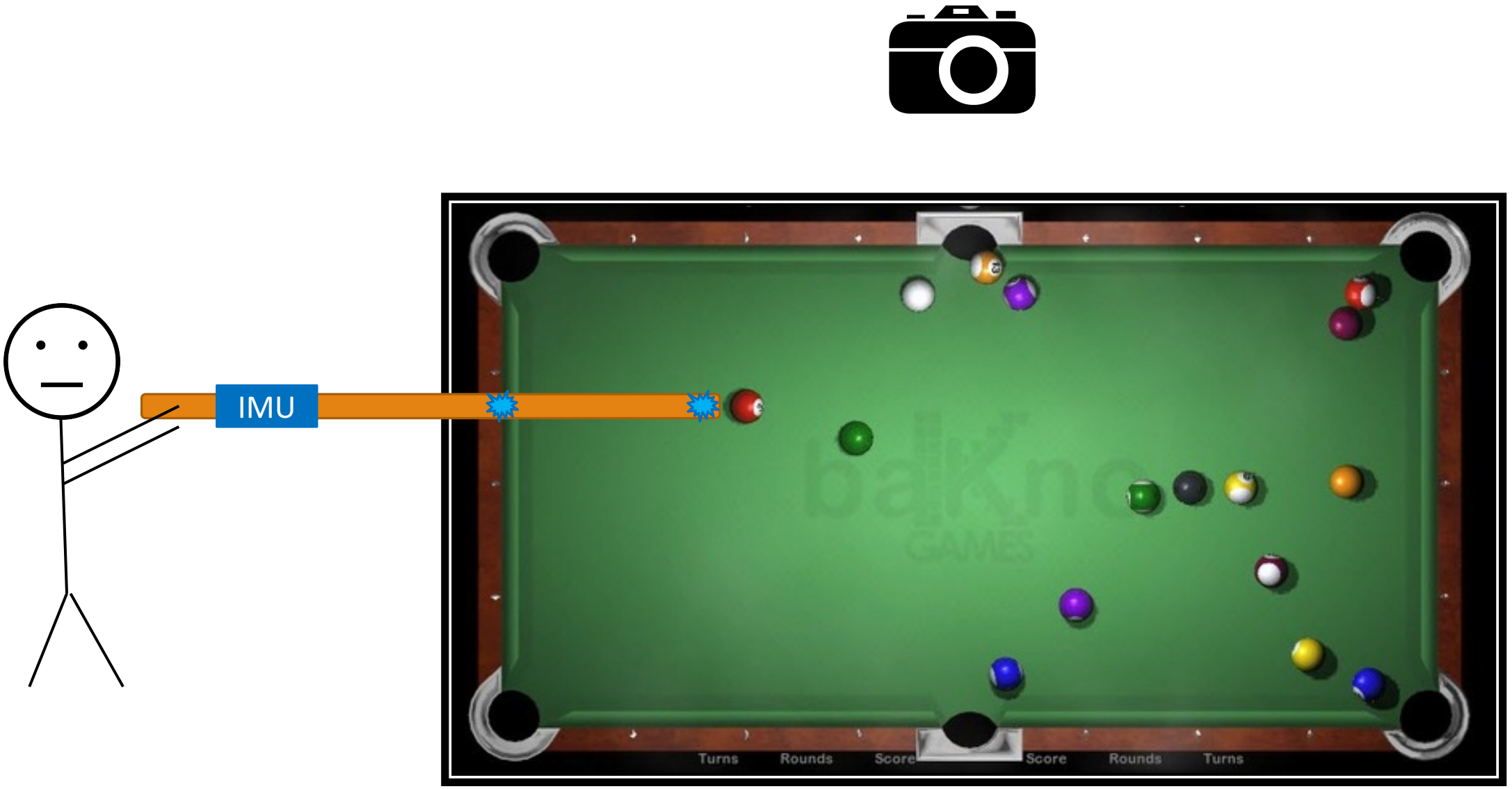
