

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

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## Report on “Embedded systems programming with MSP 430”

Organized by Dept. of ECE & III Cell – MITS

17-19 October 2016



**Submitted by: Mr. M. Jagadeesh Babu, Asst. Prof, Department of Electronics & Communication Engineering, MITS**

A training program on “Embedded systems programming with MSP 430” was organized by the department of Electronics and Communication Engineering from 17-10-2016 to 19-10-2016 for students and faculties in coordination with the Industry Institute Interactive Cell (IIIC) and sponsored by TEQIP-II. The aim and objective of the program was to provide in-depth knowledge on Embedded-System which uses a low-cost board called “MSP430”. MSP430 is a 16-bit low-power microcontroller from Texas Instruments which is widely used in applications such as Wireless Sensor Networks, Medical Applications, Wearable Electronics, and many more, where power efficiency is critical. The pre-lunch session was started at 10 AM to 12.30 PM and after lunch session was from 2.00 PM to 4.30 PM during the Morning and afternoon sessions, he covered the following points:

- MSP 430 processor architecture
- MSP 430 Instruction set
- MSP 430 Clock and Reset mechanism
- GPIO peripherals, Interrupts, PWM , ADC
- Development of three applications using MSP 430
- Remote Controller of Air Conditioner Using MSP430
  - A Low-Power Battery less Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID
  - Implementing Wi-Fi Connectivity in a Smart Electric Meter

Presentation went on very well. He explained different case studies based on his industry expertise. The sessions were interactive and he has clarified the questions asked by the participants. The delegate expressed his happiness towards the participants and thanked for the support extended by the faculty for making all the arrangements, infrastructure of the institute, cooperation among the faculty members and active support of the management.

### About MSP 430:

The MSP430 is a mixed-signal microcontroller family from Texas Instruments, built around a 16-bit CPU, it is designed for low cost and, specifically, low power consumption embedded applications. The electric current drawn in idle mode in MSP430 can be less than 1  $\mu$ A with top CPU speed of 25 MHz. MSP430 also uses six different low-power modes, which can disable unneeded clocks and CPU. Additionally, the MSP430 is capable of wake-up times below 1 microsecond, allowing the microcontroller to stay in sleep mode longer, minimizing its average current consumption. The device comes in a variety of configurations featuring the usual peripherals: internal oscillator, timer including PWM, watchdog, USART, SPI, I<sup>2</sup>C, 10/12/14/16/24-bit ADCs, and brownout reset circuitry. This kit also includes peripheral options include comparators (that can be used with the timers to do simple ADC), on-chip op-amps for signal conditioning, 12-bit DAC, LCD driver, hardware multiplier, USB, and DMA for ADC results. Apart from some older EPROM (MSP430E3xx) and high volume mask ROM (MSP430Cxxx) versions, all of the devices are in-system programmable via JTAG (full four-wire or Spy-Bi-Wire) or a built in bootstrap loader (BSL) using UART such as RS232, or USB on devices with USB support.