JETSCAN
A PORTABLE 3D SCANNER
SERIES - IDEATION
with AI Powered

Shankar Hariharan K

How 3D scanning works

There are TWO major categories of scanners based on the way they capture data:

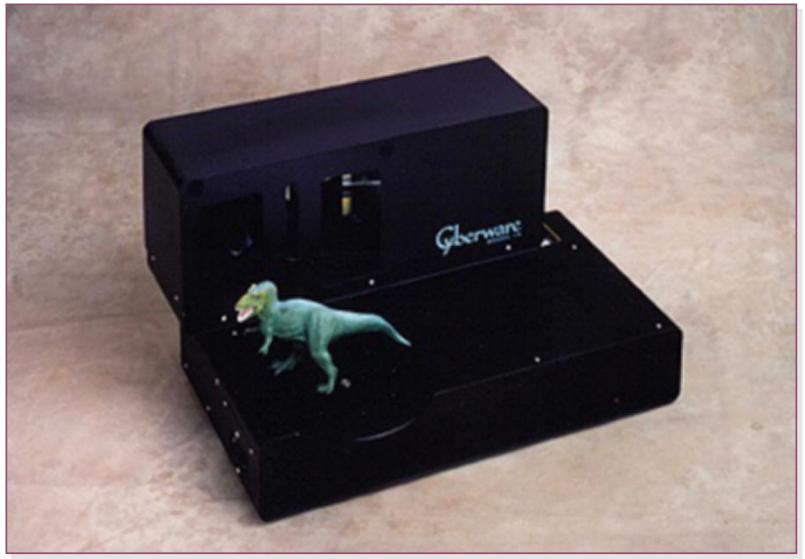
- **WHITE-LIGHT AND STRUCTURED-LIGHT SYSTEMS**