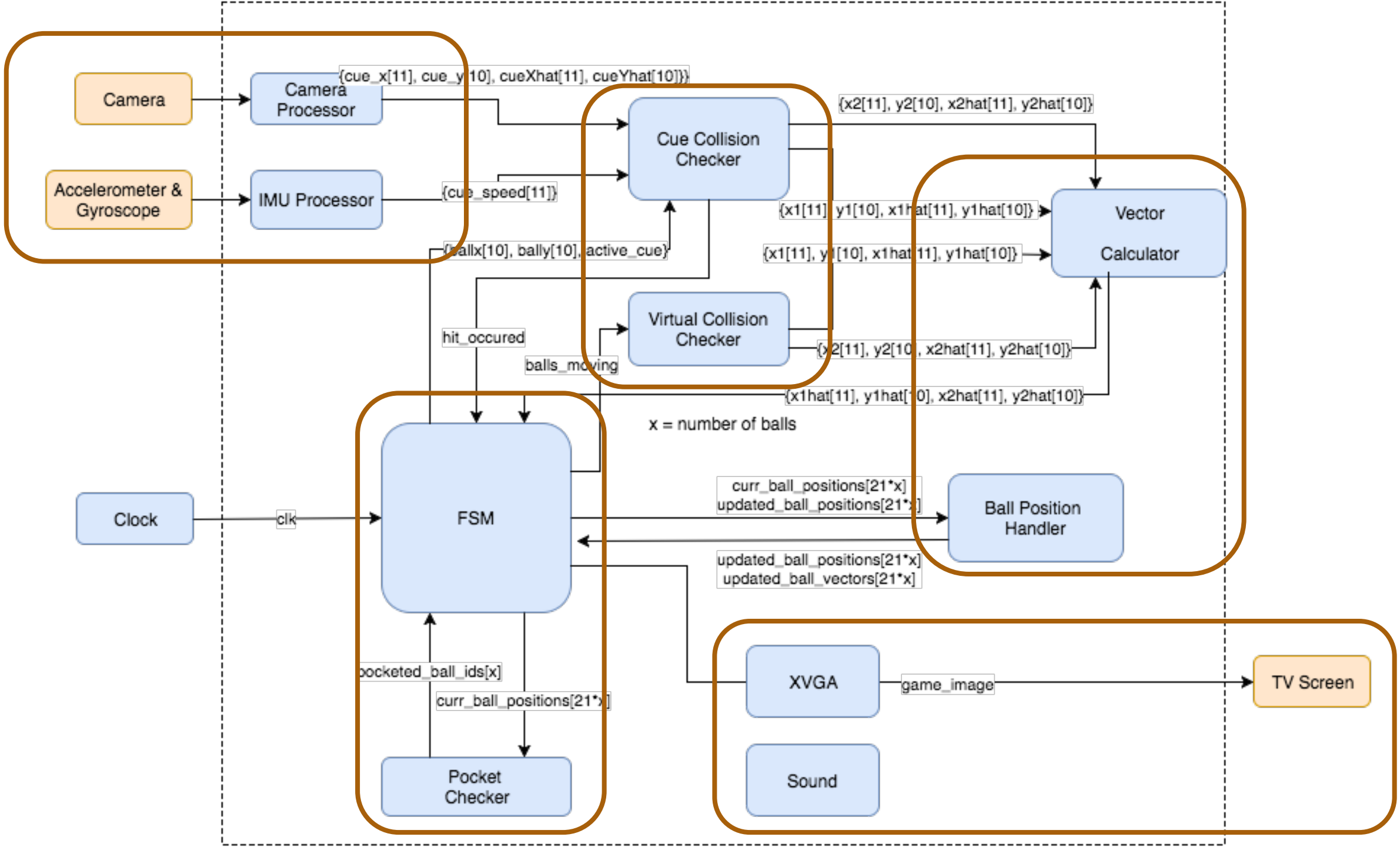
JOOLA
INSIDE

