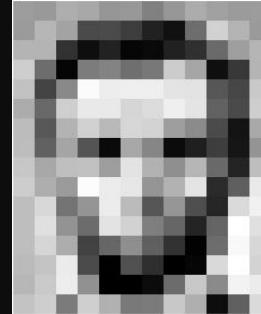


Machine Vision

Becca, Hongting, Xiwen

Machine Vision refers to the technology that empowers machines, particularly computers, to interpret and understand visual information from the real world.



157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	105	159	181
206	109	5	124	131	111	130	204	166	15	56	185
184	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	78	20	169
189	97	16	64	10	168	154	11	31	62	22	148
199	168	191	193	158	227	178	143	182	105	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	85	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	265	224
190	214	173	64	103	143	95	50	2	101	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	6	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218

157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	105	159	181
206	109	5	124	131	111	130	204	166	15	56	180
184	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	78	20	169
189	97	16	64	10	168	154	11	31	62	22	148
199	168	191	193	158	227	178	143	182	105	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	265	224
190	214	173	64	103	143	96	50	2	101	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	6	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218

DEFINITION

COMPONENTS

Image Acquisition

capturing visual data from the environment using cameras and other imaging devices

Image Processing

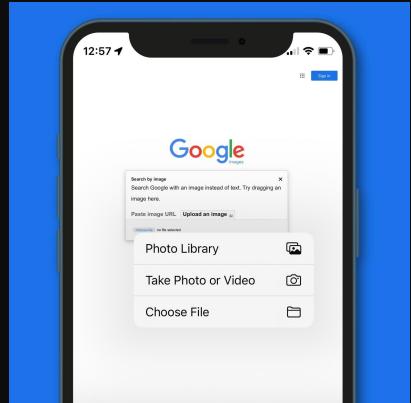
filtering, enhancement, and segmentation to improve quality of images and prepare them for further analysis

Feature Extraction

identifying and extracting relevant features from images, such as edges, corners, shapes, textures, and colors

Pattern Recognition

analyze extracted features to identify objects, recognize patterns, and detect anomalies within the images



Manufacturing

quality control, defect detection, and assembly verification, ensuring products meet rigorous standards

Automotive

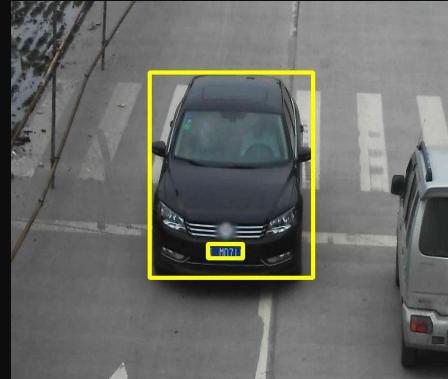
powers autonomous vehicles, driver assistance systems, and license plate recognition, enhancing safety and convenience

Healthcare

aids in medical imaging, disease diagnosis, and surgery assistance, improving patient care and treatment outcomes

Agriculture

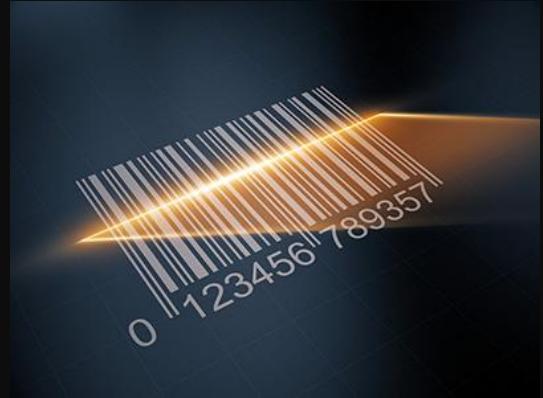
crop monitoring, yield estimation, and pest detection, optimizing agricultural practices for better productivity and sustainability



USAGE

Barcodes are machine-readable representations of data, typically used to encode information such as product identifiers, serial numbers, and inventory details

QR codes (Quick Response codes) contain more information than traditional barcodes and can store alphanumeric data, URLs, contact information, and other types of content



facilitate rapid and accurate data capture, enabling efficient inventory management, product tracking, and information dissemination

