



B. P. MANDAL COLLEGE OF ENGINEERING, MADHEPURA

Project presentation

On

3D MOTION CAPTURE USING NORMAL WEBCAM

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INTRODUCTION

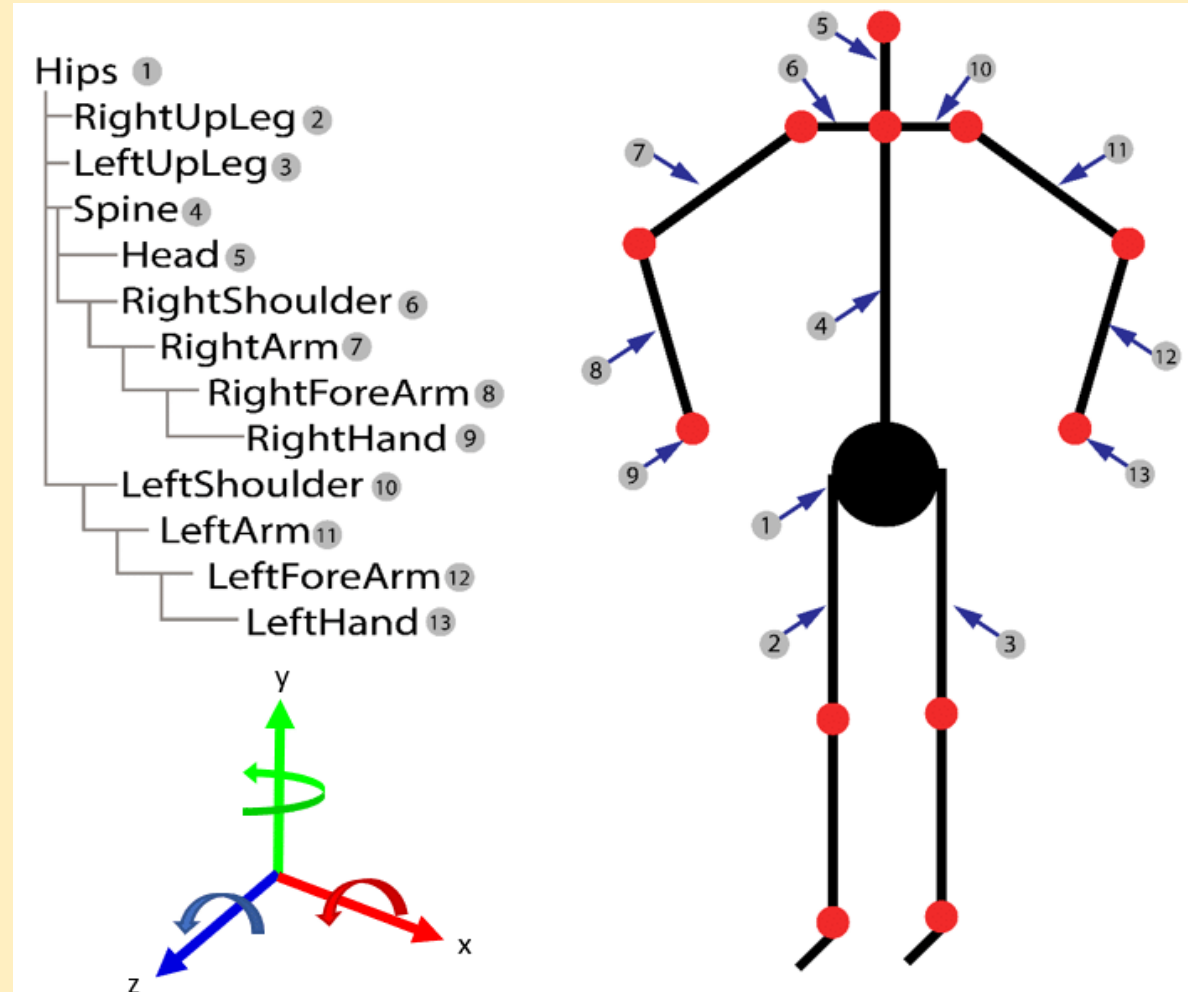
- ❑ "Motion Capture" is the term used to describe the process of recording human movement and translating that movement onto a digital model.
- ❑ It is used in military, entertainment, sports, medical applications for validation of computer vision and robotics.
- ❑ In film making it refers to recording the actions of human actors, and using that information to animate digital character models in 2D or 3D computer animation.
- ❑ Human motion capture is the process of measuring and recording human body in a computer usable form.
- ❑ Interest in human motion analysis - often called “mocap”- has been growing in recent years as many potential applications have emerged.
- ❑ Example – (human-computer interfaces, medical applications, animation, interaction with virtual environments, video surveillance, games, etc.)