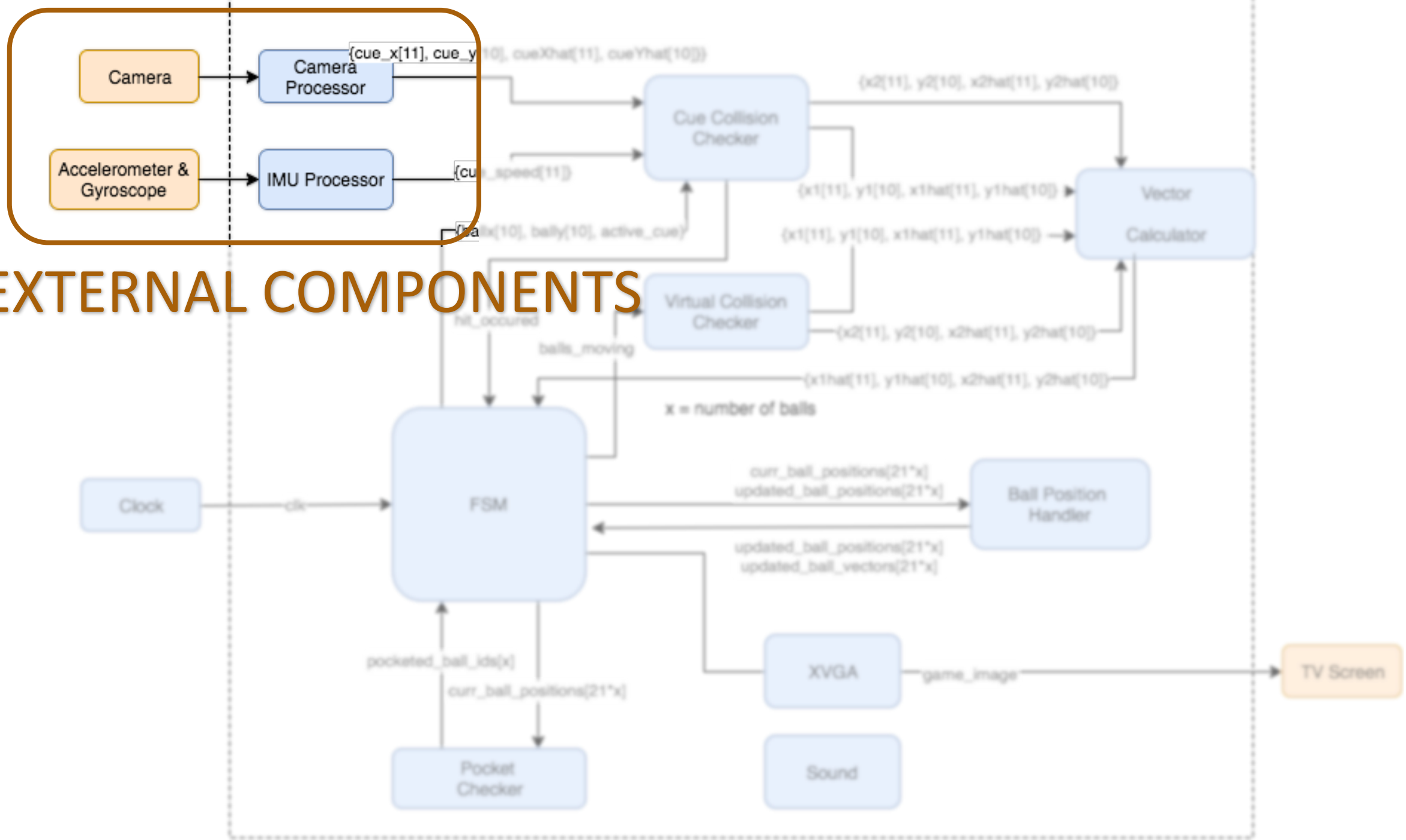
LA PC-NA

SEMI-VIRTUAL POOL

ZAREEN CHOUDHURY AND MATT BASILE


IMU
Turns
Rounds
Score
Score
Rounds
Turns


Camera
Camera Processor
{cue_x[11], cue_y[10], cueXhat[11], cueYhat[10]}
Accelerometer & Gyroscope
IMU Processor
{cue_speed[11]}
Cue Collision Checker
{x2[11], y2[10], x2hat[11], y2hat[10]}
{x1[11], y1[10], x1hat[11], y1hat[10]}
Vector Calculator
{ballx[10], bally[10], active_cue}
{x1[11], y1[10], x1hat[11], y1hat[10]}
Virtual Collision Checker
hit_occured
balls_moving
{x2[11], y2[10], x2hat[11], y2hat[10]}
{x1hat[11], y1hat[10], x2hat[11], y2hat[10]}
x = number of balls
Clock
clk
FSM
curr_ball_positions[21*x]
updated_ball_positions[21*x]
Ball Position Handler
updated_ball_positions[21*x]
updated_ball_vectors[21*x]
pocketed_ball_ids[x]
curr_ball_positions[21*x]
Pocket Checker
XVGA
game_image
TV Screen
Sound

