MANTECH Publications

Journal of Research in Electrical Circuits and Systems
Volume 2 Issue 1, January-April 2017

Multimedia Sensing based on Internet of Multimedia Things (IoMT) using API's

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Abstract

Multimedia sensing in Internet of multimedia things will be implemented as first module. Raspberry pi platform which is based on ARM and which has an inbuilt Broadcom video and graphics core will be used for this module. The Open MAX IL is an API which provide interface and communication within the components. GStreamer is a framework for developing streaming media applications. GStreamer development framework is used to flow any type of multimedia application. The framework is based on plugins which provide various encoding, decoding and other functionality. The plugins can be arranged in a pipeline.

Keywords: *Raspberry pi, OpenMAX IL, GStreamer*

I. INTRODUCTION

Multimedia sensing in IoMT will be implemented as first module. Raspberry pi platform which is based on ARM and which has an inbuilt Broadcom video and graphics core will be used for this module.

J. Barba et al. [1] have presented the use of OMX layer for the communication between the components. This component provide better multimedia platform for the communication. They also presented an HW version of OpenMAX IL which provide whole information of the OMX IL. HW implementation is used to increase the output of OMX based multimedia platform.

Mickael Lano¨e et al. [2] have introduced the progress of multimedia application based on embedded system. They introduced hardware and software frameworks for this type of growth. This type of framework access more energy and power. They designed the methodology for power and energy consumption of multimedia application which is useful in embedded system. This technology is executed in Gstreamer framework which is running on Linux operating system. Also these designs are used to measure the power consumption during compressed audio and video streams.

David de la Fuente et al. [3] have developed the designs which provide UML/MARTE methodology. They introduced increasing complexity multimedia system. The concept for designing the complex system is to develop electronic system level.

Nimmi S et al. [4] have designed the basic concepts of video streaming using GStreamer through OpenMAX IL GNU Radio platform. The Gstreamer is a framework which provide many types of multimedia applications. Gstreamer is a multimedia engine in Linux and other multimedia player. Gstreamer operates in pipeline structure. This structure is designed to generate number of multimedia applications such as video edition, media player etc.

G. Sundari et al. [5] have presented the necessity of different video bit stream techniques. The main focus is a flow of video using Gstreamer. The video is taken by web camera which is interfaced with pc. Then it encode by H.264 encoder. The flow of compressed video is through Gstreamer which gives good compression ratio. H.264 is encoder which compress the video and hence good compression ratio is occurred.

A driver stack would be developed on the video core which will be made Open MAX compliant later. Once the video components are open API compliant, GStreamer plug-in will be develop for the multimedia components. Using the plug-in a small pipeline will be designed which eventually should be driven by a Gstreamer application. GStreamer is a Multimedia framework for the Linux operating system.

GStreamer development framework is used to flow any type of multimedia application. The framework is based on plugins which provides various encoding, decoding and

other functionality. Sources, sinks and code's are the three elements of Gstreamer.

The OpenMAX IL is an API which provide interface and communication within the components. The purpose of the software interface is to take components with different initialization and commands. OMX IL is used by Gstreamer elements to access multimedia components.

