Terms & Conditions

1. The quotation must specify the period within which the supply could be effected from the date of receipt firm orders.

2. Quotation received after the due date mentioned on the reverse will not be considered.

3. Your quotations should be for materials strictly in accordance with the specifications shown. In case you are offering substitutes state clearly the exact specification etc, of the materials offered Drawing sketches or any other technical data should be submitted separately.

4. The prices quoted should clearly specify charges for delivery of the goods to destination indicated overleaf.

5. The prices quoted should include all packing costs and it will be assumed that packing materials (cases etc..) are non-returnable unless otherwise stated.

6. Sales tax or any other taxes if applicable should be shown separately giving the full rate of taxes for each items giving ex-incidence of such levies.

7. The Director reserves the right to accept the whole or part of any quotation without assigning any reason and the lowest or any quotation, will not necessarily be accepted, and the Director's decision shall be the final.

8. Samples must accompany the quotation when so specified or within two days when asked for later.

9. If it is discovered that the materials supplied are not exactly according to the specification, the entire stock will be rejected.

10. We reserve the right to inspect the goods offered at any stage of manufacture / supply at your premises.

11. Any dispute arising out of or relating to this Enquiry shall be deemed to have arisen in Madras and is subject to adjudication of the Madras Courts.

12. Rates quoted once will remain firm for that particular dealing.

13. The quotation should be kept valid for a period of 60 days from the date of opening for acceptance.

14. Payment will be made after confirmation on receipt of the materials in good condition at this Institute (normally within 30 days.) Advance payment will not be entertained at any circumstances.

15. Printed conditions of the firm sent along with the quotation form if any, shall not be binding on us.

16. In case of Printing the Proof should be got approved before final strike.

17. Materials should be supplied at this institute in good condition.

18. Price quoted by the suppliers accepted by the Director is final, and no deviation therefrom will be accepted without the Director's agreement in writing.

19. If the rates are under D.G.S. & D. Please specify the same clearly enclosing necessary documents.

Phone : 22545415, Fax: 2254 1126, email: dir@nitttrc.ac.in

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH

Taramani P.O., Chennai – 600 113.

(Government of India, Ministry of Human Resource Development)

No.NITTTR/EE&CE/IoT/2017-18/ **Date:09.02.2018**

To

Delivery required by :	QUOTATION DUE DATE
immediately	(a) Please send your quotation within the due date on sealed envelope on or before: **Date: 20.02.2018** (b) Delivery required at : NITTTR, TARAMANI, CH-113

Sl.No.	Description of Items	Material Code	Approximate Quantity Required
1.	Zigbee Sensor Node (Detailed Specification is enclosed as Annexure)		7 nos.
2.	JTAG debugger for Zigbee RF Card (Detailed Specification is enclosed as Annexure)		6 nos.
3.	IAR Embedded Workbench for ARM for Zigbee stack modifications (Single User) [Detailed Specification is enclosed as Annexure] • **Your quote will be rejected if IAR IDE authorization letter is not enclosed.**		1 no.
4.	Bluetooth Sensor Node (Detailed Specification is enclosed as Annexure)		6 nos.
5.	WiFi Sensor Node with Debugger (Detailed Specification is enclosed as Annexure)		6 nos.
6.	Sensor Modules (Detailed Specification is enclosed as Annexure) Force Sensor, Temperature Sensor, Magnetic Sensor, Vibration Sensor, Humidity Sensor, RH & Temperature Sensor , Light Sensor, 3Axis Accelerometer, Smoke Sensor, Motion Senor, Tilt Sensor, Ultrasonic Sensor, Pressure Sensor, Speed Sensor, Touch Sensor		Each 6 nos.
7.	IoT Gateway (Detailed Specification is enclosed as Annexure) a) BROADCOM BCM2837 Processor Gateway b) Ti AM335X Processor Based Gateway c) IoT 2040 Gateway		6 nos. 6 nos. 3 nos.
8.	Siemens IoT 2040 based IoT Development system**:** (Detailed Specification is enclosed as Annexure) ❖ IoT 2040 Gateway ❖ Add on modules in IoT2040 ❖ One Wi-Fi end device with sensor ❖ One Zigbee end device with sensor ❖ One loRaWAN end device with sensor ❖ Wi-Fi Bluetooth card • **Your quote will be rejected if Siemens authorization certificate for support is not enclosed.** • **Order will be confirmed only if the gateways with sensors are demonstrated with a private & public cloud at our premises if required.**		1 set

