

NOVEL ARCHITECTURE FOR MULTIMEDIA HARDWARE ACCELERATION

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Motivation of the work

The technology of telecommunication networks has been evolving in the last years (4G and 5G).

Multimedia communication usage (mainly video) is growing so rapidly (video traffic will be 79 percent of all consumer internet traffic in 2018, up from 66 percent in 2013 [1]).

The mechanism of multimedia communication has to be developed in order to provide new services for 4G and 5G networks and guarantee the quality of experience for users (extend bandwidth and minimize latency and start-up time).

Thesis Objectives

Design a "Virtualized Media Server" architecture.

Design a new architecture of hardware accelerated mechanisms to manipulate video.

Results

The experimental results demonstrate that it is possible to use a System-on-Chip to implement a Media Server (it can perform the complex real time video operations).

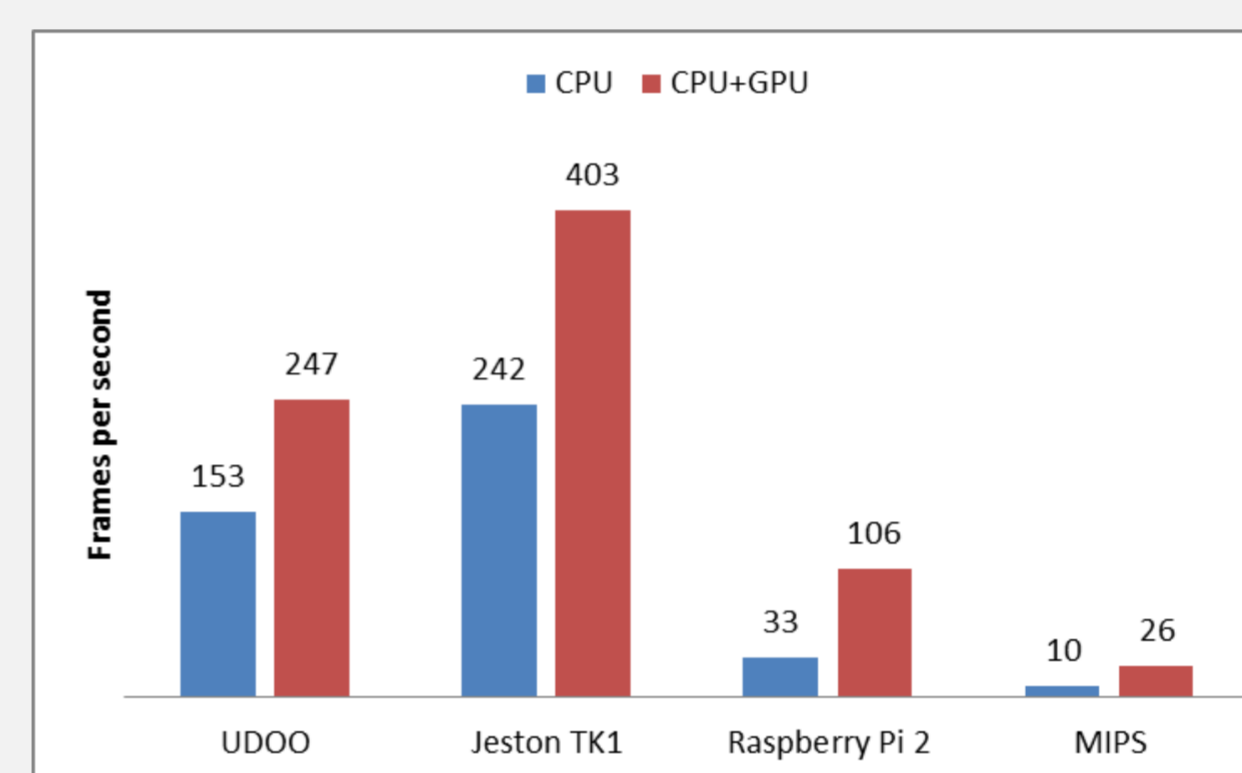


Fig1. Decoding test

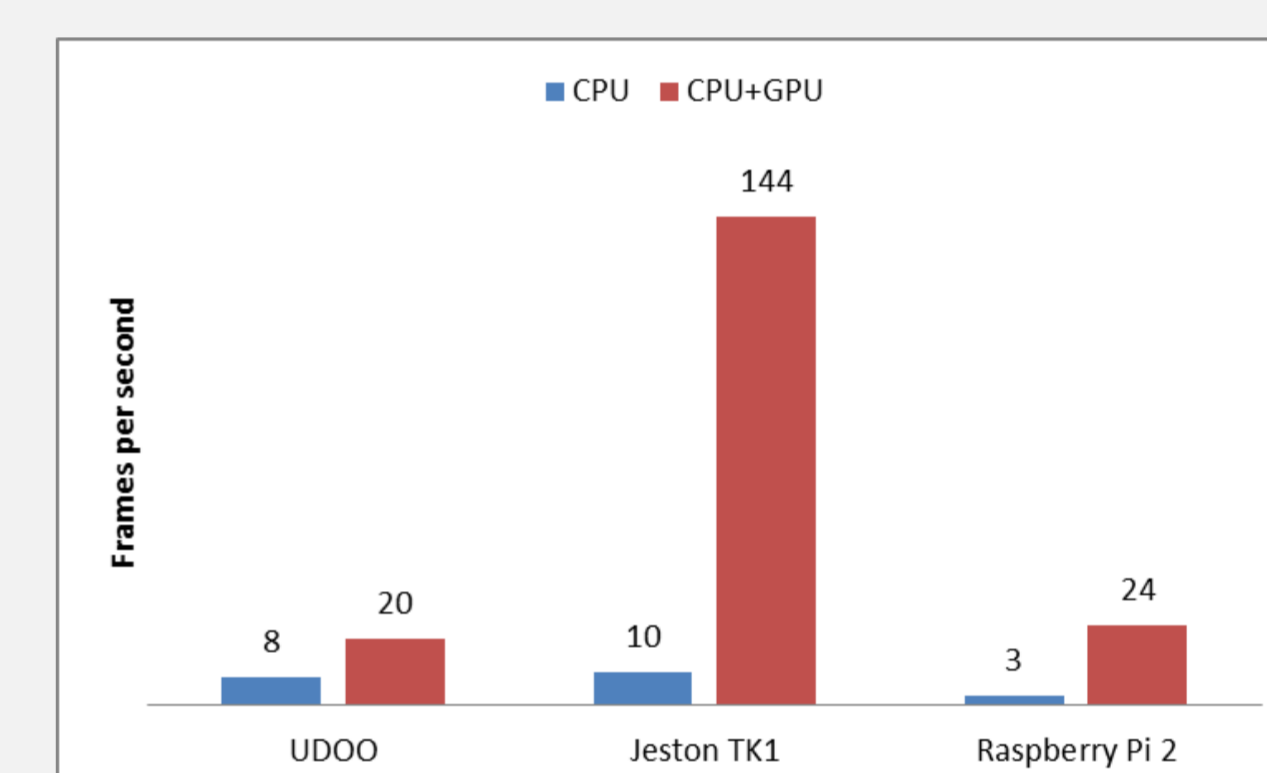


Fig2. Encoding test

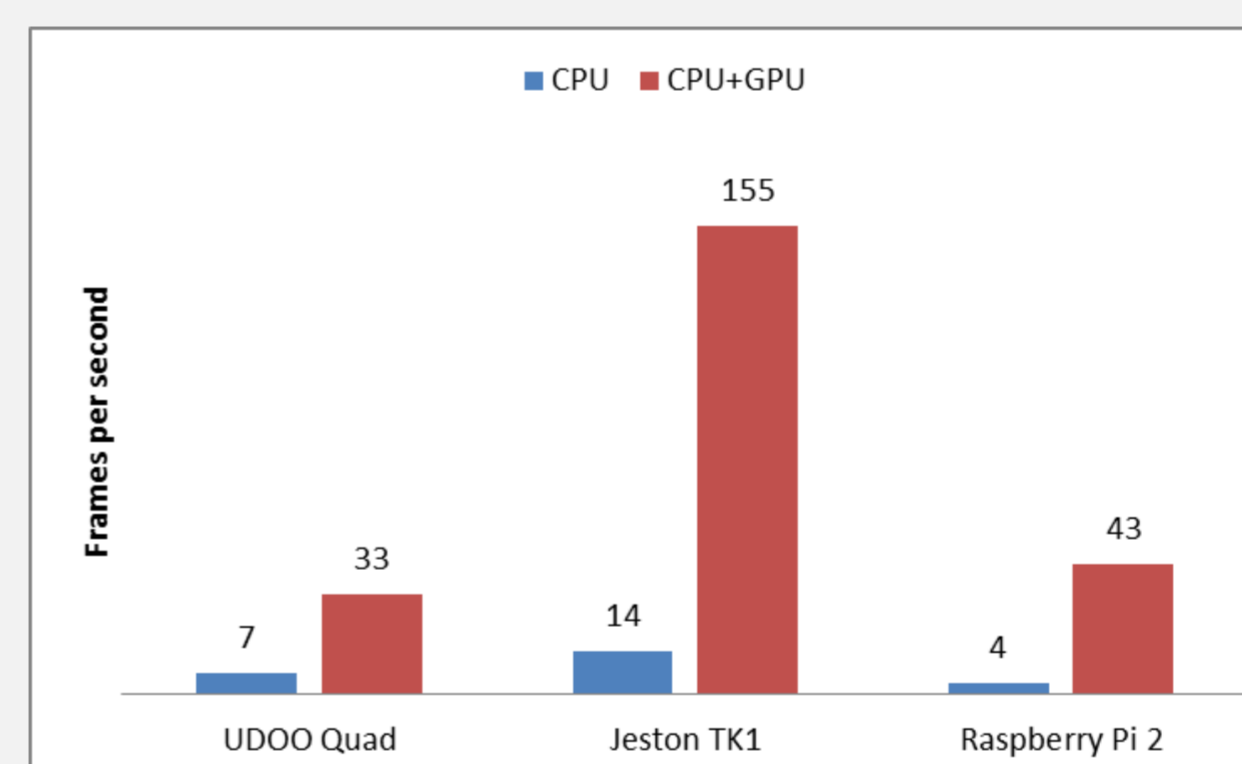


Fig3. Transcoding test (MPEG4 to H.264)