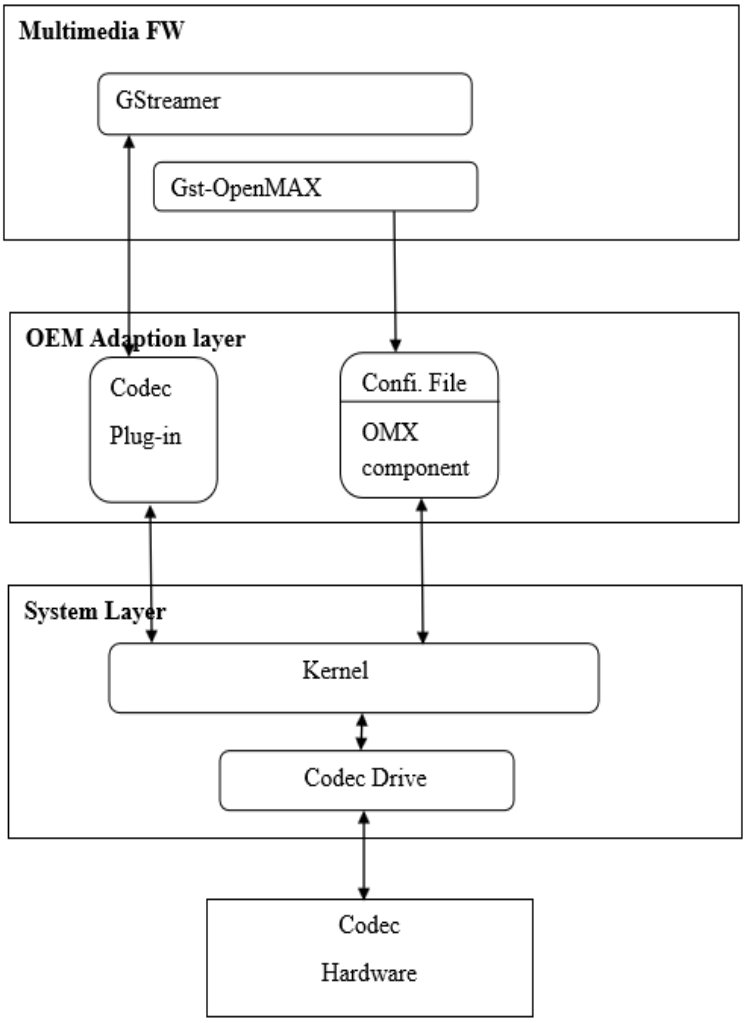


Fig. 1 Proposed Block Diagram

Multimedia sensing in IoMT will be implemented as first module. Raspberry pi platform which is based on ARM and which has an inbuilt Broadcom video and graphics core will be used for this module.

Fig. 1 presents proposed block diagram of system, is to encode and decode the sensed raw multimedia data. In video codec the one time video is to be compressed, after that every time it can be decoded to get desired results. It requires complex encoder and simple decoders.

As shown in Fig. 2, a driver stack will be developed on the video core which will make OpenMAX compliant later. Based on how far and well the project goes, the decision of whether to implement video encoder and graphics functionality will be taken. The proposed system will start with the video decoder functionality and make it open API compliant.

Once the video components are open API compliant, GStreamer plug-in will be develop for the multimedia components. Using the plug-in a small pipeline will be designed which eventually should be driven by a GStreamer application.