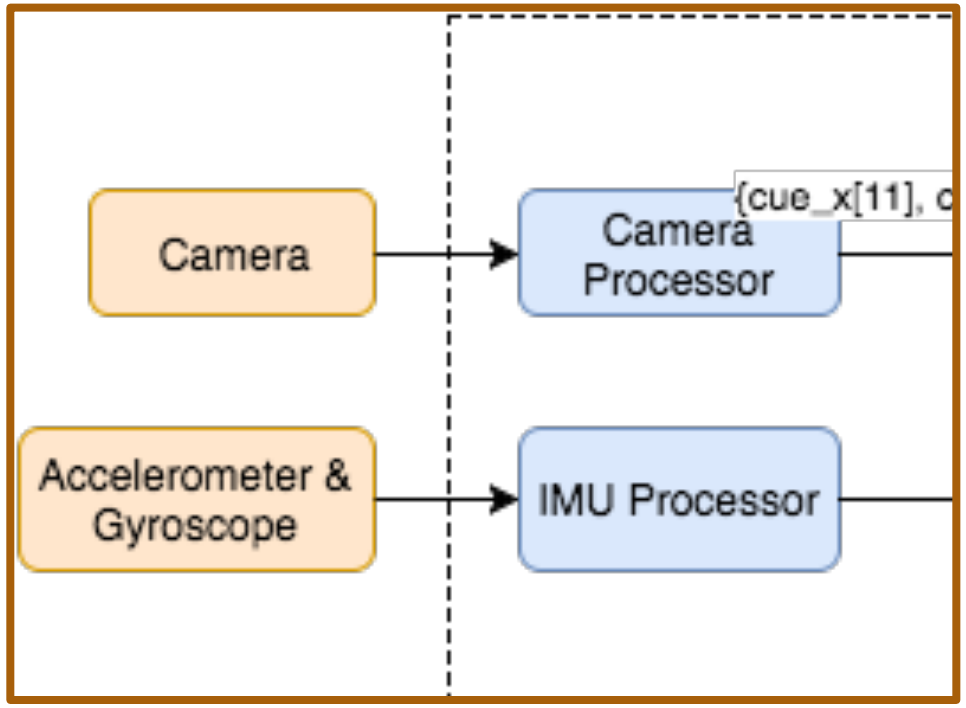


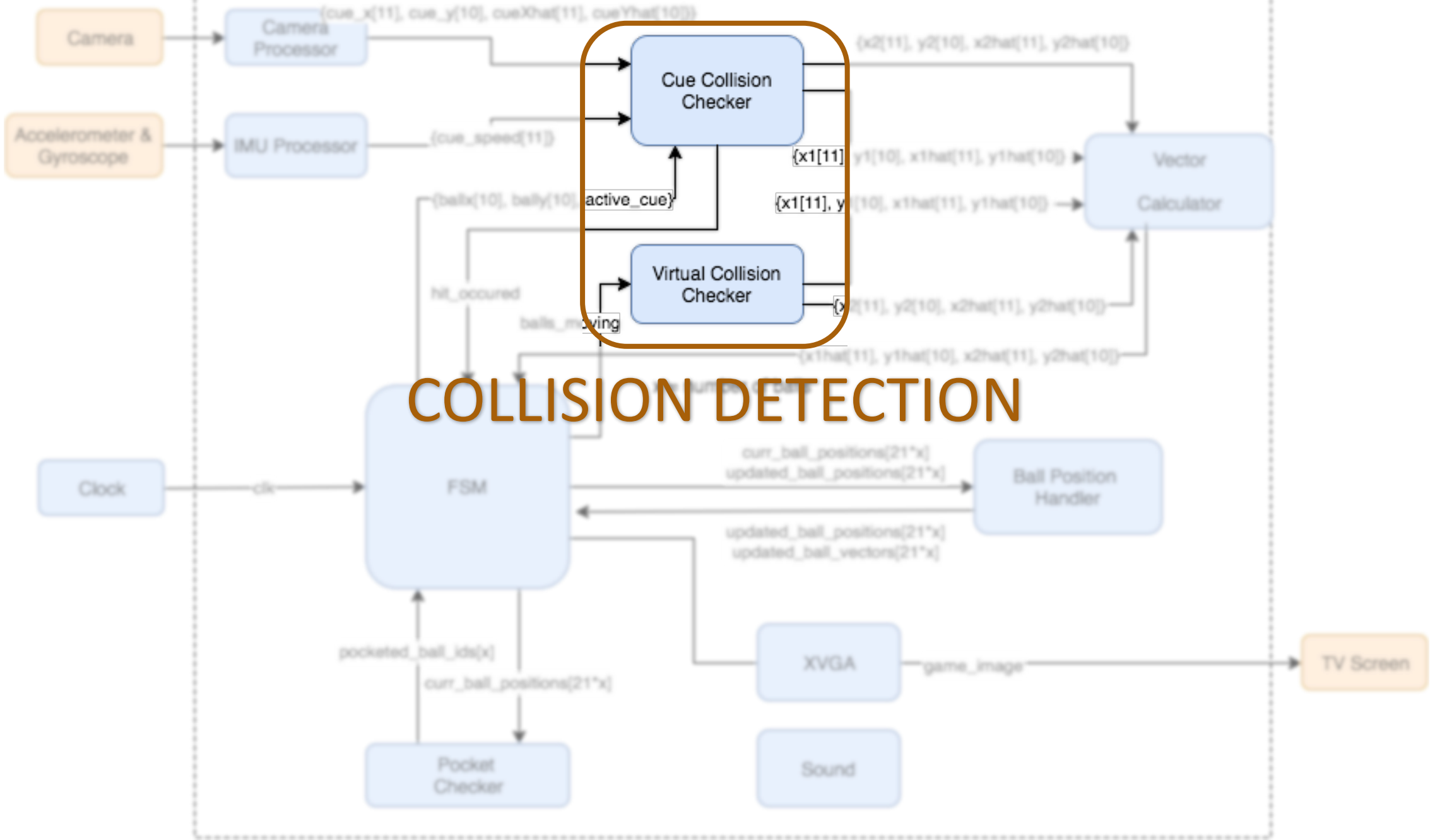
EXTERNAL COMPONENTS

External Components

Camera Processor:
Output (x,y) coordinates of IR LED's on cue

IMU Processor:
Output cue speed

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IMU Processor
