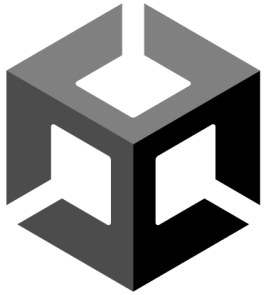
MORE ON MARKER BASED AUGMENTED REALITY

WHAT IS IT?

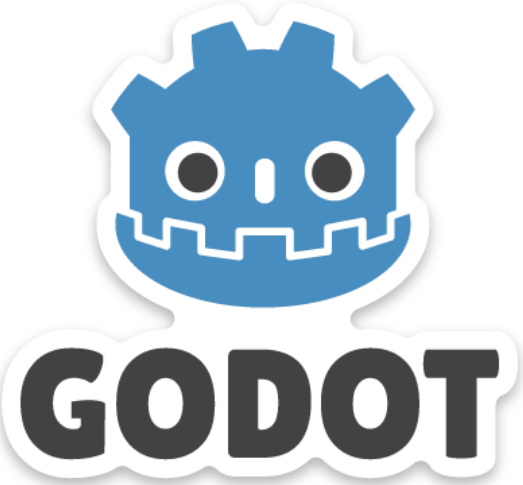
THIS TYPE OF AR WORKS ON THE CONCEPT OF TRACKING AND RECOGNITION. IN THIS TYPE OF AR, YOU NEED TO HAVE A MARKER THROUGH WHICH YOU COULD PERFORM THE AUGMENTATION.

DEVELOPMENT ENGINES



Unity®

UNREAL ENGINE



GODOT

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APERTUS VR

SOFTWARE DEVELOPMENT KITS

WHAT IS RECOGNITION?

RECOGNITION IS NOTHING BUT THE IDENTIFICATION OF ANY OBJECT/MEDIA, SUCH AS A BARCODE, OUR DEVICES HAS SOFTWARE'S TO SCAN & RECOGNIZE A BARCODE, SIMILARLY RECOGNITION OF HUMAN FACES THROUGH SECURITY SYSTEMS.

WHAT IS TRACKING?

TRACKING IN AR FINDS FOR A SPECIFIC PATTERN OR IMAGE THAT AN AR APP CAN RECOGNIZE. ONCE THE APP FINDS THE PATTERN, IT CONSTANTLY TRACKS THE POSITION OF THE PATTERN IN REAL WORLD SPACE SO THAT THE APP CAN ACCURATELY PLACE A DIGITAL OBJECT ONTO THE MARKER THAT IS BEING TRACKED.

