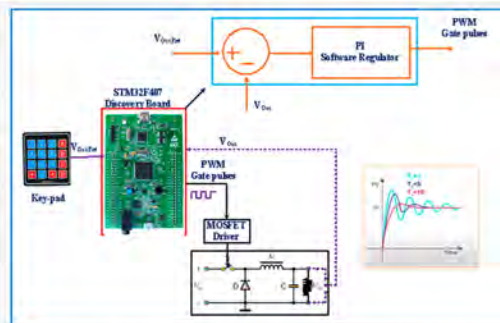
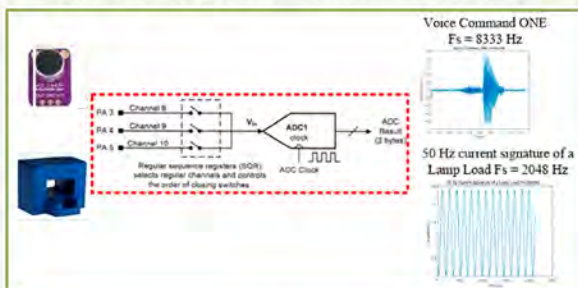


5-Day Hands-on Training On Embedded System Design Using ARM CORTEX - M Microcontroller

(28th November - 2nd December 2022)

Venue: TT515, NXP Semiconductors Lab, VIT



Organized By
School of Electrical Engineering (SELECT)
VIT, Vellore - 632014

About VIT

VIT has carved out a niche for itself as an excellent institution of higher education, on par with top universities of the world, in the field of technology. It has surpassed the notion of excellence within the country and has reached a pinnacle of glory and now rubs shoulders with the cream of world class institutions of the world. VIT has been ranked among the top 601-700 Universities of the world and one among the top 3 institutions in India (Shanghai ARWU ranking 2022). The credentials of VIT in academics and research, has placed VIT as the 9th best University, the 10th best research institution, and the 12th best Engineering institution in India (NIRF ranking, Govt of India, 2022). As per QS world University rankings 2022, Engineering and Technology subjects of VIT are the 346th best in the world and the 9th best in India. National Assessment and Accreditation Council (NAAC) has accredited VIT with A++ grade in the 4th cycle. VIT has entered into MoUs with many institutions within India and abroad including Australia, Canada, UK and USA.

About School of Electrical Engineering

The School of Electrical Engineering (SELECT) has over 93 faculty members who pursued their UG, PG and Doctoral degrees from top-notch universities in India and abroad. The school offers B.Tech. (Electrical and Electronics Engineering), B.Tech. (Electronics and Instrumentation Engineering), M.Tech. (Power Electronics and Drives), M. Tech. (Control and Automation), Ph.D and Integrated Ph.D in Engineering. The B.Tech. Electrical and Electronics Engineering and B.Tech. Electronics and Instrumentation Engineering Programmes are accredited by the Engineering Accreditation Commission of ABET. All UG & PG programmes of the school are accredited by the Institution of Engineering and Technology (IET), U.K. The placement record of the school has always been impressive. Almost 100% of the students secure job from the campus placement and many of them are recruited in core companies. The School has state-of-the art laboratories in almost all the areas of Electrical, Electronics and Instrumentation Engineering

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Coordinators

Dr. K Selvakumar (selvakumar.k@vit.ac.in),
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School of Electrical Engineering, VIT, Vellore

About Workshop

Today, ARM architecture based microcontrollers are omnipresent in every modern computing device. The global microcontroller market size is projected to reach USD 51.13 billion in 2028, at a CAGR of 7.6% during the forecast period, 2021-2028. ARM instruction set architecture supports both 32-bit computations and 16-bit computations by having ARM and Thumb instruction sets respectively. The ARM Cortex-M processor family controllers is a range of scalable and compatible, energy efficient, easy to use processors designed to help embedded system developers. The Cortex-M family is optimized for cost and power sensitive MCU and mixed-signal devices for applications such as Internet of Things, connectivity, smart metering, human interface devices, automotive and industrial control systems, domestic household appliances, consumer products and medical instrumentation. Though Arduino based development boards are used for easy and fast prototyping among engineering students, still it is far from competing to industrial hardware. Major product and service companies from automotive, consumer electronics, industrial electronics, and medical devices sector are extensively using microcontrollers from range of vendors like ST Microelectronics, Renesas, NXP Semiconductors, Infineon, etc. Hence, it is expected that embedded engineers should be flexible enough to adapt for any microcontroller within short span of time. To develop these demanding skills, we offer this workshop with blend of software and hardware development concepts for "Embedded System Design". Moreover, hands on experience, SW/HW debugging techniques, and real-time demonstrations are key focus of this workshop.

Resource Persons

Dr. K Selvakumar, School of Electrical Engineering, VIT, Vellore.
Dr. Jakeer Hussain, School of Electrical Engineering, VIT, Vellore
Er. M Sailesh, Software Engineer, Analog Devices, Bangalore

Target Participants

Under graduate, Post graduate students and Research scholars of VIT limited to 30 participants.

TOPICS

Cortex-M4 Architecture

CPU core; Architecture, Registers; Memory; Operating modes; Instructions, Instruction formats and addressing modes; Commercial ARM Cortex-M microcontrollers

ARM Programming in STMCubeIDE:

Embedded C programming; Data types, storage types, structures, bitfields, Usage of bit manipulation techniques to program MCU peripheral registers, Usage of const and volatile type qualifiers, Loops: while, for; Debugging strategies; Profiling.

GPIO Programming:

LED, Switches, and 7-segment display

GP Timer Counter Programming:

Timer circuit hardware, PWM programming

Interrupts and DMA Programming:

Exception sources, Vectors, Handlers, Bulk data transfer

ADC & Data Acquisition:

ADC parameters, sampling rate configuration, triggers, measurement of analog input voltage.

Real-time DSP:

Discrete time sequence, FFT, digital to analog frequency conversion, digital filters, voice data acquisition using microphone, spectrogram, dataset preparation.

Communication Protocols:

I2C data frame, Interfacing MPU-6050 3-axis accelerometer, I2C signal visualization using logic analyzer, SPI communication, interfacing ADXL345 3-axis accelerometer.

Demonstrations:

PID based DC-DC buck converter, Digit recognition using STM32F407 microcontroller.

Registration Details

Participants are requested to register by filling the google online form on or before 20th November 2022.

Registration fee: Rs. 1500/-
(Inclusive of 18% GST)

Interested participants can register through Google Form in the following link:

<https://events.vit.ac.in>

Important Dates

Last date for application : 25th November 2022

Workshop Dates : 28th November - 2nd December 2022

Global Microcontroller Market Share, By Application, 2020



Leading MCU Suppliers (\$M)

2021 Rank	Company	Headquarters	2020	2021	21/20 % Chg	2021 Marketshare
1	NXP	Europe	2,980	3,795	27%	18.8%
2	Microchip	U.S.	2,872	3,584	25%	17.8%
3	Renesas	Japan	2,748	3,420	24%	17.0%
4	ST	Europe	2,506	3,374	35%	16.7%
5	Infineon	Europe	1,953	2,378	22%	11.8%

Source: Company reports, IC Insights

Key Takeaway:

One can confidently interface sensors and deploy algorithms into any modern microcontroller to build an embedded system