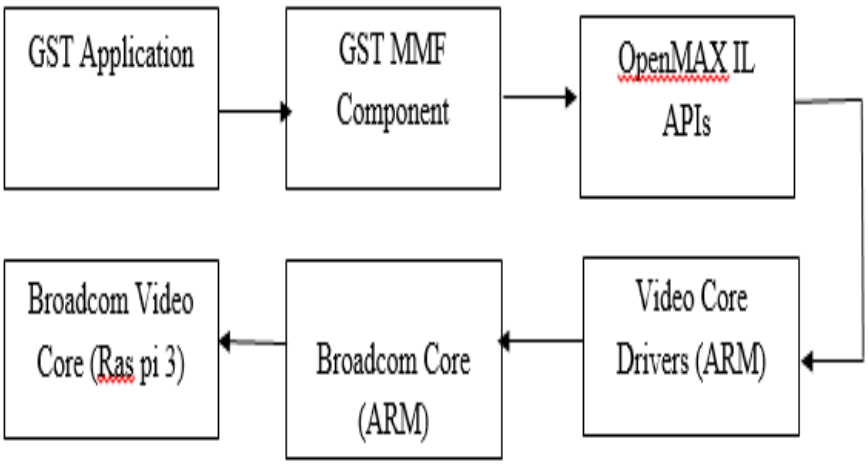


Fig. 2 Basic Block Diagram

1. Raspberry Pi 3:-

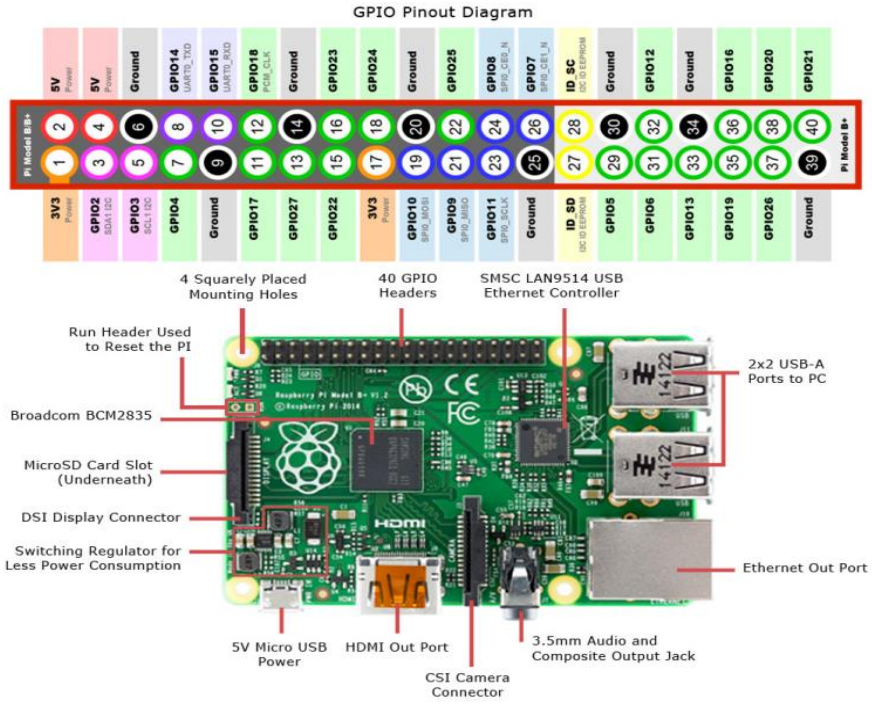


Fig. 3 Raspberry Pi 3 Module with GPIO Pin-out Diagram

Raspberry Pi 3 controller is the latest controller which uses python programming language. Fig. 3 shows Raspberry Pi 3 Module with GPIO Pin-out Diagram. As shown in fig.2, 40 GPIO pins can be used for interfacing RPI 3 with different type of sensors, dc motors, stepper motor etc.

Feature of RPI 3 Model B:

- 40 GPIO Pins
- SD card expandable up to 32 GB
- BCM2837Broadcom Processor
- 1.2GHz Quad-Core ARM Cortex-A53
- Inbuilt WIFI and Bluetooth
- RAM-1GB
- USB ports-4
- Full size HDMI
- Camera Module V2 can be directly connected using CSI port.
- Touch screen can be directly connected to DSI port.

2. Camera Module:-

Fig. 4 shows Raspberry Pi 3 camera Module. 8 megapixel Sony IMX219 Camera module V2 is used to obtain the image of the object and to monitor baby

through it. Camera module is used for taking snaps as well as for video capturing. This camera is directly connected to the RPi 3 at camera CSI connector provided on the board; also we can connect separate webcam using USB port on RPi 3.

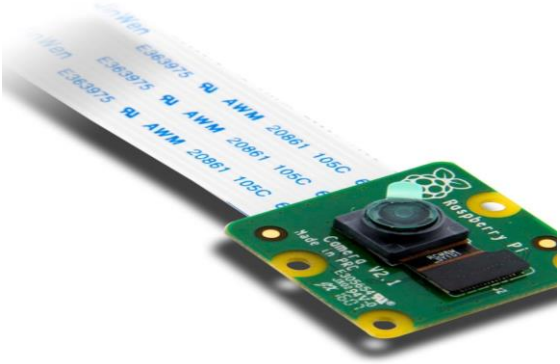


Fig. 4 Raspberry Pi camera module

Specification:-

- Sony IMX219 sensor.
- 8 megapixels captures images of 3280 x 2464 pixels.
- Capture video at 1080p30, 720p60 and 640x480p90 resolutions.
- Good white balance and image quality

3. Hardware:-

Fig. 5 shows hardware setup for encoding and decoding of streams. It shows the interfacing of raspberry pi with camera. HDMI cable is connected between screen and raspberry pi module.