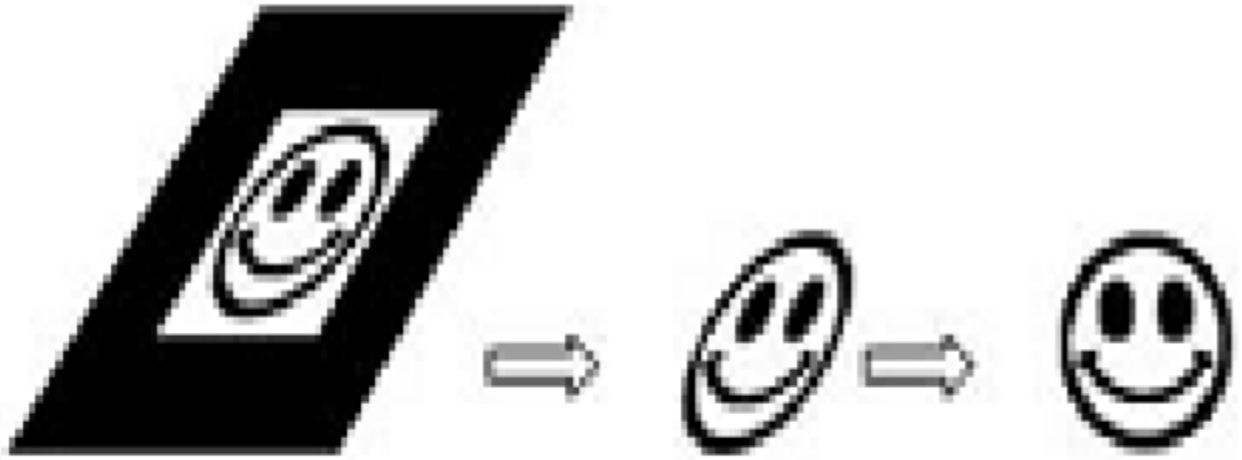
MARKER BASED AUGMENTED REALITY MAKES USE OF BOTH RECOGNITION AND TRACKING

MARKER DESIGN, DETECTION & RECOGNITION

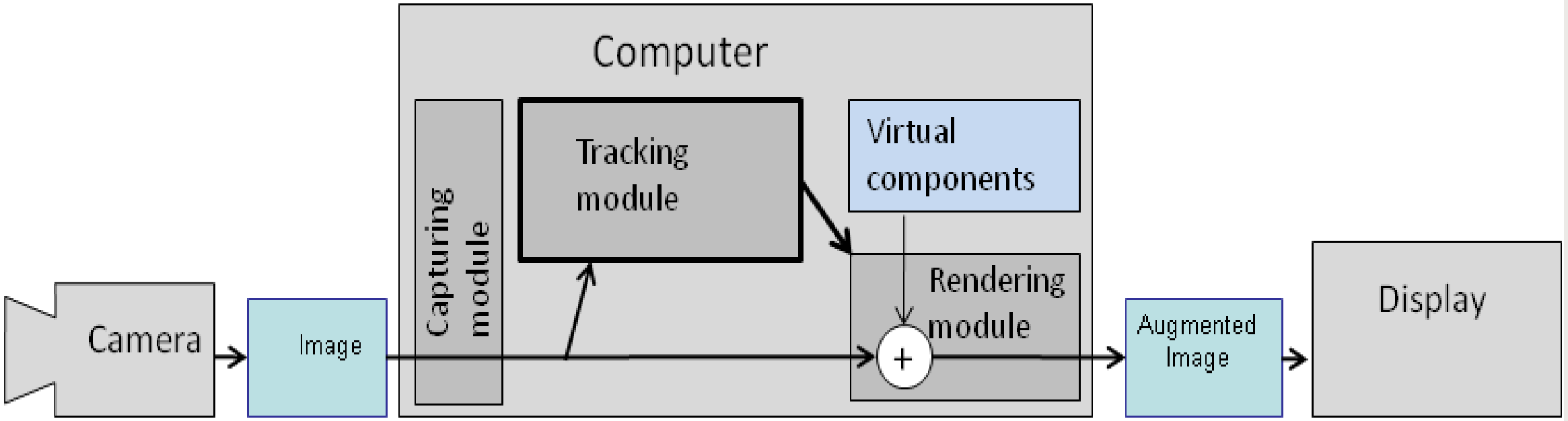
MARKERS ARE GENERALLY SQUARE SHAPED, AND MANY PEOPLE MAKE USE OF BLACK BORDERED IMAGE INSIDE THE MAIN FRAME WITH WHITE COLOR INSIDE OF IT. IT BASICALLY HELPS TO SEPARATE MARKER FROM THE BACKGROUND FRAME. INTERNAL GRAPHICS OF THE MARKER ARE OFTEN DISPLAYED DISTORTED OR PIXELATED.

MARKER IMAGE UNWRAPPING

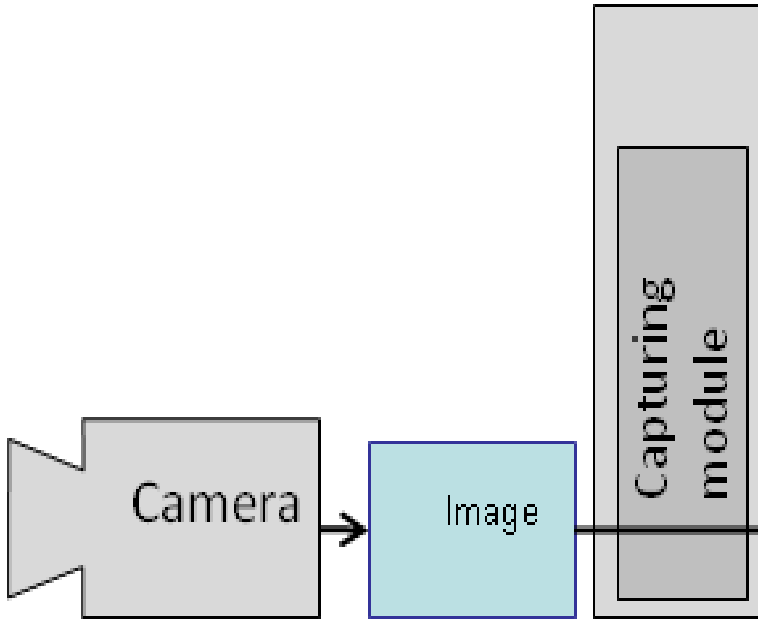
IMAGE UNWRAPPING IS A PROCESS TO UNWRAP A PART OF THE IMAGE. WHEN RECOGNIZING THE IMAGES, IT IS NECESSARY TO APPLY IMAGE UNWRAPPING.



