checking official documentation, websites, or contacting the organization directly for accurate and detailed information.

Primary functions of the DREC:	(Department Research and Education Centre), I can provide a general outline of the primary functions that a research and education center might typically serve. The actual functions can vary widely based on the nature, goals, and focus of the specific organization or department. Here are some common functions that a Department Research and Education Centre might have: • Research Conduct and Facilitation • Education and Training • Knowledge Dissemination • Community Outreach • Collaboration and Networking • Resource Development • Policy Advocacy • Innovation and Technology Transfer • Evaluation and Assessment

Major equipment available in DREC:

Sl. No.	Name of the Major Equipment	Description of equipment	Cost
1.	NI ELVIS –II Kit with Lab VIEW 8.1 software	8differntial or 16 single ended Sample rate 1.25MS/s single channel, 1.00MS/s multi channel – USB based	1,80,574.00
2.	25 MHZ Digital Storage Oscilloscope	Dual Channel; Bandwidth:25MHz; Sampling Rate:250MSPS; Display Memory Depth:25 kpts; Calculated Rise Time:14ns; Scope Display Type: WQVGA LCD Colour	35,900.00
	30 MHZ Dual Channel 4 -Trace CRO	1mV/div Sensitivity on Both Channels CH1 & CH2 Independent Channels.CH1 Signal Output Algebraic Addition and Subtraction, X-Y Operation 20ns/div to 0.2s/div Time Base ALT MAG. Trace - Max. 4 Traces, Scale Illumination Z Modulation 8 x 10 cm Display Internal Graticule Auto Focus TV Triggering Frame (V) & Line (H) Line Trigger ALT Triggering C.T. Facility	86,000.00
	Universal µC Programmer	40 pin DIP programmer for EEPROM, FLASH , Microcontroller flash memory burner	72,038.00

	ECG monitor(model_ scientific ST2351)	12 lead ECG with 3digits compatible with pc interfacing	10,500.00
	Respiration monitor(model_ scientific ST2353)	Separate Test-Points to observe waveforms after each block. User Selectable Tachypne a limit adjuster. On board visual and audible Tachypnea and Apnea indicator. User selectable Apnea period control. On board Respiration event indicator.16x2 LCD display for Respiration-rate. On board threshold control. On board Reset for display and One minute timer reset.User selectable buzzer for abnormality indication.	9,375.00
	Heart/Pulse rate monitor (BIOPAC/System) Mp150)	Data acquisition unit: MP150A-CE Universal interface module: UIM100C Ethernet Switch (for user-supplied Ethernet card or adapter): ETHSW1 Transformer: AC150A Cables: CBLETH1 (2) ®Acq Knowledge software CD	12,375.00
	3 MHZ Function Generator	Wide Frequency Range Sine, Triangle, Square, Ramp, Pulse, TTL (Sync) & DC Outputs Low Distortion High Resolution on Low Frequency Output Attenuation up to 80Db Variable DC Offset Control Four Digit digital Display with Frequency Indication in Hz, KHz, MHz / Amplitude display	52,500.00
	DSP prototyping Board	High performance floating –point digital signal processor (DSP) 150million floating –point operations (MFLOPS) 75 million instructions per second (MIPS) 34k*32 (1.1 M bits)on chip words of dual access static bit integer and 32/40bit floating point operations 32 bit instruction word,24 –bit addresses	89,424.00
	FPGA prototyping Board	Xilin xc 3S500E-4FTG256C,500K system gates 10,476 logic cells, logic family. CMOS Platform flash configuration prom 4M -bit	26,860.00
	Embedded module for ARM microcontroller	When referring to an "embedded module for ARM microcontroller," it typically means a compact, integrated module that incorporates an ARM microcontroller along with other essential components. These modules are designed to simplify the integration of ARM-based processing capabilities into various electronic devices and applications.	28,154.00
	Desktop Systems	AcerPentium(R)Dual-CoreE6600 @3.06GHz500GB Hard Disk, 2GB RAM	79,500.00

