# DMVAL on C674x

## 1 Introduction

### 1.1 Features

- **Supports Following Video Analytics Algorithms**
  - **Intelligent motion Detection**
  - **Object Counting**
  - **Trip Zone**
  - **Camera Tamper Detection**
  - **Streaming Meta Data Information**
- **Supports Detection of People and Vehicles in Scene of Scope**
- **Supports Resolution of 320x240**
- **Supports Eight Different Sensitivity Levels for Trip Zone and Object Counting Algorithm**
- **Supports Configurability of size for two differnet kind of objects like people and vehicle**
- **Supports Camera Tamper Detection Algorithm Execution in Parallel With any Other Algorithm**
- **Supports User Configurability to Define the Zones in Trip Zone and Object Counting Algorithm. Currently Maximum Two Zones can be Configured**
- **Supports Multi Channel operation of all aglorithms**
- **Supports input frame rate variying from 10 fps to 30 fps**

### 1.2 Description

DMVAL is TI's video analytics offering. This DMVAL library is validated on DM8127 with code generation tools version 7.4.2.

## 2 Performance and Memory Summary

This section describes the performance and memory usage of DMVAL.

**Table 2-1. Configuration Table**

| CONFIGURATION | ID |
|---|---|
| Trip Zone, detection interval = '8' along with Tamper Detection<br>• People in view<br>• Minimum person size 16/70 (width/height)<br>• Maximum person size 20/80 (width/height)<br>• sensitivity '5' | DMVAL_CONF_01 |
| Intelligent motion detection along with Tamper Detection<br>• People in view<br>• Minimum person size 16/16 (width/height)<br>• Maximum person size 100/127 (width/height)<br>• sensitivity '5' | DMVAL_CONF_02 |
| Object counting along with Tamper Detection<br>• People in view<br>• Minimum person size 16/16 (width/height)<br>• Maximum person size 80/60 (width/height)<br>• sensitivity '5' | DMVAL_CONF_03 |
| Streaming meta data along with Tamper Detection<br>• People in view<br>• Minimum person size 16/16 (width/height)<br>• Maximum person size 100/127 (width/height)<br>• sensitivity '5' | DMVAL_CONF_04 |
| Only Tamper Detection Enabled<br>• Sensitivity '5' | DMVAL_CONF_05 |

**Table 2-2. Cycles Information - Profiled on DM8127 IPNC with C674x Code Generation Tools Version 7.4.2**

| CONFIGURATION ID | C674x PERFORMANCE STATISTICS (MEGA CYCLES PER FRAME OF 320x240) (1) | | |
|---|---|---|---|
| | TEST DESCRIPTION | AVERAGE | PEAK |
| DMVAL_CONF_01 | Office lobby view captured @ 8fps | 8.36 | 12.4 |
| DMVAL_CONF_02 | Highway car running view captured @ 10fps | 6.8 | 11.8 |
| DMVAL_CONF_03 | Road traffic view captured @ 15 fps | 24.2 | 28.4 |
| DMVAL_CONF_04 | Highway car running view captured @ 10fps | 6.8 | 11.4 |
| DMVAL_CONF_05 | Camera tampering by hand covering @ 10 fps | 1.4 | 2.9 |

(1) Measured on DM8127 IPNC having Cortex-A8 @ 1 GHz, C674x @ 450 MHz, L3 interconnect @ 500 MHz and DDR3 @ 400 MHz and there could be a variation of around 1-2% in the numbers. Performance number can differ based on number of objects present in scene except in tamper algorithm. In all of the above number maximum 4 objects are present in scene.

**Table 2-3. Memory Statistics of Media Controller - Generated with Code Generation Tools Version 7.4.2**

| | | MEMORY STATISTICS(1) | | | | | |
|---|---|---|---|---|---|---|---|
| | | | DATA MEMORY | | | | |
| | | | | EXTERNAL | | | |
| CONFIGURATION ID | RESOLUTION | PROGRAM MEMORY | INTERNAL | PERSISTENT | SCRATCH | STACK | TOTAL |
| DMVAL_CONF_01 | 320x240 | 150 | 0 | 7002 | 9 | 2 | 2621 |
| DMVAL_CONF_02 | 320x240 | 150 | 0 | 4994 | 9 | 2 | 4590 |
| DMVAL_CONF_03 | 320x240 | 150 | 0 | 2848 | 9 | 2 | 2621 |
| DMVAL_CONF_04 | 320x240 | 150 | 0 | 7077 | 9 | 2 | 2696 |
| DMVAL_CONF_05 | 320x240 | 150 | 0 | 456 | 9 | 2 | 531 |

(1) All memory requirements are expressed in kilobytes (1 K-byte = 1024 bytes) and there might be rounding to the next integer K-byte. Stack can be kept in internal or external memory, negligible performance impact can be observed in Media Controller cycles if it is placed in external memory.

**Table 2-4. Split-Up of Media Controller Internal Data Memory Statistics**

| CONFIGURATION ID | DATA MEMORY - INTERNAL (1) | | |
|---|---|---|---|
| | SHARED | | INSTANCE |
| | CONSTANTS | SCRATCH | |
| ALL | 0 | 0 | 0 |

(1) Internal memory refers to on chip memory. If the system doesn't have enough internal memory, then external memory can also be used. Memory requirements are expressed in kilobytes.

## 2.1 Notes

- I/O buffers:
  - Input buffer size = 112.5 KB (320x240, one YUV420 SP)
  - Output buffer size = 4 KB
- Buffers at input and output should be in non cached region as it is accessed by C674x

## 2.2 Glossary

| Term | Description |
|---|---|
| Constants | Elements that go into .const memory section |
| Scratch | Memory space that can be reused across different instances of the algorithm |
| Shared | Sum of Constants and Scratch |
| Instance | Persistent-memory that contains persistent information - allocated for each instance of the algorithm |

## 2.3 Acronyms

| Acronym | Description |
|---|---|
| CIF | Common Intermediate Format |
| DMVAL | Digital Media Video Analytic Library |
| TZ | Trip Zone |
| OC | Object Counting |
| IMD | Intelligent Motion Detect |
| SMETA | Streaming Meta |
| Tamper | Tamper algorithm |