1966

The Summer Vision Project

1979

Neocognition

1989

Backpropagation

Computer Vision

80322-4129 80206

40004 14310

37878 05453

~~35502~~ 75216

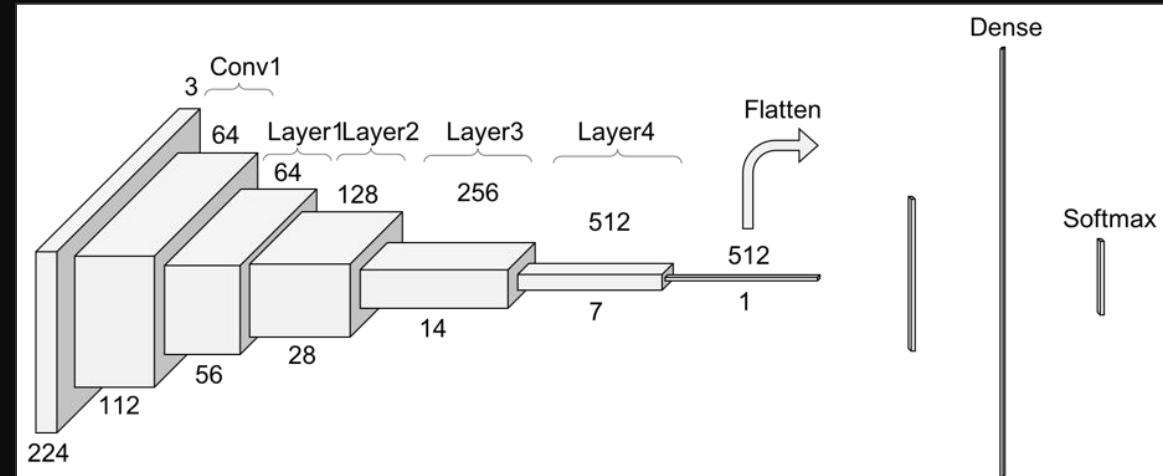
35460 44209

1998
LeNet-5

1999
Object Detection

2001
Face Detection

AlexNet, VGGNet, and ResNet

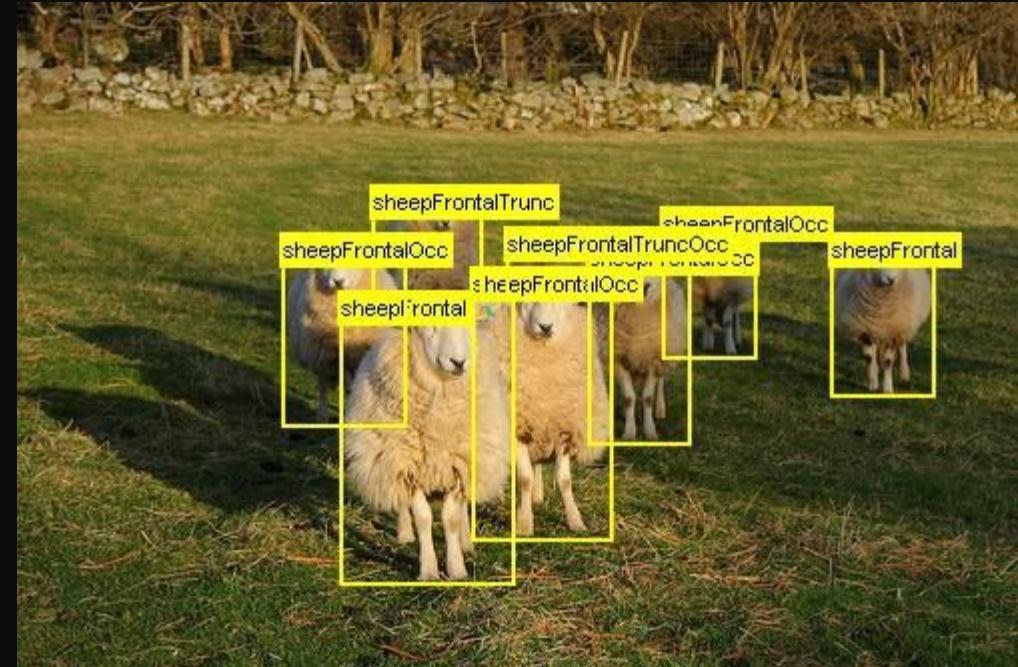


Computer Vision

2006
Pascal VOC

2010
ImageNet

2014
COCO



Computer Vision

"CV Dazzle" by Adam Harvey, 2020



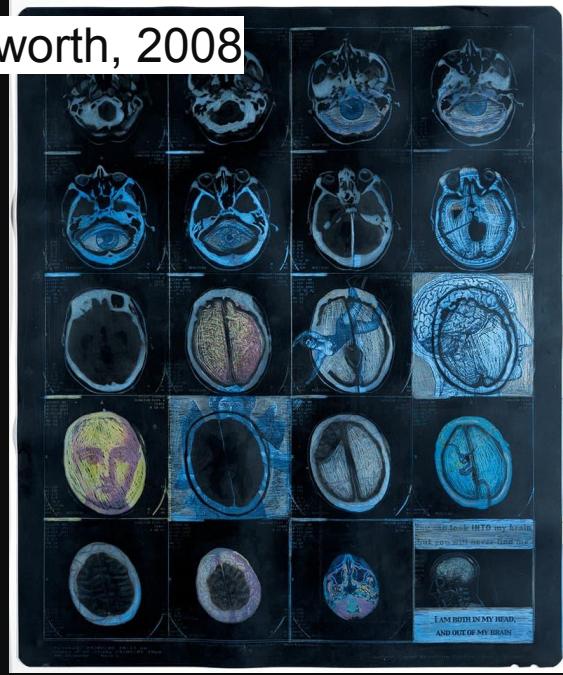
Facial Recognition

"Autonomous Trap 001" by James Bridle, 2017



Autonomous Vehicles

Cogito Ergo Sum 1, 2 & 3 by Susan Aldworth, 2008



Medical Image Analysis

"Unmoored" by Mel Chin, 2018



Augmented Reality

"AI: More than Human" by Memo Akten, 2018



Semantic Segmentation

AICAN + Ahmed Elgammal Faceless Portrait, 2019



Instance Segmentation

