

MET's Institute of Engineering, Bhujbal Knowledge City, Nashik
Department of Computer Engineering

Honours Course TE Sem-V Subject: **310601: Embedded System & Internet of Things**

Following are NPTEL Courses available on NPTEL Repository

Embedde System: <https://nptel.ac.in/courses/108/102/108102169/>

<https://nptel.ac.in/courses/106/105/106105159/>

<https://nptel.ac.in/courses/106/105/106105193/>

IoT: <https://nptel.ac.in/courses/108/108/108108098/>

<https://nptel.ac.in/courses/106/105/106105166/>

<https://nptel.ac.in/courses/106/105/106105195/>

<https://nptel.ac.in/courses/108/108/108108179/>

<p>Unit I ES Overview Embedded Systems: Architecture & Characteristics of ES, Types of Embedded systems, Examples of Embedded Systems. Embedded System On Chip (SOC). Components of ES: Hardware and software Hardware components of ES: Power supply: types, characteristics, selection criteria, Procusing Unit, Input devices, Output Devices</p>	<p>https://youtu.be/uFhDGagZzjs https://youtu.be/3OmyM4-zuQw https://youtu.be/zVxBEkaeHQc, https://youtu.be/zVxBEkaeHQc https://youtu.be/docZGkYbruw https://youtu.be/G_YfGR1yKSk https://youtu.be/iRwk7K8Lgvo https://youtu.be/CZuBWNhknSI https://youtu.be/F0cNJfVe-U</p>
<p>Unit II Introduction to ES System Software Introduction to Embedded operating Systems: Operating Systems Concepts, Real time operating systems, and, Task Scheduling, Different OS tasks, Introduction to Real-Time Operating Systems, characteristics, selection criteria, bootloader: U-boot. #Exemplar/ Case Studies Case study: Raspberry Pi OS</p>	<p>https://internetofthingsagenda.techtarget.com/definition/embedded-operating-system, https://youtu.be/t4Hj4Ca69DM, https://youtu.be/RhV8i1GZY2I, https://www.digi.com/blog/post/what-is-an-embedded-operating-system, www.embedded.com/tasks-and-scheduling/ https://www.raspberrypi.org/software/ https://www.raspberrypi.org/software/operating-systems/#raspberrypi-os-32-bit https://www.raspberrypi.org/software/raspberrypi-desktop/ https://magpi.raspberrypi.org/ https://hackspace.raspberrypi.org/ https://wireframe.raspberrypi.org/ https://projects.raspberrypi.org/</p>
<p>Unit III Sensors, Actuators and Interfacing Sensors : Roles of Sensors & Actuators, Types of sensors ,Active and passive, analog and digital, Contact and no-contact, Absolute and relative Working of Sensors: Position, occupancy and motion, velocity and acceleration, force, pressure, flow, Acoustic, Humidity, light, radiation, temperature, chemical, biosensor, camera. Development boards: Types of boards - Arduino, Raspberry pi, Beagle bone, ESP8266, selection criteria. Interfacing of sensors with development boards.</p>	<p>https://youtu.be/I9pNBSiZjU, https://youtu.be/r_Job1rEbT0 https://youtu.be/Y2jbcAYhCS0, https://youtu.be/IUfY8BzN6IA https://youtu.be/tJJ602g3r2s, https://youtu.be/R6eCLQqWnCY https://youtu.be/AbUkoG7jvD8, https://youtu.be/Lfiw-KBUNQk https://youtu.be/_IOe6aMX81l, https://youtu.be/_FipkXdppS0 https://youtu.be/OVt7qEOcokg https://youtu.be/EDhu5Na9cPc https://youtu.be/AxnqJq-rEnA https://randomnerdtutorials.com/arduino-vs-raspberrypi-vs-beaglebone-vs-pcduino/ https://www.electronicdesign.com/technologies/modules/article/21796457/arduino-raspberrypi-or-beaglebone</p>
<p>Unit IV Embedded System - Application Development Integrated Development Platforms for Application</p>	<p>https://youtu.be/IE6_zAT0puA https://www.segger.com/products/development-tools/embedded-studio/</p>