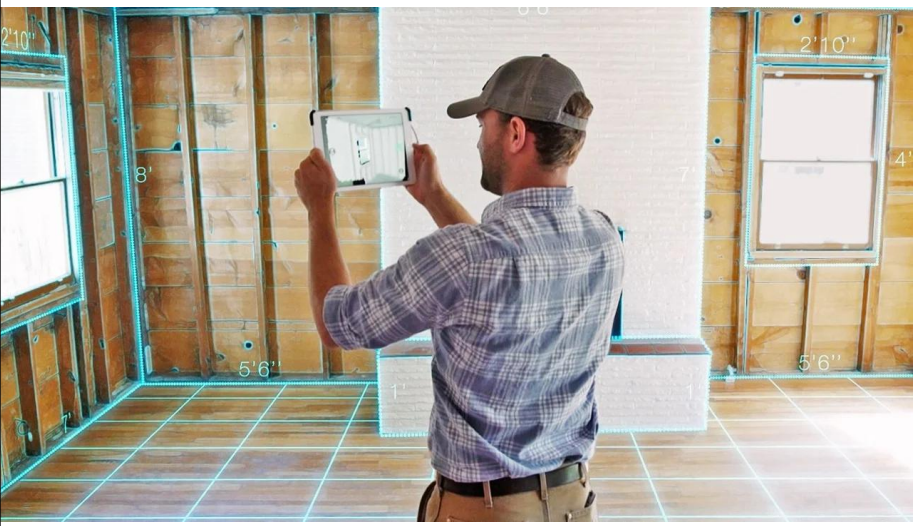
Take single snapshots or scans

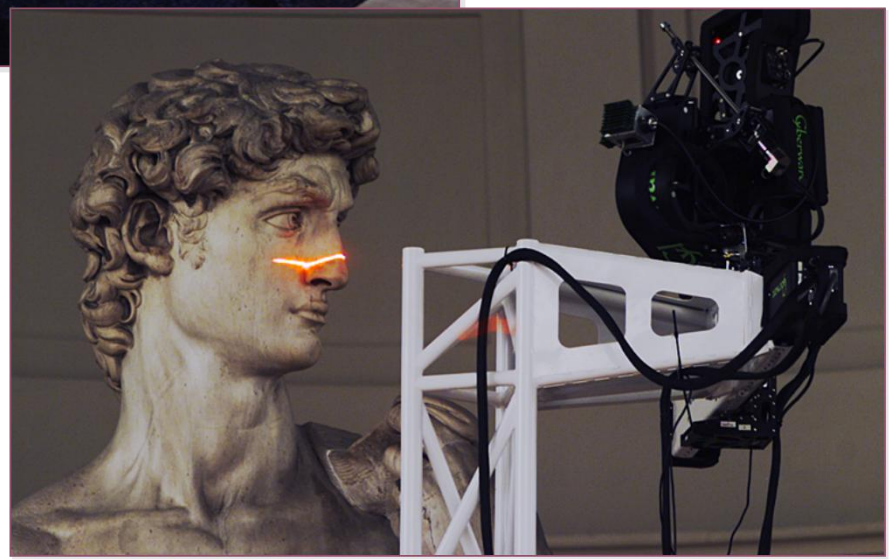
- **SCAN ARMS AND PORTABLE HANDHELD SCANNERS**

Capture multiple images continuously

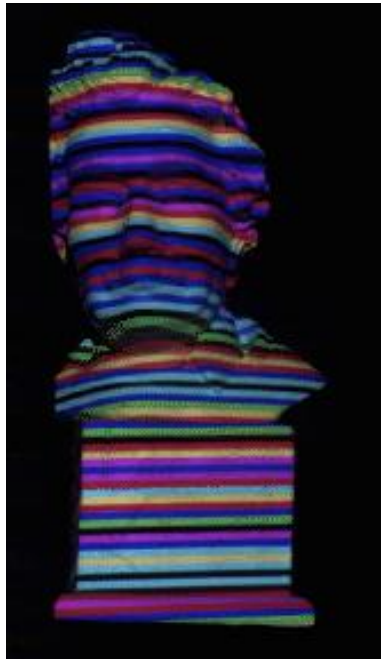
3D Scanning







Structured Light



- Any spatio-temporal pattern of light projected on a surface (or volume).
- Cleverly illuminate the scene to extract scene properties (eg., 3D).
- Avoids problems of 3D estimation in scenes with complex texture/BRDFs.
- Very popular in vision and successful in industrial applications (parts assembly, inspection, etc).

For more on 3D scanners
Please go through each of the link for better understanding .....pls !

- https://arrival3d.com/what-is-3d-scanning/
- https://www.creaform3d.com/sites/default/files/assets/technological-fundamentals/ebook1_an_introduction_to_3d_scanning_en_26082014.pdf
- https://graphics.stanford.edu/talks/3Dscanning-3dpvt02/3Dscanning-3dpvt02.ppt
- http://www.cimtecautomation.com/promo/pdfs/EBOOK_A_Simple_Guide_To_3D.pdf
- http://www.dirdim.com/lm_everything.htm
- https://www.slideshare.net/SkorpionEngineering/3d-scanning-and-reverse-engineering
- https://www.aniwaa.com/3d-scanning-technologies-and-the-3d-scanning-process/
- https://en.wikipedia.org/wiki/3D_scanning
- https://arxiv.org/pdf/1801.08863.pdf
- https://pdfs.semanticscholar.org/1565/dbd5fae9b785989a41d849248f3500c83628.pdf
- http://www.cs.cmu.edu/~16385/s14/lec_slides/lec-17.ppt
- https://www.cs.princeton.edu/~smr/papers/thesis/smr_defense.ppt
- https://www.slideshare.net/sunvision1234/3-d-laser-scanning-25508749
- https://artec3d-production.s3.amazonaws.com/pdf/ArtecLeo.pdf

Use Cases :

Industrial design and manufacturing

- Reverse engineering
- Quality control
- Rapid prototyping
- Aerospace
- Logistics

Applications in healthcare

- Healthcare
- Orthopedics
- Prosthetics
- Amputation
- Plastic surgery

VR/AR

- Content Creation
- Room scanning
- 3D interaction
- 3D analysis
- Gaming

Science and education

- Research
- Training
- 3D printing
- Online museums

Art and design

- Heritage preservation
- Civil engineering
- Architecture
- CGI
- Fashion
- Augmented reality

Engineering

- 3D Printing
- Smart Prototyping
- Reverse engineering
- 3D Deep learning
- Holographic projection

Logistics

- Inventory managment
- Measurment of Pack dimensions

etc .....