Machine Hallucination — NYC, Refik Anadol, 2019

AI DATA PAINTINGS & SCULPTURES
HALLUCINATION : NYC
REFIK ANADOL STUDIO



3D Object Recognition

Surveillance System

“Dragonfly Eyes” by Xubin, 2017



Joseph DeLappe's "Dead in Iraq" (2006-2007)



OCR

2009

Foundation of G3 (North America, Europe, Japan)

2014

Germany joined

2015

China joined

Industry Associations – The G3		Future Standards Forum (FSF)
AIA		Bob McCurrach (AIA) George Chamberlain (Pleora / AIA)
EMVA European Machine Vision Association		Jochem Herrmann (Adimec / EMVA)
JIIA Japan Industrial Imaging Association		Tsuneo Sakuma (Kirin Techno-System / JIIA)

Standardization

2023

Release of Glaze

2023

Release of Nightshade

Resistance

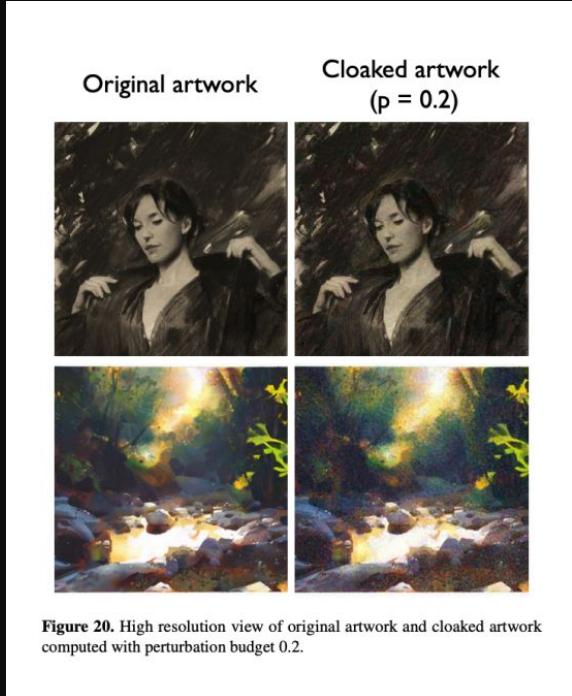


Figure 20. High resolution view of original artwork and cloaked artwork computed with perturbation budget 0.2.