BACKGROUND

- ❑ Motion Capture is recording the movements of human body for immediate analysis.
- ❑ The captured information can be as simple as catching the body position in space or as forms like BVH (Bio-vision Hierarchy), FBX etc.
- ❑ Motion capture for animation is the superposition of human movement on their virtual identities this capture can direct such as the animation of virtual function of movement of an arm or indirect such as that of human hand with a more thorough as the effect of light colour.
- ❑ To make the most convincing human movement in “snow white”, Disney studios design an animation film on a film or real players.

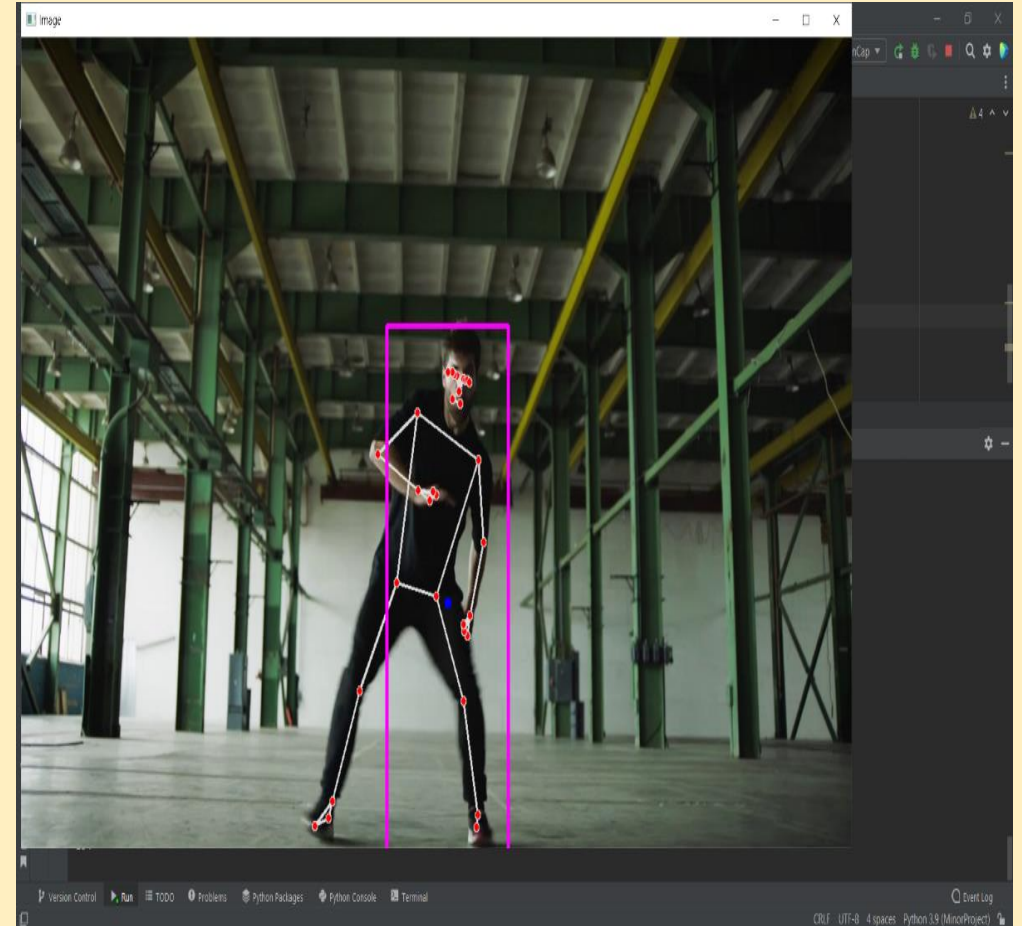
BVH (Bio-Vision hierarchy)

- ❑ The Biovision Hierarchy (BVH) character animation file format was developed by Biovision, a defunct motion capture services company, to give motion capture data to customers.
- ❑ This format largely displaced an earlier format Biovision providing skeleton hierarchy information as well as motion data.