Note:

- GST No. must be specified in your quotation
- Specify warranty period, Specify educational institute discount
- Sales tax and any other charges should be mentioned separately in each item
- Reference No. and Date should be written on the cover.
- As per Ministry of Finance, Govt. of India Notification No. 45/2017-Central Tax (Rate), dt. 14th Nov 2017, we are eligible for concessional GST @ 5%

Cover should be addressed:

Name: **Associate Professor & Head i/c – Electrical Electronics & Communication Engineering**
National Institute of Technical Teachers Training and Research,
Taramani P.O., Chennai – 600 113.

(For terms and conditions please see overleaf) **DIRECTOR**

Annexure

Detailed Specification for Purchase of Internet of Things

A Development Environment for IoT with sensor nodes like Zigbee, Bluetooth, Wi-Fi, LoRaWAN etc., should be provided.

Zigbee sensor nodes, based on Cortex M3 Controller should be provided to carry out various Experiments using Zigbee stack.

The experiments should be based on a IEEE Zigbee protocol which should be able to modify the stack by participants using IAR IDE for forming experiments like star, mesh, hopping, point to point, connect single sensor or multiple sensors to a single Zigbee node. **The participants should be able to study the Zigbee protocol in detail using IAR IDE and should be quoted with authorization letter.**

3 Gateways include a Industrial gateway from Siemens IoT2040, based on broadcom BCM2837 and based on AM3358 and should be able to interface Zigbee, Wi-Fi, Bluetooth, LoRaWAN based sensor nodes. **The gateways with sensors should be demonstrated with a private & public cloud.**

The IoT2040 should be provided with all interface for industrial applications; RS232, RS485 (MODBUS), Profinet, PoE Ethernet, USB host, USB Device, Wifi Expansion of hardware through mPCIe and Arduino port. Various experiment boards for the above interfaces should be provided to exercise or participant can write code in Python or C/C++ or in Java to access these boards.

The Supplier should provide a authorization certificate for maximum support from Siemens.

IoT2040 should be connected to a PLC/DCS through Profinet.

Sample programs should be provided to communicate with OPC UA, Profinet, Modbus, Snap7 Protocols.

Sensors interface to Zigbee includes (Each 6 nos.)

Temperature Sensor, Magnetic Sensor, Force Sensor, Vibration Sensor, Humidity Sensor, RH & Temperature Sensor, Light Sensor, 3 Axis Accelerometer, Smoke sensor, Motion sensor, Tilt Sensor, Ultrasonic sensor, Pressure sensor, Speed Sensor, Touch Sensor.

IoT 2040 Gateway should include the following add on cards and should be fixed on a sleek panel.

Intel Centrino Wi-Fi Module, RS485 Slave module with sensor-2Nos, RS232 module with sensor- 1Set, Zigbee Coordinator & End Device with sensor, Wi-Fi End Device with sensor, LoRaWAN Coordinator & End Device with Sensor-1 Set.

NOTE: 1. A Detailed Demo should be given on the quoted items, as IoT is growing technology, for all technical clarification.