Current Players in 3D scanning in **all forms**

- 3D scanner market is expected to grow from USD 3.41 billion in 2016 to USD 5.90 billion by 2023, at a CAGR of 7.8% during the forecast period. Rapid technological developments, increasing application of 3D scanners in newer market segments, and rising adoption of 3D scanners to enhance product quality and reduce manufacturing time are some of the significant factors driving the growth of the 3D scanner market.
- Software & hardware providers are increasingly focusing on workflow enhancement and usage convenience; this is propelling the sales of 3D scanners.

Key players in the 3D scanner market

- Hexagon AB (Sweden)
- FARO Technologies, Inc. (US),
- Nikon Metrology NV (Belgium),
- Creaform, Inc. (Canada),
- Basis Software Inc. (US),
- Maptek Pty Ltd (US),
- Trimble Inc. (US)
- Topcon Corporation (Japan)
- 3D Systems Corporation (US)
- Perceptron Inc. (US)

Kreon Technology (France)

- Carl Zeiss Optotechnik GmBH (Germany)
- Shapegrabber (Canada)
- Fuel 3D (UK)
- Arctec 3D (Luxemburg)
- Capture 3D (California)
- True Point Laser Scanning LLC (US)
- Next Engine (California)
- Shining 3D Tech (China)

RangeVision (Russia)

- Exact Metrology (US)
- Trimet (US)
- 3D Scanco (US)
- Paracosm, Inc (US)

Latest report (Source)

- https://www.marketsandmarkets.com/Market-Reports/3d-scanner-market-119952472.html

Completely Portable 3D scanners (cordless)

Artec Leo

- https://www.artec3d.com/portable-3d-scanners/artec-leo

Calibry3d

http://calibry3d.com/

Drake

http://thor3dscanner.com/

structure

https://structure.io/structure-sensor

DotProduct3D series:

https://www.dotproduct3d.com/

Handheld 3D scanner	Technology	Accuracy*	Resolution**	Weight	Country	Price***	Buy
Shining 3D EinScan Pro 2X	Structured light	0.04 mm	0.2 mm	1.13 kg	China	$5,499	QUOTE
THOR3D Calibry	Structured light	0.1 mm	0.3 mm	0.7 kg	Russia	$5,790	QUOTE
Shining 3D EinScan Pro 2X Plus	Structured light	0.04 mm	0.2 mm	1.13 kg	China	$6,899	QUOTE
Peel 3D peel 2	Structured light	0.25 mm	0.5 mm	0.95 kg	Canada	$7,490	QUOTE
Artec Eva	Structured light	0.1 mm	0.5 mm	0.9 kg	Luxembourg	$19,800	QUOTE
Artec Leo	Structured light	0.1 mm	0.5 mm	2.6 kg	Luxembourg	$25,800	QUOTE
Creaform Go!SCAN SPARK	Structured light	0.05 mm	0.2 mm	1.25 kg	Canada	$30,000	QUOTE
FARO Freestyle3D X	Laser triangulation	1 mm	0.2 mm	0.98 kg	United States	$10K - $50K	QUOTE
Mantis Vision F6	Laser triangulation	0.5 mm	1.0 mm	1.0 kg	Israel	$10K - $50K	QUOTE
Creaform HandySCAN BLACK	Laser triangulation	0.035 mm	0.1 mm	0.94 kg	Canada	$50K - $100K	QUOTE