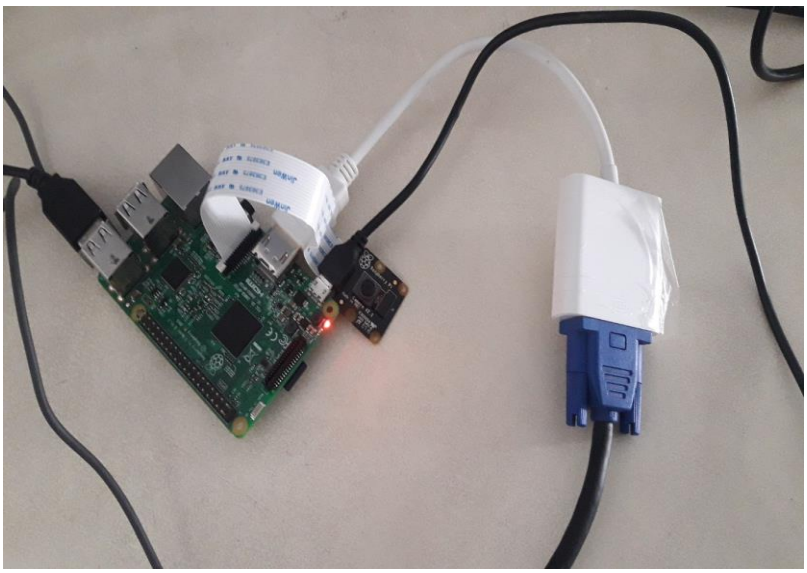


Fig. 5 Hardware Setup

II. RESULTS

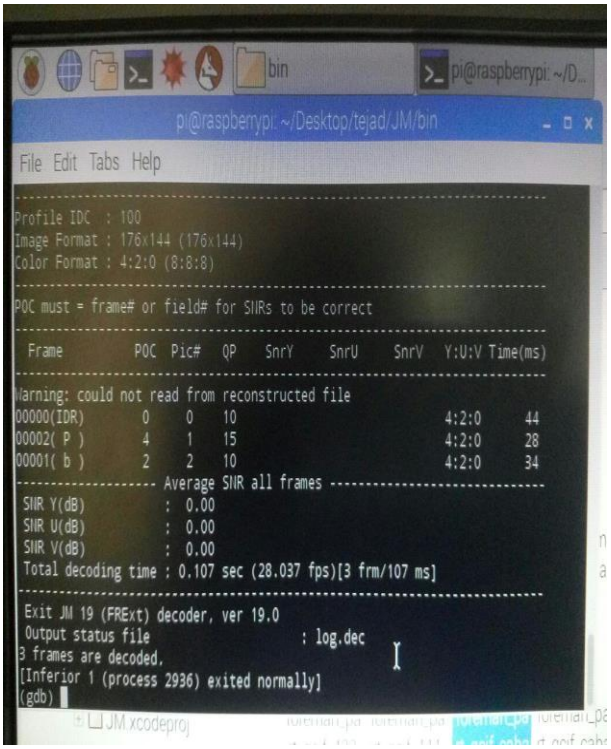
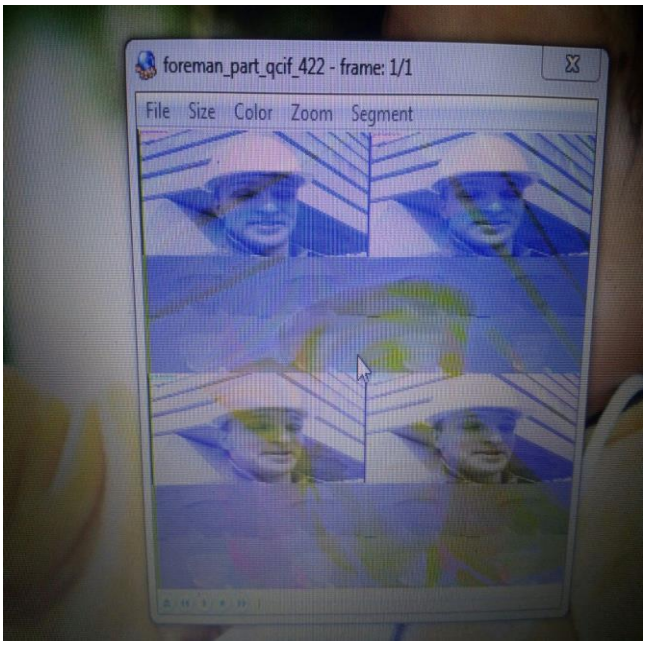
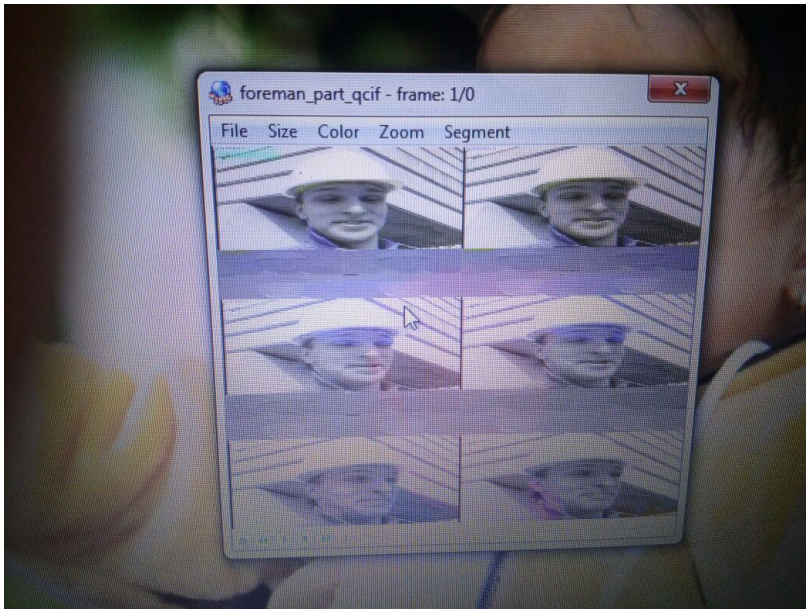