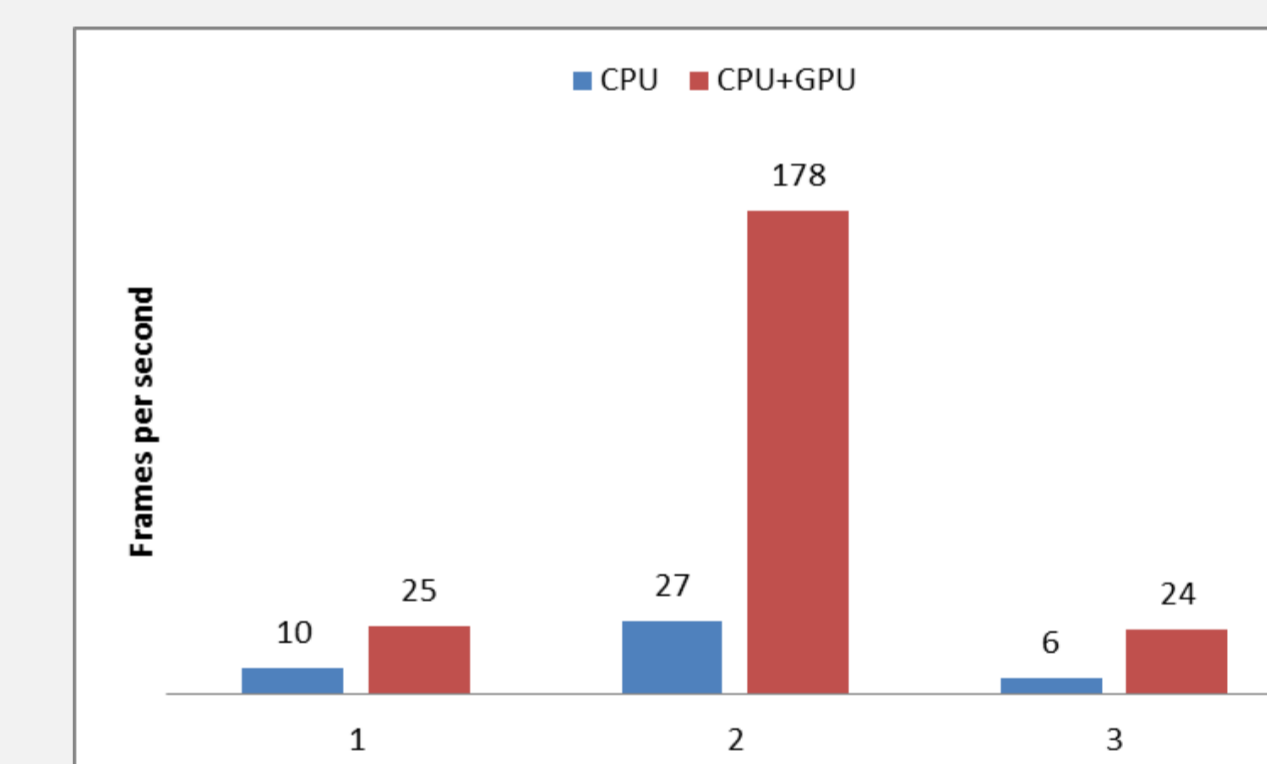


Fig4. Scaling test (1080p to 480p)

Research Plan

First and second year research plan

First stage (first year 2014/2015): review of the state of the art and identification of areas of contribution

- Establish an essential knowledge of GStreamer [2].
- Establish an essential knowledge of hardware video acceleration [3][4].
- Establish an essential knowledge of the media server [5].
- Review the data sheets of different manufactures of hardware video acceleration.
- Initial design of architecture for multimedia hardware acceleration.

Second stage (second year 2015/2016): contribute with new ideas and publications

- Establish an essential knowledge of the GPU virtualization.
- Test video processing in different embedded boards[6].
- Participate in a workshop in English Academic Writing.

Third year research plan

Final stage (third year 2016/2017): write and present the dissertation

- Participate in scientific conferences.
- Design a "Virtualized Media Server" architecture.
- Submit a journal paper.
- Write the final report.
- Present the dissertation.

Next Year Planning

Participate in scientific conferences

Design a "Virtualized Media Server" architecture.

Submit a journal paper.

References

- [1] Cisco Visual Networking Index: Forecast and Methodology 2013–2018, June 2014.
- [2] GStreamer Application Development Manual [Online]. Available: <http://gstreamer.freedesktop.org/>
- [3] X. Nui, L. Galarza, Y. Gao, J. Fan. "Software-hardware co-design for video coding acceleration" In Southeastern Symposium on System Theory (SSST), Jacksonville, FL, March 2012, pp. 57 – 60.
- [4] D. Min, Q. Rongcai, W. Ruiping, B. Sheng, C. Wenyi, X. Jiayi, "A new high-definition video player method based on GPU technology", In international Conference on Cyber Technology in Automation, Control, and Intelligent Systems (CYBER), Bangkok, May 2012, pp.388 – 392.
- [5] H. Wang, J. Li, C. Zhao, Z. Ying, "Design of an Embedded Streaming Media Server in video monitoring" In International Conference on Natural Computation (ICNC), Shenyang, July 2013, pp. 1324 – 1328.
- [6] G. El Haj Ahmed, F. Gil Castiñeira, E. Costa Montenegro, P. Couñago Soto, "System-on-Chip evaluation for the implementation of video processing servers", Sixth international conference on Innovative Computing Technology (INTECH), August 2016. (submitted)