HITO STEYERL,

***HOW NOT TO BE SEEN: A FUCKING DIDACTIC
EDUCATIONAL .MOV FILE, 2013***

Art work



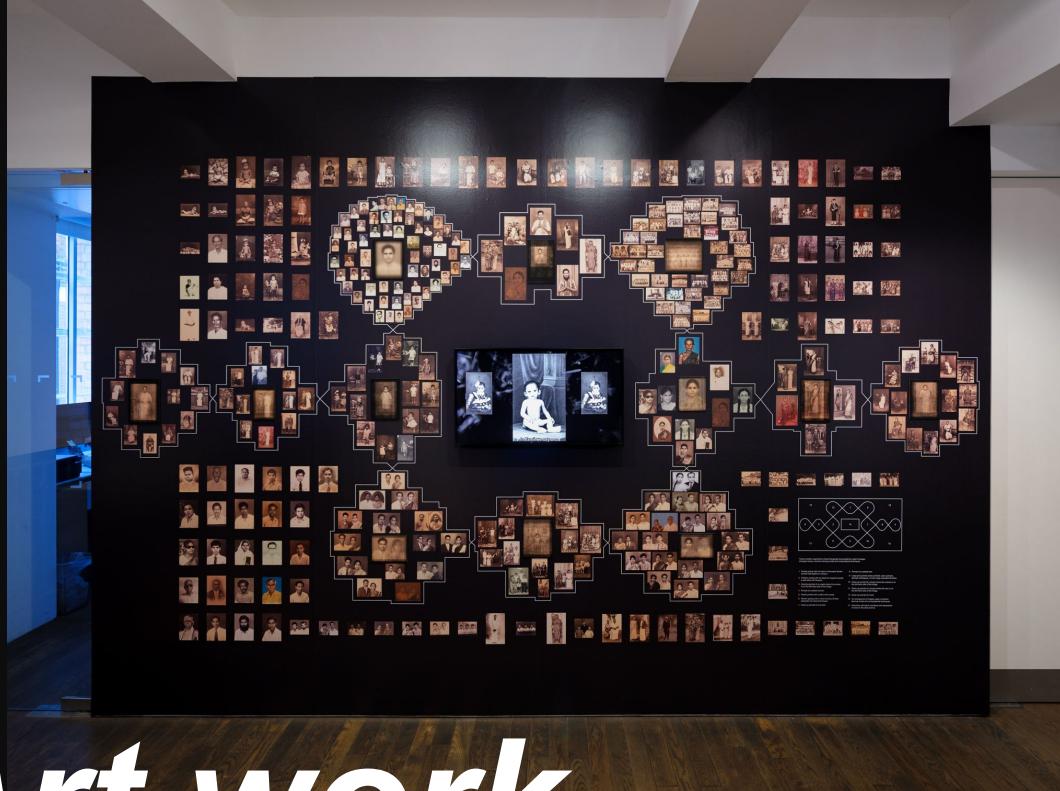
Alex Turner, Blind River



Art work

A·KIN