Picture of DREC	

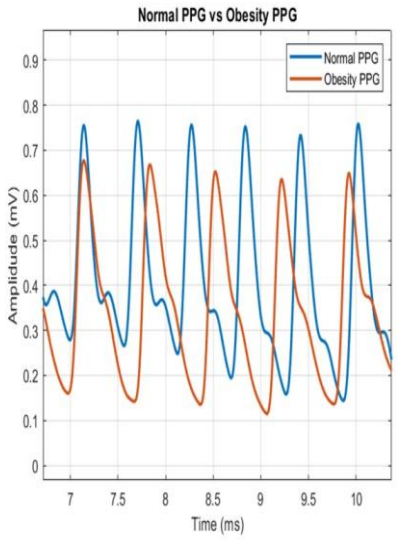
Software available in DREC:

Sl. No.	Name of the Software	Purpose of Software	Cost (in Rs.)
1.	BIOPAC system software	Used To Identify &Record Signals	10,17,035.00

Sl. No.	Name of the Project / Research carried out in the DREC	Outcome of Project / Research carried out
1.	Cardiovascular Disease detection using PPG and ML	Article communicated and Under Review
2.	Prediction of health disordered associated with obesity using PPG SIGNAL	In progress
3.	Extraction of Respiratory rate from PPG signal using ML algortihm	Article communicated and Under Review

Photographs of working models / application software developed with description:

S. No.	Name of the Working model developed in the DREC	Details of working model developed
		Detecting Cardiovascular Disease (CVD) using Photoplethysmography (PPG) signals and Machine Learning (ML) techniques is an emerging field that shows promise for non-invasive and early detection. PPG is a simple and cost-effective optical technique that measures blood volume changes in the microvascular bed of tissue. ML algorithms can be trained on PPG data to identify patterns and anomalies associated with cardiovascular conditions. Here's a general overview of the process: Steps in Cardiovascular Disease Detection using PPG and ML: **Data Collection:** Gather PPG data: Use wearable devices, such as smart watches or fitness trackers, equipped with PPG sensors to collect continuous and real-time PPG signals. Include relevant demographic and health information in the dataset, such as age, gender, medical history, and lifestyle factors. **Preprocessing:** Clean the PPG data: Remove noise, artifacts, or motion-related interference from the raw PPG signals. Segment the data into relevant time intervals for analysis. **Feature Extraction:** Extract meaningful features from the PPG signals, such as pulse rate, heart rate variability, and characteristics of the PPG waveform. Time-domain and frequency-domain features can be used to capture different aspects of the



signal.

Labeling: Annotate the dataset with labels indicating the presence or absence of cardiovascular disease. This can be done based on medical records, diagnostic tests, or other relevant information.

Data Splitting: Divide the dataset into training, validation, and test sets to train and evaluate the ML model.

Model Selection:

Choose an appropriate ML algorithm. Common choices include: Support Vector Machines (SVM)Random Forest Neural Networks Gradient Boosting algorithms

Training:

Train the ML model using the labeled training dataset. The model should learn to distinguish between PPG patterns associated with healthy and diseased individuals.

Validation: Evaluate the model on the validation set to fine-tune hyper parameters and ensure it generalizes well to new data.

Testing: Assess the model's performance on the test set, providing an unbiased estimate of its effectiveness.

Interpretation and Visualization:

Understand which features contribute most to the model's predictions. Visualization techniques can help interpret the model's decision-making process.

Deployment: Integrate the trained model into a user-friendly application or healthcare system for real-time CVD risk assessment.

Monitoring and Updating:

Continuously monitor the model's performance and update it as needed to adapt to changes in the population or technology.

It's crucial to collaborate with healthcare professionals, validate the model on diverse populations, and adhere to ethical and privacy considerations when developing and deploying such systems. Additionally, obtaining regulatory approvals and ensuring the security of health data are important steps in bringing these technologies into clinical practice.

Details of Faculty incharge for Research and Education Centre: (Photo, Contact details)

Name of the Faculty Incharge, DREC	Contact details
	Phone No: 9912155777 Mail ID: bj.eie@kitsw.ac.in

HoD-EIE & Programme Head-ECI
(Dr. M. Raghu Ram)