TECH TALK: OptiTrack Motion Capture System

The Optitrack Motion Capture System is a precision digital 3D optical measurement and object tracking tool that can be adapted for use in different enclosed environments.

The table below is a technology selection decision support tool and not a substitute for business procurement processes. Information is correct at time of publication

What's in the box	Technical specifications		Set up investment and required skills

What's in the box

Image source: OptiTrack

Hardware

Manufacturer:	NaturalPoint
Model and release date:	OptiTrack Prime^X 13
Price (est):	AU$3,500 per camera[1] (ex GST)
Weight:	320g (ea.)
Size:	69 x 69 x 53 mm
Tracking Accuracy:	± 0.2 mm
Tracking Range:	16 m
Frame Rate:	240 Hz (4.2 ms latency)
Tracked wavelength:	850 nm (Infrared)
Lens and Filter:	Adjustable focus and filter
Usage environment:	Indoor and outdoor use

Technical specifications

Connectivity

Connection:	GigE (Gigabit Ethernet)/PoE (Power over Ethernet)
Power:	PoE
Multi-port Gigabit switch with PoE:	NETGEAR ProSafe MS510TXPP supports up to 7 cameras ($549 USD)
Computer Network Adapter:	Intel X540-T1 ($500 USD)
Ethernet Cable:	Connectively between Gigabit switch and camera (multiple required)

Recommended PC Specification (4 cameras)

OS:	Windows 10 or 11 (64-bit)
CPU:	≥ 3.0 GHz Intel i5
Memory:	4 GB devoted to MOCAP
Ethernet:	1 Gigibit Ethernet additional to local network connection
USB:	Spare port for hardware key

Essential Accessories

Mounts and Tripods:	Calibration tools
Markers:	Digitising probe

Tracking and Applications

Solid object monitoring:	Inspecting industrial process
Skeleton (person wireframe):	Ergonomic and Biomechanical Analyses
Robots and drones:	Environmental Tracking
Measurement:	Precise 3D point inspection

Set up investment and required skills

Key Compatible Software

- Motive* (Optical MOCAP software)
- InSight* (Optical MOCAP software)
- Unreal and Unity Plugin
- Camera SDK* (C++ programming) and NatNet SDK* (C/C++/.NET)

*License required

Key Knowledge (depending on application)

- Experience with Motive
- Experience with programming
- Experience with gaming engine (e.g. Unreal and Unity)

Practical Task Setup
(as experienced by engineers)

- Initial system set-up and configuration is time consuming, requiring hardware and software familiarisation
- Once set-up, basic recording of object motion is straightforward, but files are large
- More advanced tracking features require more familiarisation time and practice
- After first configuration, adapting the system and moving it becomes faster
- Measurement is fast and accurate and requires minimal post processing

[1] A minimum of three cameras is needed; a small OptiTrack system (4 cameras) is approximately AU$20,000, excl. computer

PEOPLE PERSPECTIVE: OptiTrack motion capture system

Task/Environment Suitability	Usability Features	Task/Environment Considerations	Usability Considerations	Key Opportunities & Applications	Guidance for Implementation
Portable With a wired connection to a laptop/PC the system is portable Permanent fixtures are preferred, tripods can be used for short periods but may clutter already busy environments **Open or confined spaces** Not suitable if cameras are likely to be disturbed (incl. vibration) **Repetitive tasks** Great for repetitive tasks where accuracy is critical	**Performance** Once set-up, system is easily calibrated, and software can capture simple data immediately (providing real time feedback to users) Capturing stationary markers over short periods takes seconds Software compatibility/ interoperability issues can occur if using multiple apps or systems. Post processing of object motion takes longer than recording period and benefits from additional cameras (i.e minimise marker drop out) **Safety** OptiTrack cameras are cabled which may introduce a tripping hazard depending on where they are mounted	**Accuracy/performance:** A wired Gigabit Ethernet connection is essential for operation. It may be technically challenging to route cables Premium OptiTrack systems can be used in outdoor settings though may experience sensitivity problems depending on lighting levels (e.g. direct unfiltered sunlight) OptiTrack is unsuitable for dirty (dusty) or other environments with high particle contamination for long durations	**Performance** Appropriate placement of markers is essential. Poor placement choices reduce quality of the data obtained The system can generate high information load or complexity (e.g. data can be complex depending on application) Technology and software require familiarisation time, extended software features more so **Customisation** It is relatively easy to create custom arrangements of markers for specific monitoring applications **Safety** Markers must be kept clean so that they can be detected. If used for monitoring or real-time decision-making, failure to do so could result in accident or injury	**Portable/precise measurement** Can accurately survey position and orientation of objects and surfaces **Ergonomic Analysis** Major application is task posture monitoring, can track multiple people in small workspaces **Tracking** Used to monitor 3D position of drones and robots Track critical parts of industrial processes to monitor interaction **Future applications** Feasible to implement systems for collision avoidance and route planning and tracking multiple agents	Initial set up and use is time consuming but with practice becomes a lot faster Once set-up, data can be captured very quickly for simple tasks. More complex motion tracking and data require extended knowledge of software Optimum camera placement comes with intuition and experience. Camera placement determines the accuracy of the recording It is not practical to place the cameras in thoroughfares or high traffic areas where disturbance is likely. Wired connections are a tripping hazard on the ground Cameras and markers need to be kept clean, light dust soiling is acceptable but regular inspection and maintenance is important Attention needs to be paid to how the data captured is displayed (i.e. interface design) to facilitate fast, effective decision making. Timely user feedback that is easy to understand is important

These suggestions are formulated from use in Flinders University's Digital Transformation Lab at Tonsley. Selection and implementation of a technology should consider the abilities of the person doing the task, the task requirements, and the environment in which the work is to be undertaken.