



K. J. Somaiya College of Engineering, Mumbai-77

Batch: _____ Roll No.:

Experiment / assignment /
tutorial No.

TITLE : Software architecture of B Tech. ProjectArchitecture in two Known different styles

AIM : To understand different types of architectures.



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Expected OUTCOME of Experiment:

CO 1. Design the architecture of software systems in various architectural styles.

Books/ Journals/ Websites referred:

1 “Software Architecture, Richard N Taylor etl, Wiley

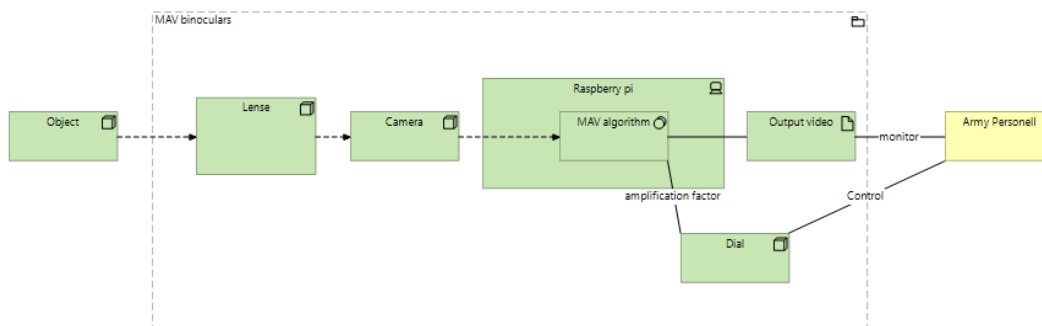
www.isr.uci.edu/projects/archstudio/setup-easy.html

Aim: To Design the architecture of software systems in various architectural styles.

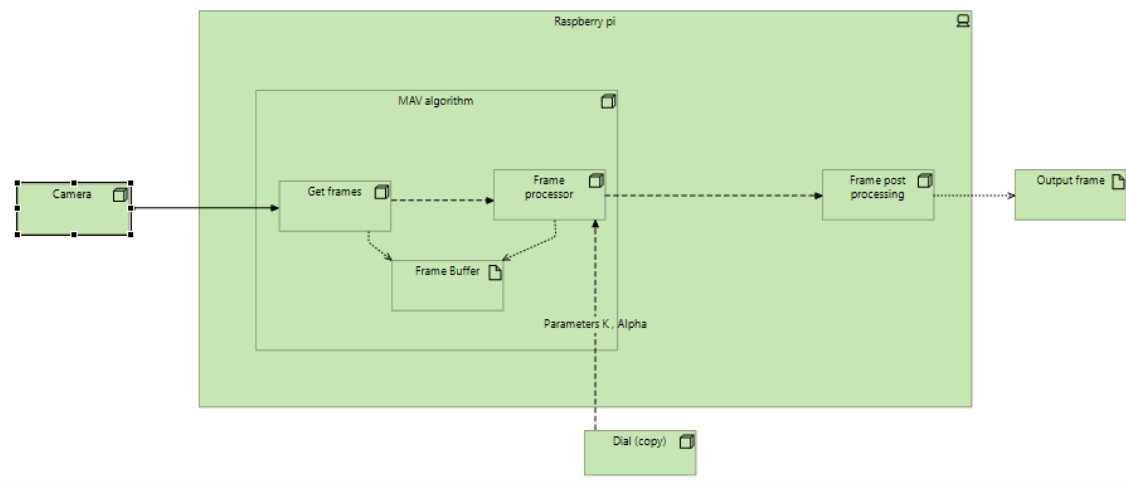
Title of B.E Project: Video motion amplification camera

Abstract of B.E Project: Video motion amplification camera is used to detect camouflage enemies by amplifying subtle motion in video frames. It is a hardware based system on IoT devices. It magnifies small movements to help detect them better.

Architecture of .B.E Project:



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Explanation of Components and Connectors:

Components:

Camera
MAV algorithm
Frame Post processing

Connectors :

Stream of frames in memory

Architecture styles used in Project :

Style Names: Pipe and filter, Stream processing

Justification for Styles

1) Pipe and Filter style

Processing is done on video feed with various pipes

pipe 1 - MAV algorithm

pipe 2- post processing

These pipes operate are located on the devices memory. Each works independently of the other.

2) Stream Based



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Stream based architecture is used over here because of the realtime nature of the project. Frames need to be processed in realtime for this.

The processing of the video frames is done in a single stream of data located in the memory. When the frames are obtained from the camera, they are first stored in a stream buffer and then sent to the differencing algorithm module. This module amplifies the video frames and then sends it to the next module in a stream. The next module is the post processing module. It operates on the same stream provided by the first module. Hence it cannot start its work until it receives the frames. Also this module has time complexity higher than that of the first module. Hence there is a chance that this module may have many frames stored behind it in buffer. It may have to drop off some frames from the stream to make it synchronous.

Post Lab Descriptive Questions

1. Design and Compare the architecture of BE project in 2 different architecture style w.r.t Style Analysis Dimensions

1. Pipe and Filter Architecture

a. Design Vocabulary

Component Types: Filters (processing units)

Connector Types: Pipes (streams that transfer data between filters)

b. Allowable Structural Patterns

Linear Pipeline: Sequential processing, where data flows from one filter to the next in a linear fashion.

Branching Pipeline: Filters can be arranged in a tree structure where a filter can send data to multiple downstream filters.

Feedback Loop: A filter can send data back to a previous filter or itself for iterative processing.

c. Underlying Computational Model

Data Stream Processing: Data is processed in stages (filters) with a continuous flow (pipe). Each filter performs transformations on the data before passing it to the next filter in the sequence.

d. Essential Invariants of the Style

Separation of Concerns: Each filter performs a specific, isolated task.

Data Independence: Filters operate independently and do not share state. Data is



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passed between filters via pipes.

Incremental Processing: Each filter processes data as it arrives, typically without needing to wait for all input data.

e. Common Examples of Its Use

Image Processing Pipelines: Sequentially applying filters to images (e.g., camera feed).

Data Transformation Pipelines: Parsing, processing, and outputting data in multiple stages.

f. advantages of Using the Style

Advantages:

Modularity: Easy to add, replace, or modify filters.

Reusability: Filters can be reused in different pipelines.

Scalability: Parallelization and distribution of filters across multiple systems.

Disadvantages:

Latency: Some filters may introduce delays, especially if they are time-intensive.

Error Propagation: Faulty filters can propagate errors downstream.

g. Specializations

Pipeline Parallelism: Filters can be executed in parallel to improve performance.

Adaptive Filters: Filters that change their behavior based on incoming data.

Date: _____

Signature of faculty in-charge