<p>Development in ES environment, SDLC-Requirements, Architecture, Design, Components, Coding, Testing and Deployment. Study of any two Open source IDE for ES application development with respect to any of the two indicated Case studies</p> <p>#Exemplar/ Case Studies Design and development of ES Applications: Object detection, Traffic signal, digital clock, robotics arm movement, fire alarm, automated disinfection tent, Bus ticketing system, Tyre pressure monitoring system, smart metering</p>	<p>https://www.theengineeringprojects.com/2016/11/top-10-embedded-systems-software-development-tools.html https://www.sam-solutions.com/blog/top-ten-embedded-software-development-tools/ https://www.eclipse.org/community/eclipse_newsletter/2017/october/article2.php http://dSPACE.vpmthane.org:8080/jspui/bitstream/123456789/4495/1/Embedded%20system%20development%20environment%20-%20IDE%2C%28UNIT6%29.pdf https://www.elprocus.com/embedded-system-projects/</p>
<p>Unit V IoT</p> <p>Introduction of IoT: Definition and characteristics of IoT, Technical Building blocks of IoT, Device, Communication Technologies, Data, Physical design of IoT, IoT enabling technologies, IoT Issues and Challenges- Planning, Costs and Quality ,Security and Privacy, Risks</p> <p>#Exemplar/ Case Studies Smart Home: Characteristics of Smart Home - Smart Home Energy Management, Smart Appliances, Communication Technologies for Smart Homes, maintenance, security, challenges. Smart Agricultural: characteristics and applications -Scarecrow, Smart Irrigation System, Crop Water Management, Integrated Pest Management, Sensor-based field and resource mapping, Remote equipment monitoring)</p>	<p>https://youtu.be/bzBAi1YkKeA, https://youtu.be/bpxtNIAR4BI, https://youtu.be/IZOKa0Bh83o, https://youtu.be/6dmFuQtG0Eo, https://youtu.be/bpxtNIAR4BI, https://youtu.be/39pE_SVUD04, https://youtu.be/2kOpd6lZ8Js, https://youtu.be/6rdGDDKmg0, https://youtu.be/TipzDf5MC4k,</p> <p>https://www.acrel-electric.com/cloud_platform_for_power_iot https://www.digiteum.com/internet-of-things-energy-management/ https://www.intechopen.com/chapters/65877 https://www.hindawi.com/journals/wcmc/2020/8896637/ https://www.ripublication.com/ijaer17/ijaerv12n16_05.pdf https://www.cropin.com/iot-internet-of-things-applications-agriculture/ https://www.hindawi.com/journals/sp/2021/5536884/ https://www.telit.com/industries-solutions/agriculture/irrigation-management/ https://www.pratititech.com/a-practical-look-into-remote-monitoring-using-iot/ https://www.iotacommunications.com/blog/remote-monitoring-system/</p>
<p>Unit VI Communication under IoT</p> <p>IoT Protocols:MQTT, CoAP, XMPP and AMQT, IoT communication models, IoT Communication technologies: Bluetooth, BLE, Zigbee, Zwave, NFC, RFID, LiFi, Wi-Fi, Interfacing of wifi, RFID, Zigbee,NFC with development board.</p> <p>#Exemplar/ Case Studies e-health: Characteristics of e-health and applications- monitoring of health parameters, smart medicine box, elderly people monitoring, challenges. IoT Smart City: Characteristics and applications– Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment, Smart Living Smart Grid, Smart Home, Transport and Traffic Management, Smart Healthcare</p>	<p>https://youtu.be/8Eso5VnT35E, https://youtu.be/WCfc-itJvSI, https://youtu.be/lZ3JPbDRjiY, https://youtu.be/sHJ2_cyi_yc, https://youtu.be/uCbsFzZovY0, https://youtu.be/nwVtglguQRM, https://youtu.be/flcrWvQBzdQ, https://youtu.be/zwUk1jEoZk, https://youtu.be/V0CjXPWQT-4, https://youtu.be/GYMYXKUpBK8</p> <p>https://www.ijser.org/researchpaper/Smart-Medicine-Box-Using-IOT.pdf, http://wthtjsjs.cn/gallery/6-whjj-june%20-5435.pdf https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6631618/ https://www.finextra.com/blogposting/17931/what-is-the-role-of-iot-in-smart-cities https://www.hindawi.com/journals/js/2018/6464036/ https://www.egovspace.co.in/use-cases-for-applications-of-iot-in-e-governance/ https://blog.mantratec.com/how-iot-based-smart-traffic-management-system-optimizes-traffic</p>