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Cue Collision Checker
{x2[11], y2[10], x2hat[11], y2hat[10]}
{x1[11]
active_cue}
{x1[11], y
Vector Calculator
{balls[10], bally[10]
hit_occured
Virtual Collision Checker
balls_moving
{x1hat[11], y1hat[10], x2hat[11], y2hat[10]}
COLLISION DETECTION
Clock
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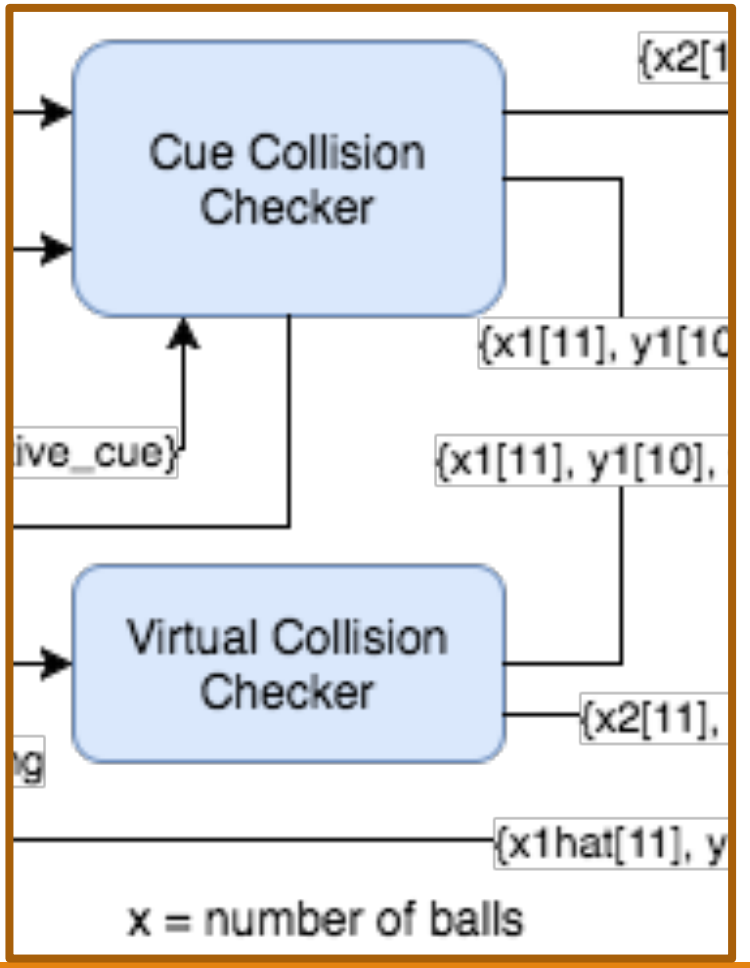
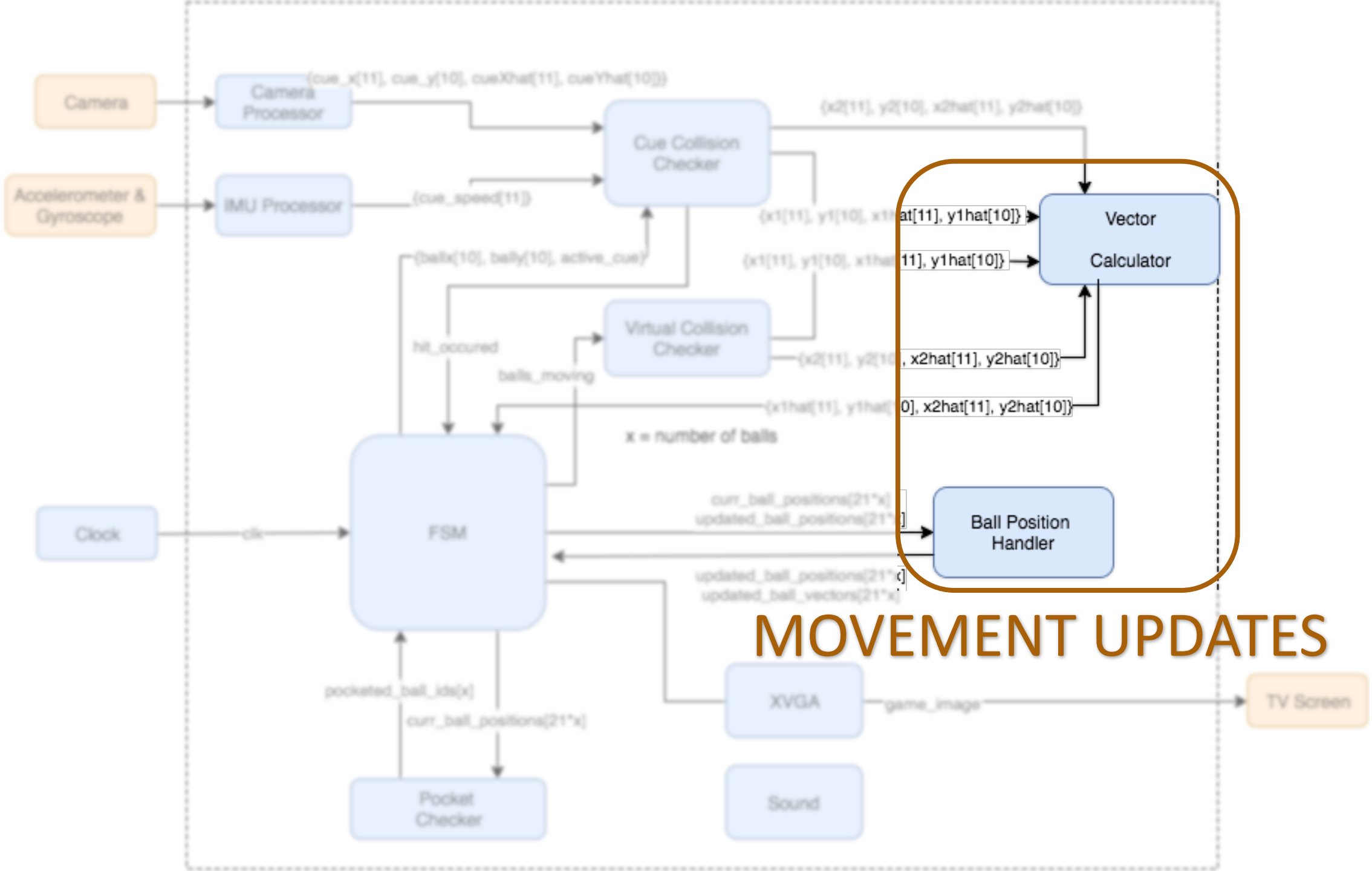
Collision Detection

Calculate distance between ball centers

Model cue tip as “pool ball”