AR SYSTEM ARCHITECTURE



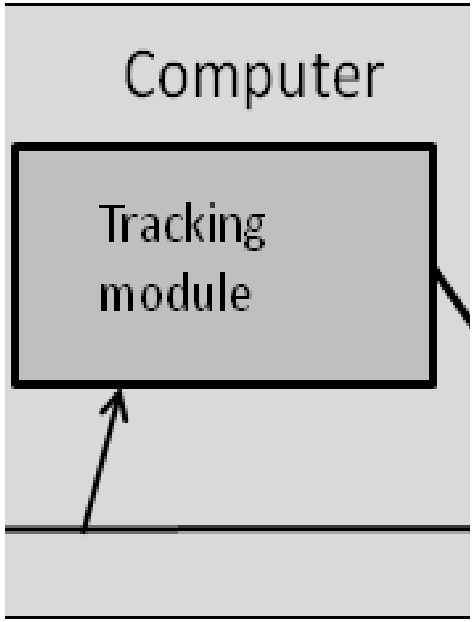
CAPTURING MODULE



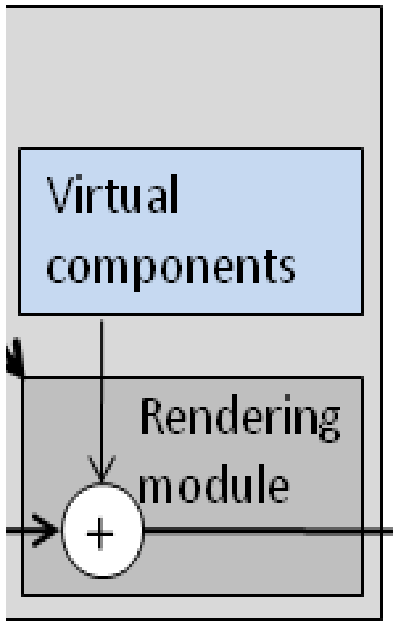
THE CAPTURING MODULE CAPTURES THE IMAGE FROM THE CAMERA.

TRACKING MODULE

THE TRACKING MODULE IS THE CORE OF THE AR SYSTEM, IT CALCULATES THE RELATIVE POSE OF THE CAMERA IN REAL TIME.
THE TERM "POSE" MEANS BASICALLY THE 6 DEGREES OF FREEDOM, THAT IS THE 3D LOCATION AND ORIENTATION OF AN OBJECT.



RENDERING MODULE



THE RENDERING MODULE HELPS US TO COMBINE THE VIRTUAL COMPONENTS AND REAL IMAGE INTO ONE USING THE CALCULATED POSE AND AFTER ALL THESE IT RENDERS THE AUGMENTED DIGITAL OBJECT ON THE IMAGE