For More info :

- https://www.aniwaa.com/best-handheld-and-portable-3d-scanner/
- https://all3dp.com/1/best-3d-scanner-diy-handheld-app-software/#section-the-best-3d-scanners-under-1000
- https://www.dotproduct3d.com/uploads/8/5/1/1/85115558/dpproductlist-09092019.pdf
- https://www.creaform3d.com/en/portable-3d-scanners
- https://europac3d.com/3d-scanners/
- http://thor3dscanner.com/
- https://www.javelin-tech.com/3d/3d-scanners/
- https://www.laserdesign.com/products/category/portable-3d-scanners/
- https://proto3000.com/products/3d-scanners-software/

Portable 3D scanner proposal :

- Enough of info and prices .....
- What if a Completely Portable 3D scanner is made with **structured light** or **stereo structured light** or **LIDAR** and also with the **Deep learning Compute module** in it ?
- This gives the solution to a Cheap (< $800) and completely cordless portable 3d reconstruction system with HD 3D models output.
- Not compromising in accuracy (relatively same as costly ones)
- With power backup it can be carried anywhere
- Can be used by a lay man , without 3D scanning expertise

JETSCAN

Hardware

- Compute Module by Jetson platform(or any embedded GPU)
- Intel realsense range of depth modules
- Structure Core
- other depth modules
- TOF modules
- 9 DOF IMU module

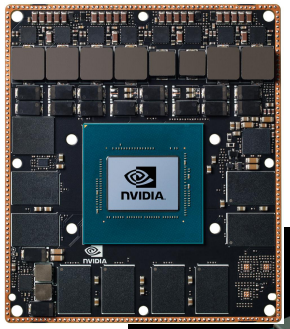
Software Stack

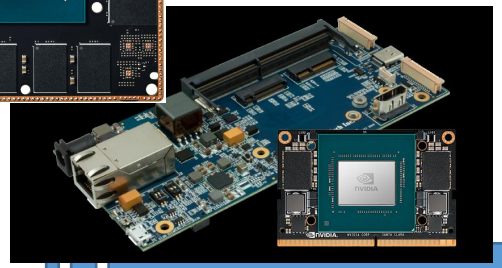
- High end 3D reconstruction available for GPU end
- Taking Full course of GPU compute
- Making it online or realtime 3D reconstruction
- Deeplearning based reconstruction for better accuracy

The Scanner / reconstruction system

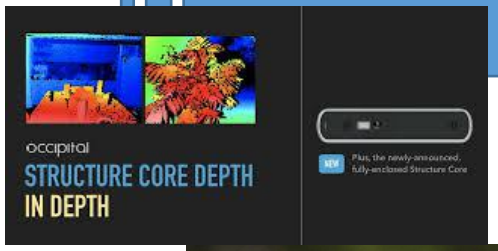
- Deeplearning on pointcloud (ex pointNet)
- Deeplearning assisted 3D scanner
- Real time or near real time 3D construction
- HD 3D models
- User freindly
- Highly custom modular approach

The Modular Stakes :