Avoid square roots using known distances





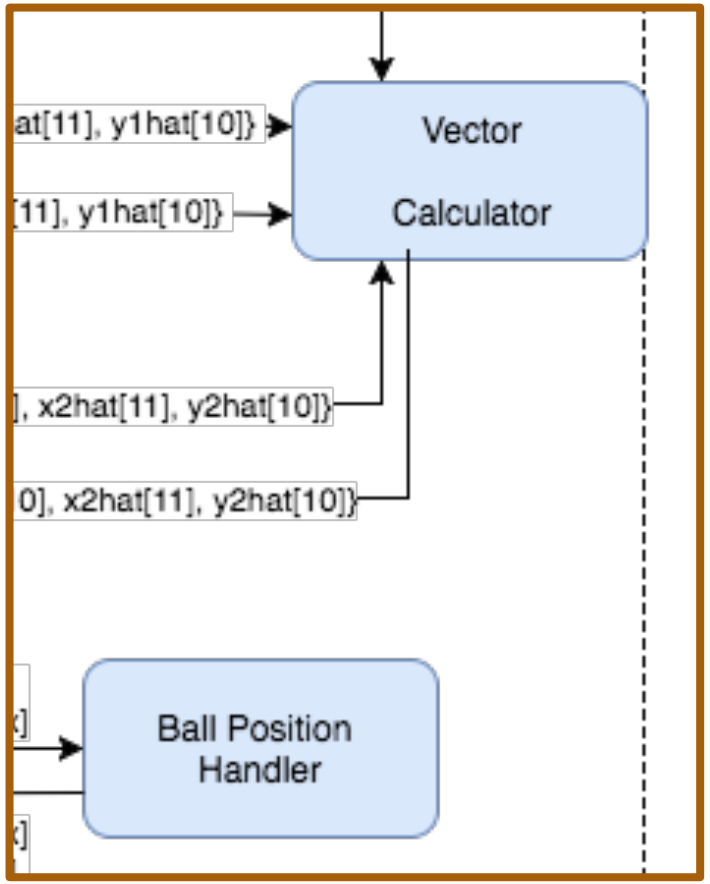
MOVEMENT UPDATES

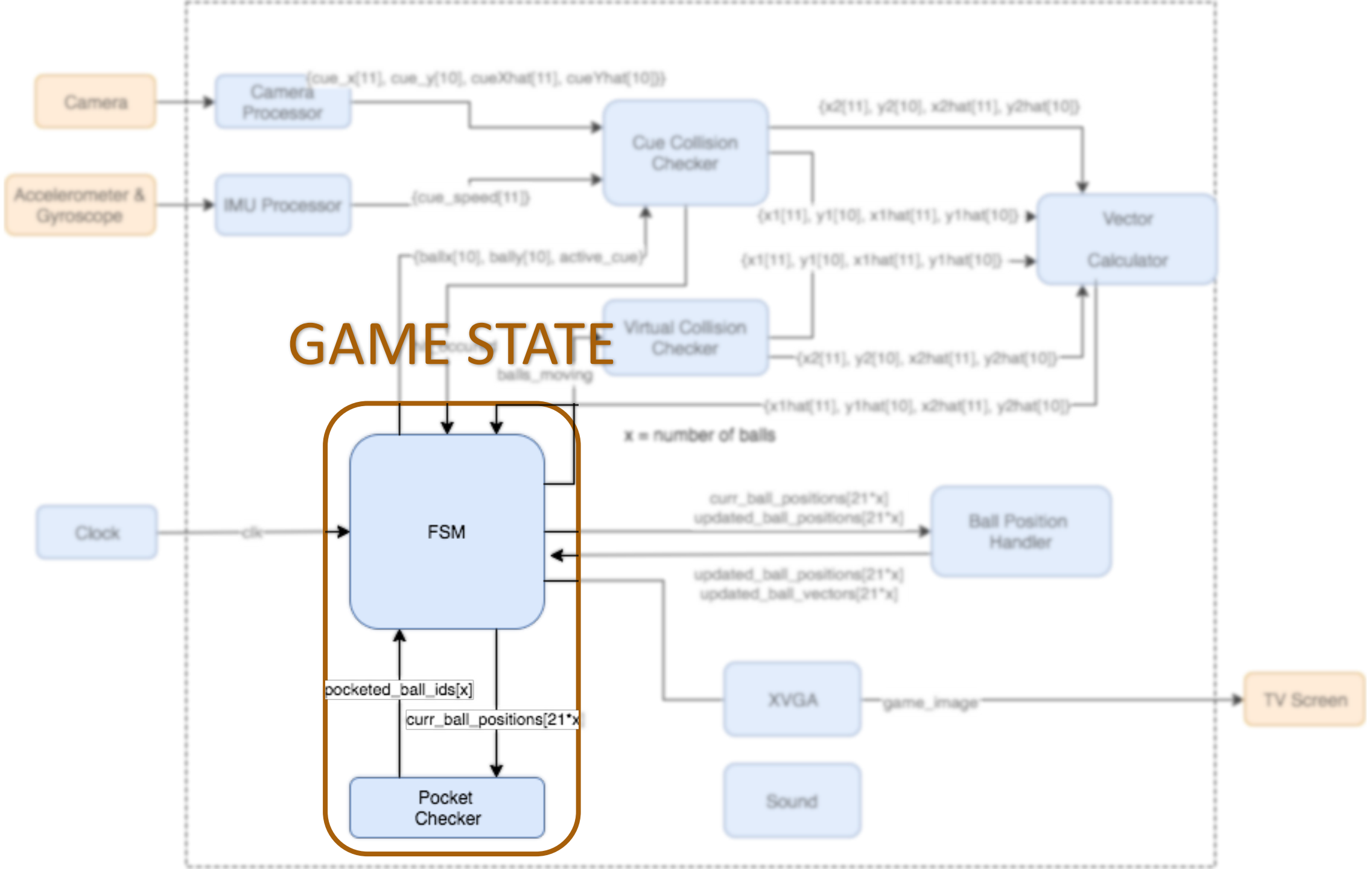
Movement Updates

Every ball has a position and movement vector
- Split into X and Y components

Update every ball's position at each time step
- Then lower speed in each direction: friction

Collisions: find normal and tangential vectors
- Tangential vectors stay the same
- Normal vectors swap

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GAME STATE
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game_image
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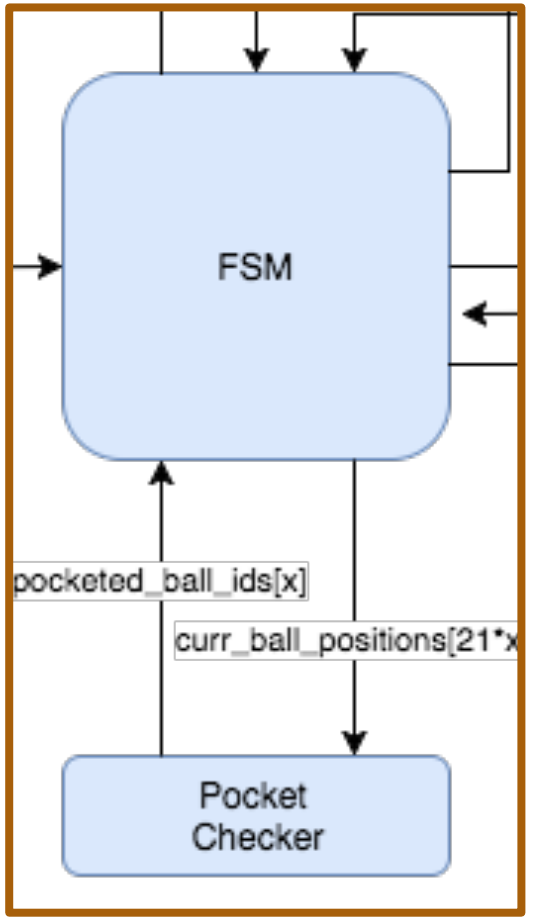