DETAILED SPECIFICATIONS :-

1. **ZigBee Sensor Node—7 nos.**

* Powerful SoC for 2.4GHz Zigbee applications
*ARM Cortex M3 MCU with 32KB RAM & 512KB Flash
*JTAG connector for downloading/debugging.
*Can be operated Battery/External Power adapter
*8 channel Analog input.
*I2C interface connector for sensor interface.
*Each Analog input should be terminated at individual connector along with power for
sensor interface.
*On board LDR sensor.
*On board Trimmer for going analog input.
*Casio socket should be available onboard for giving external power.
*RF card should be available as plug in module for easy upgradation and serviceability.
*On board LED indication for wireless connectivity status.
*On board USB to serial interface for easy debugging.
*Power ON/OFF switch.
*Power button for user and Reset.
*SPI interface connector for SPI board sensor interfaces.

2. **JTAG Debugger for ZigBee RF Card –6 nos.**

* USB Bus Powered
* Support USB 2.0 (480Mbps)
* Support target with 20pin (or) 14 pin JTAG
* Support smart RF flash programmer 2
* USB A to Mini B cable included

3. **IAR Embedded Workbench for ARM – Single User**

* IAR systems support a broad range of components and platforms Wireless applications.
* IAR Embedded workbench with its integrated IAR C/C++ compiler and C-Spy debugger is the natural choice for Wireless Applications.
* IAR system offers a complete solution of RTOS and middle ware components such as TCP/IP and USB that can enhance your embedded design.
* Gives an uninterrupted workflow and one single tool box in which all components integrate seamlessly.
* Provision for multiple projects within the same workspace with dockable windows and tab groups.
* Provision for editing the source files without leaving the debug session while debugging.
* Many example projects.
* Possibility for integration with X-WARE IoT Platform
* Support for C, C++ and embedded C
* Integrated software Solutions from leading RTOS and middle ware vendors
*C-SPY debugger provides an instruction simulator as well as extensive support for debugging probes and target systems.

* Power debugging technology samples the momentary current drawn by the system and feeds it to a power debug API where it is synchronized with time stamped debug information. This connects power consumption directly to the source code.
* Debugging of several independently built images during one debug session
* Generic Flash Loader.

4. Bluetooth Sensor Node – 6 nos.

* Bluetooth Specification Version 4.1
* It Can be operated standalone as well as interface with MCU
* ASCII Command interface over API
* Firmware upgrade over UART or OTA
* 64KB Internal serial flash
* UART/3 channel ADC/ DIO
* Can be operated Battery/External Power adapter
* 3 user LEDs.
* Each ADC inputs terminated at individual connector along with power for sensor interface.
* On board RS232 interface for interface with other microcontroller.
* On board USB interface for easy configuration / programming.
* Additional GPIOs and SPI lines should be terminated at separate connector.

5. WiFi Sensor Node with debugger – 6 nos.

* Low power CC3200 wireless MCU
* Cortex M4 based Microcontroller with inbuilt WiFi
* Onboard 9 low power mems sensors
* Connect sensors directly to the cloud with WiFi
* Can be configured as access point and station mode

6. SENSOR MODULES (All-each 6 nos.)

 # Force Sensor
* Sensor : FSR400
* Analog output : 0 - 3.3V
* O/P voltage proportional to the force supply to the sensor

 # Temperature Sensor
* Sensor : LM35
* Precision Temperature Sensor Calibrated directly in Celsius
* Rated for full +2˚ to +150˚C range

 # Magnetic Sensor
* Sensor : A 1324
* Linear output hall effect such as displacement, angular position & current measurement
* Output voltage proportional to magnetic flux density

 # Vibration Sensor
* Sensor : Mini sense100
* High voltage sensitivity : 1 V/g
* Over 5 V/g resonance
* Upto 40 Hz operation below resonance

 # Humidity Sensor

* Sensor : HIH4030
* Near linear voltage output Vs %RH
* Typical 1 to 3.6 Volt DC output for 0 to 100% RH at 5V DC supply

 # RH & Temperature Sensor

* High accuracy Temperature sensor
* Precision relative Humidity Sensor
* 0 to 100% RH operating range
* -40 to 125°C operating range
* Suitable for automotive climate control and defogging micro environment data centre.