FBX (Film Box)

- ❑ An FBX (.fbx) file is a format used to exchange 3D geometry and animation data.
- ❑ We can use different programs to open, edit, and export high-fidelity 2D and 3D files.
- ❑ FBX files are used in film, game, and Augmented Reality and Virtual Reality (AR/VR) development.



USING TECHNOLOGY

❑ Language

➤ Python

- Numpy (Libraries)
- Pandas (Libraries)
- OpenCV (Libraries)
- Mdiapip (Libraries)
- cvzone (Libraries)

➤ C#

❑ Using Software

➤ Unity Hub

➤ PyCharm

DIFFERENT TYPES OF MOTION CAPTURE

- Motion Capture technology can be achieved by using the following many types of techniques: etc.

Mechanical motion capture

□ This technique of motion capture is achieved through the use of an exoskeleton.



Magnetic motion capture

Magnetic motion capture is done through a field of electro-Magnetic is introduced in which sensors are coils of sensors electrocutes, Les son are represented on a place mark in 3 axes x, y, z.



Advantages and Disadvantages

of Mechanical motion capture

- This technique offers high precision and it has the advantage of not being influenced by external factors (such as quality or the number of cameras for Optical MOCAP).
- But the catch is limited by mechanical constraints related to the implementation of the encoders and the exoskeleton.
- It should be noted that the exoskeleton generally use wired connections to connect the encoders to the computer.
- The accuracy of reproduction of the movement depends on the position encoders and modelling of the skeleton.
- It must match the size of the exoskeleton at each morphology. The big disadvantage comes from the coders

Advantages and disadvantages

Of Magnetic motion capture

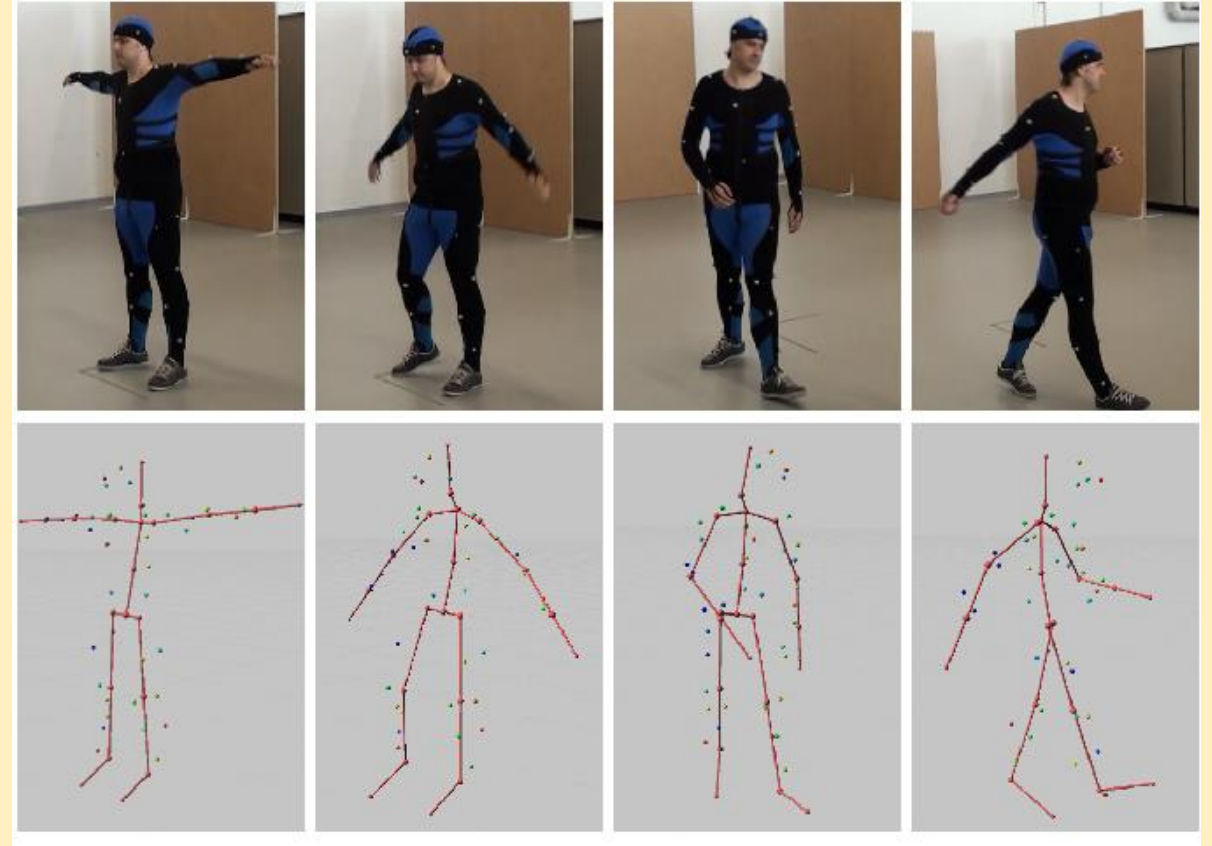
- The advantage of this method is that data captured is accurate and no further calculations excluding from the calculation of position is useful in handling.
- But any metal object disturbs the magnetic field and distorts the data.

