Add-on Course on "CUDA"

'Introduction to GPGPU and CUDA'

Sat, 13/02/2016- Sun, 14/02/2016,
Sat, 05/03/2016 - Sun, 06/03/2016,

E&T/C & Computer Department
MAEER's MIT, Pune.

Report on Add-on Course on "CUDA"

Add-on course on 'Introduction to GPGPU and CUDA' was jointly organized by Electronics and Telecommunication Engineering Department and Computer Department of MAEER's MIT College.

The course was scheduled on four days: Sat 13/2/2016, Sun 14/3/2016, Sat 05/03/16 and Sun 06/03/16 from 9.30 am to 3.30 pm.

The course contents were delivered by Mr. KaustubhHiwarekar of Sinhagad College of Engineering and Mr. Sumit Harale of Indira College of Engineering and Management.

The course was attended by about 30 students of E&Tc and Computer Engineering. The syllabus covered in these four days is attached herewith. Course was organized by Prof. Mrs. Savita Kulkarni, Prof. Mrs. Anuradha Phadke of E&Tc Department and Prof. Vandana Jagtap of Computer department.

(Note: Schedule attached along with)

CUDA Add-onCourse Syllabus

I. Syllabus

1. Introduction to C and Parallelism
    - 1.1 Basic Data Types
    - 1.2 Basic Data Structures
    - 1.3 Pointers and their uses
    - 1.4 Case and Loop control Structure
        - 1.4.1 Basic Structures like *if-else, for, while,* etc.
        - 1.4.2 What happens in Parallelism (with an example of a *for* loop)
        - 1.4.3 Types of Parallelism
            - 1.4.3.1 Embarrassing Parallelism
            - 1.4.3.2 Coarse Grained Parallelism
            - 1.4.3.3 Fine Grained Parallelism
        - 1.4.4
    - 1.5 File Handling in C
2. Introduction to Heterogeneous computing
    - 2.1 Basics of GPGPU
    - 2.2 Comparison with CPU
    - 2.3 Architecture of NVIDIA GTX280 (brief introduction)
    - 2.4 Introduction to Thread Processing Cluster and Streaming Multiprocessors.
3. Introduction to CUDA C
    - 3.1 Basic entities and their properties (Grids, Blocks, Threads, Kernels, Host variables and functions, Device variables and functions, etc)
    - 3.2 Basic Syntaxes
    - 3.3 CUDA Program Structure
    - 3.4 Acquiring Device Properties
4. Introduction to Memory Model

- 4.1 Memory Hierarchy
- 4.2 Global memory
- 4.3 Shared memory
- 4.4 Constant memory
- 4.5 Texture memory

5. Programming Examples on Memory model
   - 5.1 Global memory
   - 5.2 Thread synchronization
   - 5.3 Shared memory
6. Theoretical Consideration for Performance Optimization
   - 6.1 Thread warp and memory access patterns
   - 6.2 Memory coalescing
   - 6.3 Time measurement using API
   - 6.4 Applications of specific types of memories
     - 6.4.1 Texture memory
     - 6.4.2 Constant memory
     - 6.4.3 Global memory
     - 6.4.4 Shared memory
   - 6.5 Launch Parameters
   - 6.6 Optimization of CPU-GPU interaction

Schedule for the Course:

Day 1 (13/02/2016)				
Sess No.	Time	Venue	Topic	Speaker Name
1	09.30am-10.30am	CUDA Lab (NVIDIA Lab)	Introduction to CUDA	Mr. KaustubhHiwarekar
2	10.30am-11.30am	CUDA Lab (NVIDIA Lab)	High performance Computing with GPU's	Mr. KaustubhHiwarekar
3	11.30am-12.30am	CUDA Lab (NVIDIA Lab)	Basic Syntaxes CUDA Program Structure	Mr. KaustubhHiwarekar and Mr. Summit Harale
Lunch break (12.30pm to 1.30pm)				
4	1.30pm-3.30pm	CUDA Lab (NVIDIA Lab)	Basic entities and their properties (Grids, Blocks, Threads, Kernels, Host variables and functions, Device variables and functions, etc)	Mr. KaustubhHiwarekar and Mr. Summit Harale
Day 2 (14/02/2016)				
1	9.30am-12.30am-	CUDA Lab (NVIDIA Lab)	Introduction to Memory Model	Mr. KaustubhHiwarekar and Mr. Summit Harale
Lunch break (12.30pm to 1.30pm)				
2	1.30pm-3.30pm	CUDA Lab (NVIDIA Lab)	Programming Examples on Memory model	Mr. KaustubhHiwarekar
Day 3 (5/03/2016)				
1	9.30am-12.30am-	CUDA Lab (NVIDIA Lab)	TThread synchronization Shared memory	Mr. KaustubhHiwarekar
Day 3 (5/03/2016)				
2	1.30pm-3.30pm	CUDA Lab	Applications	Mr. KaustubhHiwarekar and Mr. Summit Harale

Feedback:

We have collected feedbacks from participants for the CUDA-Add-on Course, Summarized feedback analysis is given below:

Overall participant's feedback:

- Sessions are properly organized
- Overall feedback is good.
- Good facilities are provided.
- Good hands on for lab related assignments and useful for project development

Overall speaker's feedback:

- Overall feedback is good.
- Satisfied with the facilities provided.
- Sufficient time was provided to conduct the session.
- Willing to come back again for conducting more sessions.