Fig. 6 Decoder Output Window

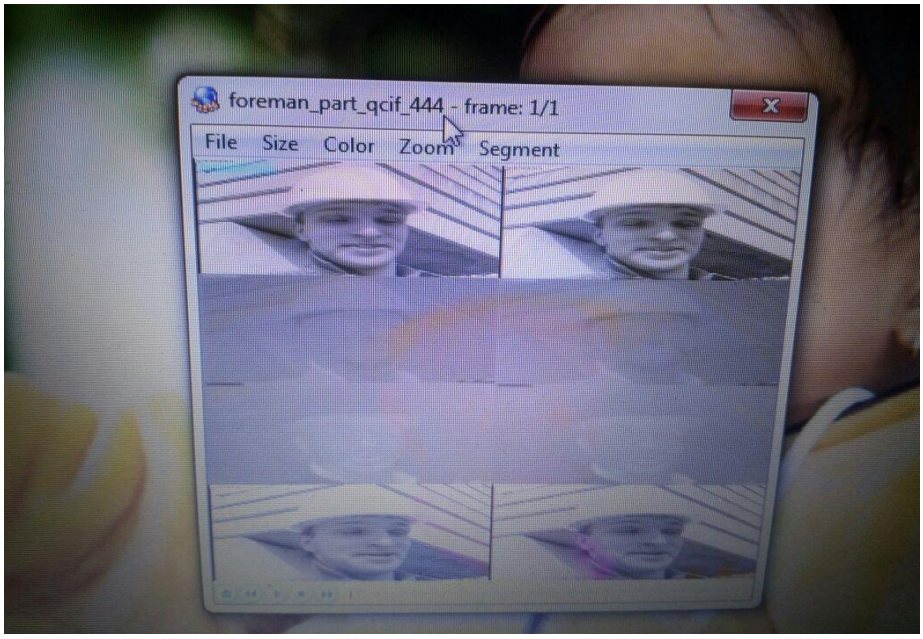


(a)



(b)

(c)



(d)

Fig. 7 Output of Decoder with different streams

The Fig. 7 shows the output of decoded streams in this streams are decoded by using JM references module. In this streams are available in .h264 format and after decoding streams are converted into YUV format.

CONCLUSIONS

The Raspberry Pi 3 is successfully used to run JM reference module for encoding and decoding. Different streams with .h264 format are encoded and decoded. Also decoded outputs are played in YUV player. The advantage of decoding is to decompress the data which is present in .h264 format and speed of decoding will also increase.

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