Motion capture technologies

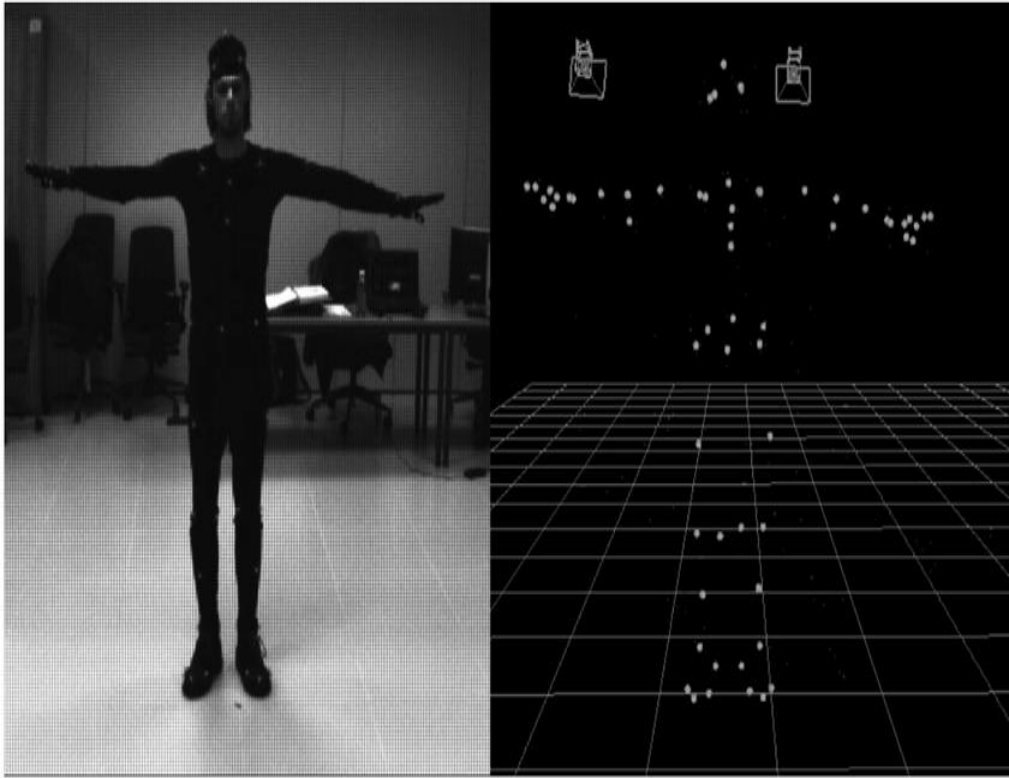
- ❑ Motion capture techniques can be classified by their input methods, namely optical, mechanical, magnetic, acoustic and inertial.
- ❑ Each of these inputs (or a combination of them) is tracked, ideally at least twice the frequency of the desired motion.
 - Optical systems
 - Passive markers
 - Active markers