PROJECTIVE GEOMETRY IS THE MATHEMATICAL MODEL FOR POSE ESTIMATION

AR SYSTEM ARCHIETECTURE

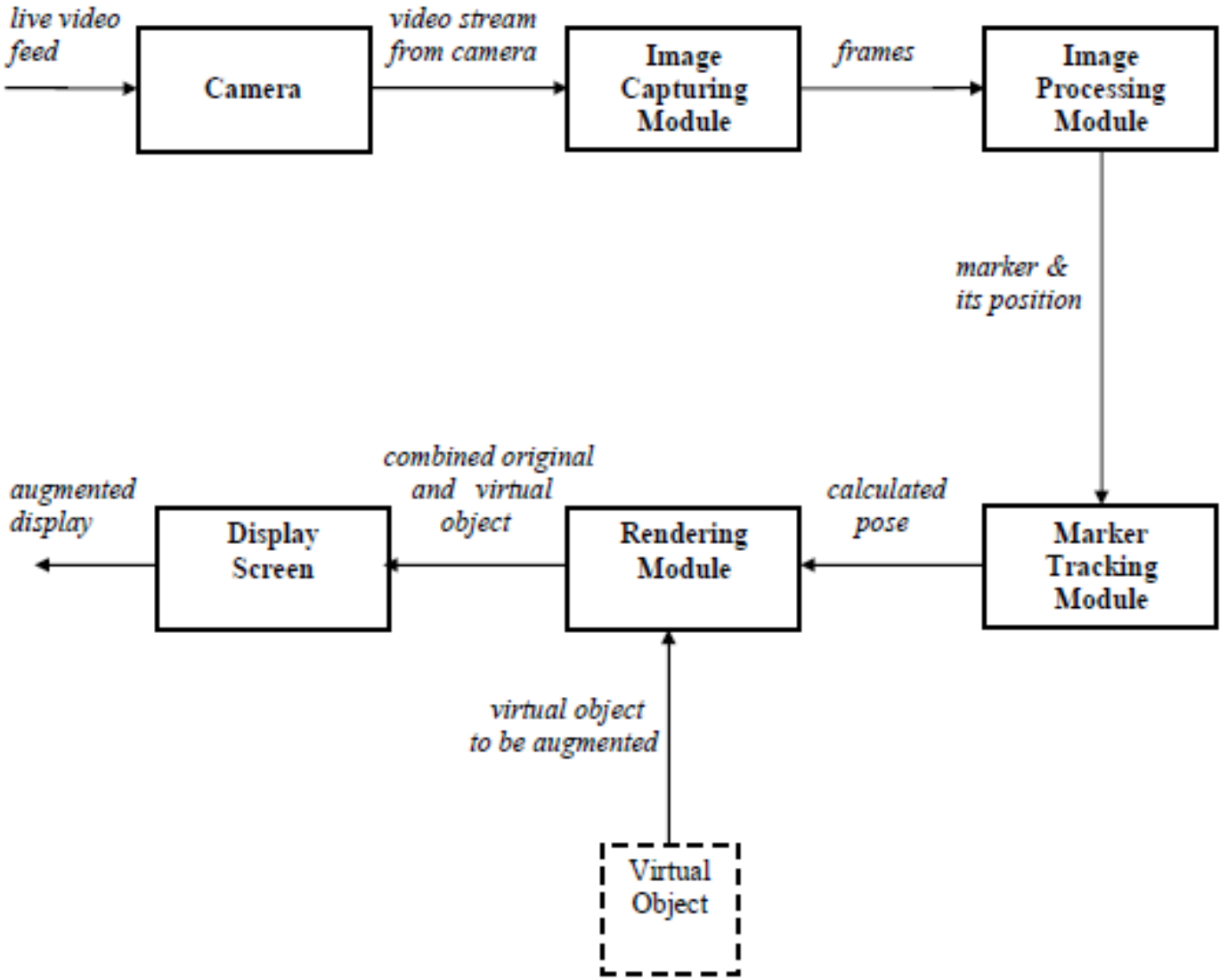


IMAGE CAPTURING MODULE

THE INPUT TO IMAGE CAPTURING MODULE IS THE LIVE VIDEO FEED FROM THE CAMERA OF A MOBILE DEVICE. THIS MODULE ANALYSES THE CAMERA FEED, BY ANALYZING EACH FRAME IN THE VIDEO. THIS MODULE GENERATES BINARY IMAGES A DIGITAL IMAGE THAT HAS ONLY TWO POSSIBLE VALUES FOR EACH PIXEL. TYPICALLY, THE TWO COLORS USED FOR A BINARY IMAGE ARE BLACK AND WHITE. THESE BINARY IMAGES ARE PROVIDED AS AN INPUT TO IMAGE PROCESSING MODULE.

IMAGE PROCESSING MODULE

INPUTS TO IMAGE PROCESSING MODULE ARE THE BINARY IMAGES FROM IMAGE CAPTURING MODULE. THESE BINARY IMAGES ARE PROCESSED USING AN IMAGE PROCESSING TECHNIQUE TO DETECT THE AR MARKER. DETECTION OF AR MARKER IS ESSENTIAL TO DETERMINE THE POSITION, WHERE TO PLACE THE VIRTUAL OBJECT. ONCE THE AR MARKER IS DETECTED, ITS LOCATION IS PROVIDED AS AN INPUT TO THE TRACKING MODULE.

MARKER TRACKING MODULE

THE TRACKING MODULE IS THE CORE OF THE AR SYSTEM. IT CALCULATES RELATIVE POSE OF THE CAMERA IN REAL TIME. THE TERM POSE MEANS THE 6DOF POSITION, THAT IS THE 3D LOCATION AND ORIENTATION OF AN OBJECT. THE CALCULATED POSE IS PROVIDED AS AN INPUT TO RENDERING MODULE.

RENDERING MODULE

THERE ARE 2 INPUTS TO RENDERING MODULE. FIRST IS TO CALCULATE POSE FROM THE TRACKING MODULE AND OTHER IS THE VIRTUAL OBJECT TO BE AUGMENTED. THE RENDERING MODULE COMBINES THE ORIGINAL IMAGE AND THE VIRTUAL COMPONENTS USING THE CALCULATED POSE AND RENDERS THE AUGMENTED IMAGE ON THE DISPLAY SCREEN OF THE MOBILE DEVICE.