 # Light Sensor

* Sensor : LDR
* Analog output : 0 - 3.3V
* It detects any light source
* Wide Spectral response

 # 3 Axis Accelorometer

* Sensor : ADXL346
* It measures the static accleration of gravity in tilt sensing applications
* Digital output resolution - 10 bit
* It detects x,y,z axis of the object
* Selectable Sensitivity (±2g/±4g/±8g/±16g)

 # Smoke Sensor

* Sensor : MQ-II
* Good sensitivity to Combustible gas in wide range
* High sensitivity to LPG, Propane and Hydrogen
* Analog Output

 # Motion Sensor

* Sensor : AMN23111
* Pyroelectric sensor modules contain the necessary functions in a small package (TO-5)
* Ideal for small-movement detection

Tilt Sensor

* Sensor: SFH7710
* Digital output
* Angle 70 to 200 degree gives high output
* Angle 250 to 20 degree gives low output

 # Ultrasonic Sensor

* Distance Measurement
* Not more than 15 degrees
* Precision upto 2mm
* Output : Electrical frequency

 # Pressure Sensor

* I2C Interface
* Wide barometric pressure range
* Pressure range
* 3.3V operating range
* Factory calibrated

 # Speed sensor(MOC7811)

* Sensor: MOC7811
* Slotted couplers consist of an infrared emitting diode facing a photo detector in a molded Plastic housing

 # Touch Sensor

* 2 wire serial Interface
* 8 keys or 16 keys mode
* Capacitive touch key
* Operating Voltage : 3.3V

7. IoT Gateway

a) Broadcom BCM2837 Processor Based Gateway -6 nos.

Third Generation Raspberry Pi , 1.2GHz, 64bit quad core Cortex A53 CPU Board Bluetooth 4.1 Classic BLE , 2.4GHz, 802.11 Wireless , 1GB internal RAM , 4 USB ports Full HDMI port , Ethernet port 10/100Mbps, Camera & display interface port

b)Ti AM335x Processor Based Gateway. – 6 nos.

1 GHz ARM Cortex A8 , 512 MB DDR3 RAM , 4GB 8 Bit onboard Flash
4 x USB 2.0 host, 3D Graphics Accelerator, Wi-fi 802.11b/g/n/ 2.4 GHz and Bluetooth 4.1 LE
OS Compatiblity : Debian , android ,ubuntu etc.,

c). IoT 2040 Gateway : 3 Nos

- PLC and sensors of many brands can be integrated through Ethernet & Serial ports.
- Open Protocols: Modbus, Profinet, REST or MQTT ,AMQP, OPC UA
- Based on Intel Quark X1020 ,(x86)@400MHz
- Compatible With Open Source Software Arduino IDE and Yocto Linux
- High level language support : Java, Python, C/C++

- 1 GB RAM, 8MB Flash ,256KB SRAM
- Micro SD card Slot up to 32GB
- One miniPCIe Slot for hardware expansion for WLAN /Additional Ethernet Port
- Arduino Uno – R3 Compatible
- Intel Wi-Fi + Bluetooth Module for 300MB data rate
- 2xRS232/422/485(Switchable)
- 1xUSB Controller + 1 x Device
- 2 x 10 /100 Mbps Ethernet RJ45
- Add on Modules with sample program
  1. RS 485 add on module with controller and sensor
  2. RS 232 add on module with controller and sensor

8. Siemens IoT 2040 based IoT Development system – 1 no.

SIMATIC IoT 2040 is an Industrial IoT Gateway relayable open platform for collecting processing transmission data. It helps the student to get the industrial IoT experience and develop industry 4.0 projects.