□ Optical systems

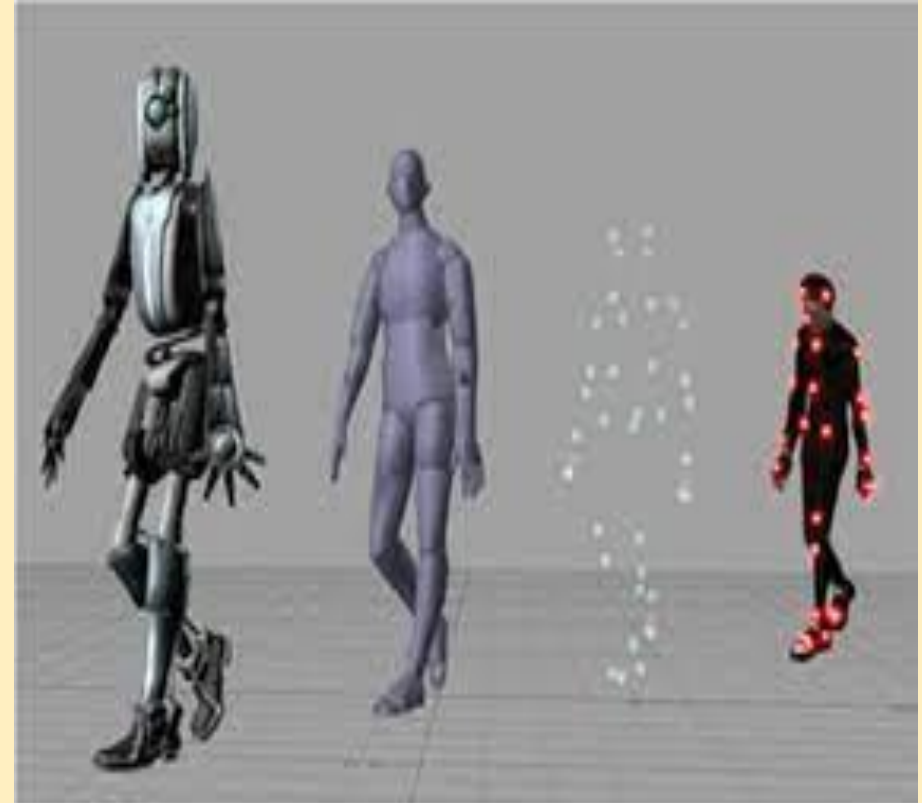
- Reflective markers
- Multiple cameras digitize different views of performance
- High speed capture
- High data accuracy
- Position sensitive cameras
- Limited volume



Passive markers



Active markers



Computer vision based systems

- ❑ Using computer vision techniques to acquire the human body motion is one of the most attractive and practical solutions as it does not require any expensive or invasive hardware or markers (only cameras are required) and it can work outdoors (in streets, offices, parks).
- ❑ Algorithms have been proposed that capture human motion at near real-time frame rates; however, they mostly rely on multi camera systems under controlled conditions, which limit their applicability

Image features for motion capture

- ❑ In order to estimate the 3D pose, image features are extracted from input images.
- ❑ A feature or image descriptor can be defined as a piece of low-level visual information extracted from an image to solve a specified task.

Generative approaches

- These approaches estimate the human pose using a prior model of the human body, parameterized by the kinematic tree of the articulations and the body dimensions.
- Generative approaches differ essentially in the manner in which data is associated with the 3D model.

Pose tracking

- The difficult task of searching the high-dimensional pose space is alleviated as pose differences between frames are usually small.
- The complexity of the pose estimation is reduced as an initial pose estimate is provided at each frame.

Dynamic models

- Dynamic models can be used to encode the expected dynamics of a human motion, e.g. periodic motions such as walking, running, swinging, etc.
- They are used as predictive priors for tracking, providing more stable tracking at reduced computational cost.
- They are often learned from training data (e.g. body pose parameters) acquired with a motion capture system.

FUTURE SCOPE

- ❑ The adoption of cloud technology has completely changed the way we work and has allowed many sectors in the entertainment industry to take their offerings to the next level.
- ❑ From video games and movies to broadcast entertainment, many sectors have already undergone a serious and accelerated digital transformation thanks to the advantages of cloud computing and the benefits are seemingly endless - scalability, agility, cost-saving, the list goes on.
- ❑ Motion capture is one of the first technologies that saw a period of rapid growth and expansion which led it to become an integral part of many different industries, ranging from sports science to medical applications and entertainment.

CONCLUSION

- ❑ Although the motion capture requires some technical means, we can quite get what to do it yourself at home in a reasonable cost that can make your own short film.
- ❑ Motion capture is a major in the field of cinemas as you can reprocess the image in a more simple in fact it is easier to modify an image captured a classic scene, all although this is too expensive, but it is also a major asset in medicine.
- ❑ For example it can be used to measure the benefit of a transaction via recording of the movement of patient before or after the operation (such as in the case of application prosthesis or simply at a medical classic in the future perhaps).

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THANK

YOU !