Pocket Checker
Sound

GAME STATE

Keeps track of:

- Player turn
- Balls remaining
- Balls moving
- Ball positions

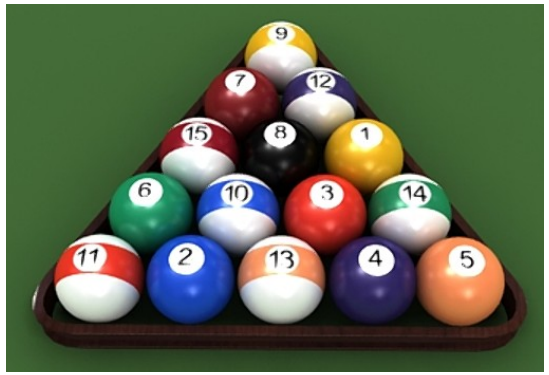
Serves as central coordinator for information for consistency and timing



	10/31	11/7	11/14	11/21	11/28	12/5
Camera + IR Setup	Zareen	Zareen				
IMU Setup		Zareen	Zareen			
Cue Collisions				Zareen	Zareen	
Ball Collisions	Matt	Matt				
Movement Updates		Matt	Matt			
Game FSM			Matt	Matt		
Integration				Both	Both	
Testing/Buffer					Both	Both

Stretch Goals

Increased number of balls



Spinning pool ball

Sound

Haptic feedback on cue-ball collision

Questions?