The Industrial IoT system have variolus kinds of communication protocol, those may be either wired or wireless bases. We have designed siemens IoT 2040 gateway based development system to impart the IioT experience to the education community. It includes RS232, RS485 (Modbus based module with Sensors, Profinet, Ethernet, Lorwan, Wifi, Zzigbee end device with sensors)

Siemens IoT 2040 Gateway Based IoT Development System which consists of:

- **IoT 2040 Gateway :**
  - PLC and sensors of many brands can be integrated through Ethernet & Serial ports.
  - Open Protocols: Modbus, Profinet, REST or MQTT ,AMQP, OPC UA
  - Based on Intel Quark X1020 ,(x86)@400MHz
  - Compatible With Open Source Software Arduino IDE and Yocto Linux
  - High level language support : Java, Python, C/C++
  - 1 GB RAM, 8MB Flash ,256KB SRAM
  - Micro SD card Slot up to 32GB
  - One miniPCIe Slot for hardware expansion for WLAN /Additional Ethernet Port
  - Arduino Uno – R3 Compatible
  - Intel Wi-Fi + Bluetooth Module for 300MB data rate
  - 2xRS232/422/485(Switchable)
  - 1xUSB Controller + 1 x Device
  - 2 x 10 /100 Mbps Ethernet RJ45
- 5 types of sensors such as Temperature sensor, LDR sensor, Motion sensor, Humidity sensor, Magnetic sensor included to interface with IoT2040 & add on modules of IoT2040
- The IoT 2040 Gateway can communicate with PLC, DCS using profinet or OPC UA.
- Analog Inputs are terminated in a SP7 patch connector
- 4Nos of Digital Input SPDT Switch
- 4Nos of user LEDs

- **Add on modules in IoT2040**
  - 2Nos of RS485 slave modules with feature like
    - 2 Nos of Analog Inputs
    - 2 Nos of Digital Inputs and 2 Nos of Digital Outputs
    - RS485 port with modbus in 9 pin D connector
  - 1No of RS232 module with feature like
    - 2 Nos Analog Inputs
    - 2 Nos of Digital Inputs and 2 Nos of Digital Outputs
    - RS232 port in 9 pin D Connector
  - 1 No of LoRaWAN Coordinator
  - 1 No of Zigbee Coordinator
- All the above integrated in a single panel.
- External Wireless Sensor Interface Modules
  - **One Wi-Fi End Device with sensor**
    - ★ API or AT command configuration
    - ★ 4 Channel ADC for connecting sensors with 10 bit resolution
    - ★ 802.11 b/g/n standard
    - ★ 1Mbps data rate
    - ★ Up to 309mA Transmit current
    - ★ Power supply : Battery/External 5V
    - ★ Analog input range : 0 to 1.25V(Max)
    - ★ Sensor : Temperature
  - **One Zigbee End Device with sensor**
    - ★ API or AT command configuration
    - ★ 4 Channel ADC for connecting sensors with 10 bit resolution
    - ★ 802.15.4 protocol
    - ★ 250Kbps data rate
    - ★ 35mA Transmit current
    - ★ Power supply : Battery/External 5V
    - ★ Analog input range : 0 to 1.25V(Max)
    - ★ Sensor : LDR
  - **One LoRaWAN End Device with sensor**
    - ★ LoRaWAN is a media access control(MAC) protocol for WAN
    - ★ LoRaWAN uses lower radio frequencies with 8 longer range
    - ★ LoRaWAN uses the 863-870 MHz
    - ★ Long range greater than 1KM
    - ★ Secured and efficient network
    - ★ The data rate can be varies from 0.3kbps to 27kbps for 125KHz BW
    - ★ 14 GPIO pins for control, status and ADC
    - ★ Sensor : Temperature

Wi-Fi Bluetooth Card

The Intel Centrino Advanced-N 6235 which has support for 802.11agn, dual-stream (300Mbps), dual-band (2.4 GHz + 5 GHz) and Bluetooth 4.0.