Hardware



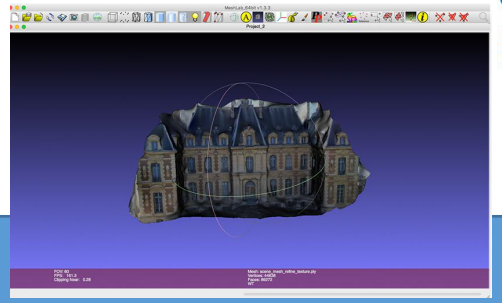
OpenGL

OpenCV

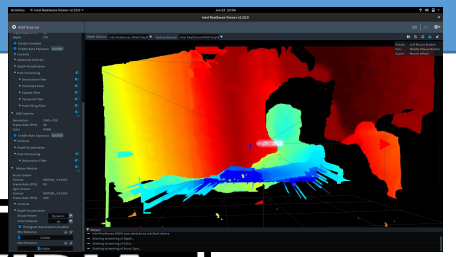
docker

OPEN3D

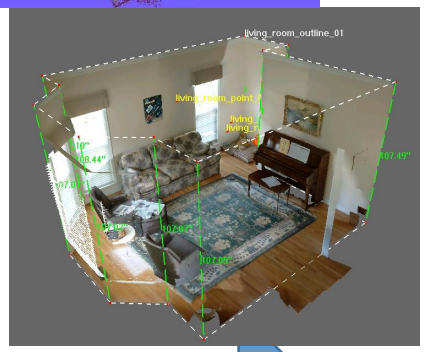
intel
REALSENSE
TECHNOLOGY



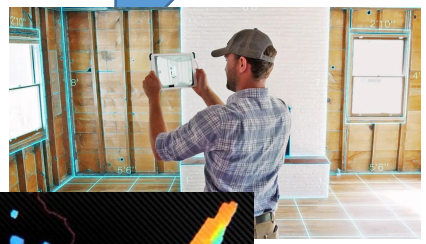
Software

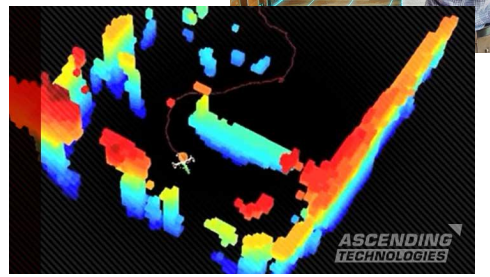


NVIDIA
CUDA

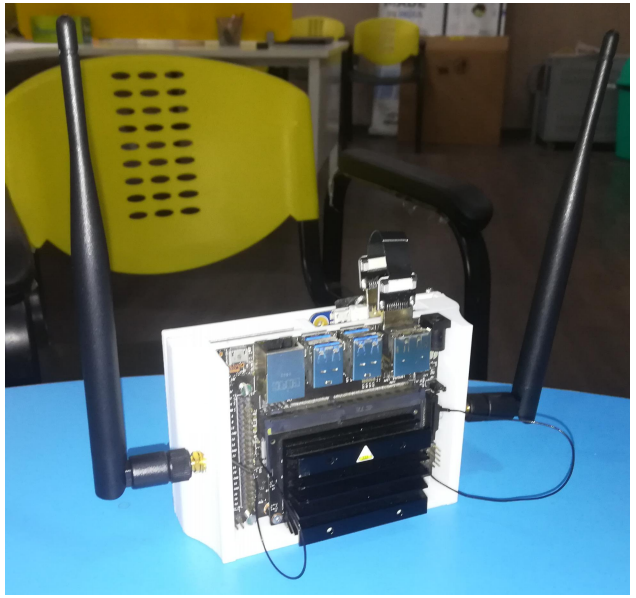


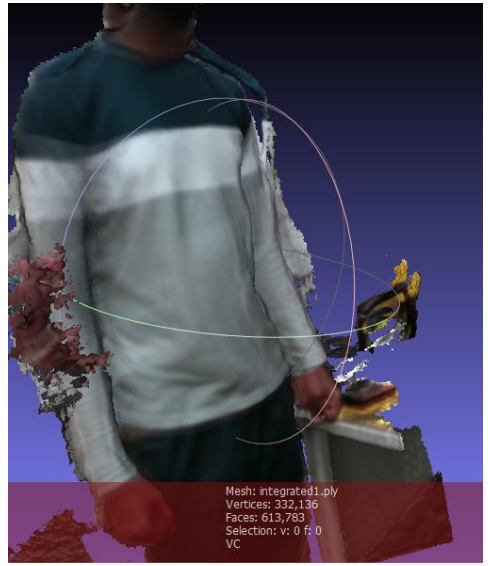
The Start .....





The Module and its Sample ……..





Made By
Shankar Hariharan K