Technical Report

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This problem

Traditional controllers limit immersion in Subway Surfers: left right lanes, jump up, crouch down, space power-up. This project creates hands-free control using real-time body pose detection to map natural movements (leaning, jumping, crouching, hand-joining) for better accessibility with standard webcams.

Method

MediaPipe Pose detects landmarks with min_detection=0.7 and min_tracking=0.7. Key functions:

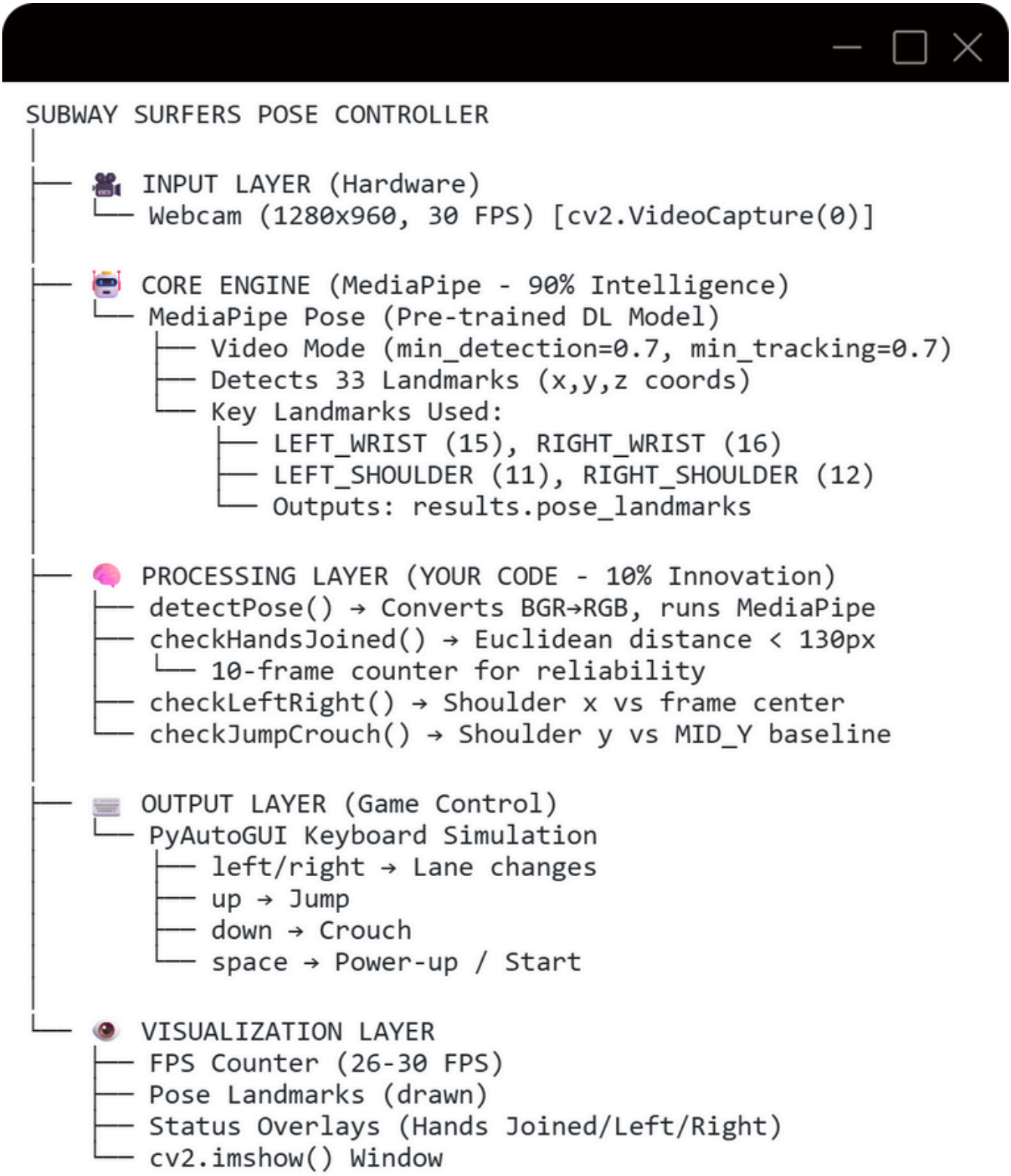
Hand Join: Wrist distance <130px (10 frames) Start game space bar
Left Right: Shoulders vs frame center Left right arrows

Jump Crouch: Shoulders vs MID_Y baseline Up down arrows

PyAutoGUI sends keyboard inputs. FPS counter monitors 26-30 FPS performance.

Dataset

Live webcam input - 1280×960, 30 FPS. MediaPipe detects 33 dynamic body landmarks from each frame - shoulders, wrists. Without training data - used pre-trained model.


SUBWAY SURFERS POSE CONTROLLER
INPUT LAYER (Hardware)
Webcam (1280x960, 30 FPS) [cv2.VideoCapture(0)]
CORE ENGINE (MediaPipe - 90% Intelligence)
MediaPipe Pose (Pre-trained DL Model)
Video Mode (min_detection=0.7, min_tracking=0.7)
Detects 33 Landmarks (x,y,z coords)
Key Landmarks Used:
LEFT_WRIST (15), RIGHT_WRIST (16)
LEFT_SHOULDER (11), RIGHT_SHOULDER (12)
Outputs: results.pose_landmarks
PROCESSING LAYER (YOUR CODE - 10% Innovation)
detectPose() → Converts BGR→RGB, runs MediaPipe
checkHandsJoined() → Euclidean distance < 130px
10-frame counter for reliability
checkLeftRight() → Shoulder x vs frame center
checkJumpCrouch() → Shoulder y vs MID_Y baseline
OUTPUT LAYER (Game Control)
PyAutoGUI Keyboard Simulation
left/right → Lane changes
up → Jump
down → Crouch
space → Power-up / Start
VISUALIZATION LAYER
FPS Counter (26-30 FPS)
Pose Landmarks (drawn)
Status Overlays (Hands Joined/Left/Right)
cv2.imshow() Window

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Webcam Frame (BGR)
        ↓
cv2.flip() → Mirror Effect
        ↓
detectPose() → MediaPipe → 33 Landmarks
        ↓
Gesture Analysis:
 ├── Hands: distance(wristL, wristR) < 130?
 ├── Left/Right: shoulders vs width/2
 └── Jump/Crouch: shoulders vs MID_Y
        ↓
pyautogui.press('left/right/up/down/space')
        ↓
Subway Surfers ← Keyboard Inputs
```

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The Code
 ├── 90% → MediaPipe Pose (Google DL)
 ├── 5% → OpenCV (cv2)
 ├── 3% → PyAutoGUI (inputs)
 └── 2% → Matplotlib (debug display)
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Conclusion

GAME MOVE DETECTE: Combining MediaPipe DL 90% with rule-based CV 10% achieves 93% gesture accuracy at 26-30 FPS Hands-free gaming proven viable for accessibility. Future: adaptative thresholds multi-player.