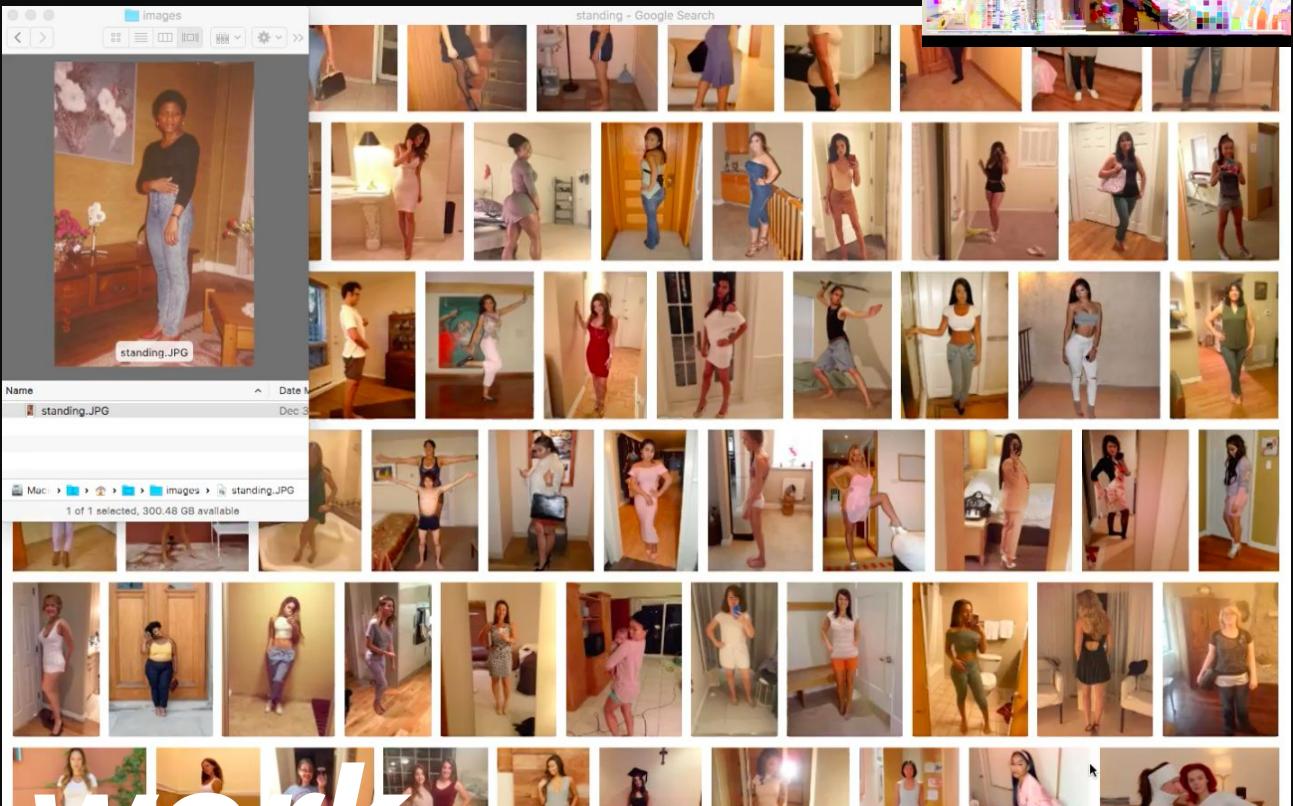
AARATI AKKAPEDDI



Art work

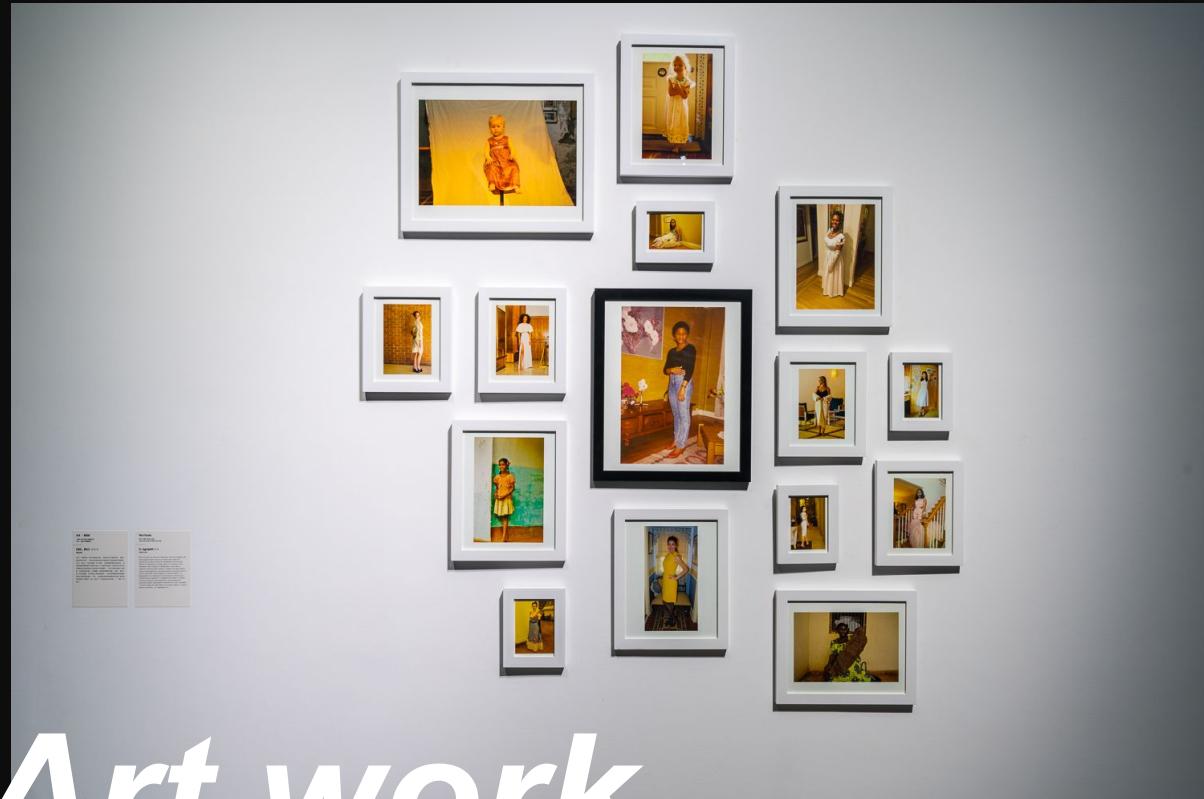
Us, Aggregated (2017)

Mimi Onuoha



Art work

Us, Aggregated 2.0 (2018)

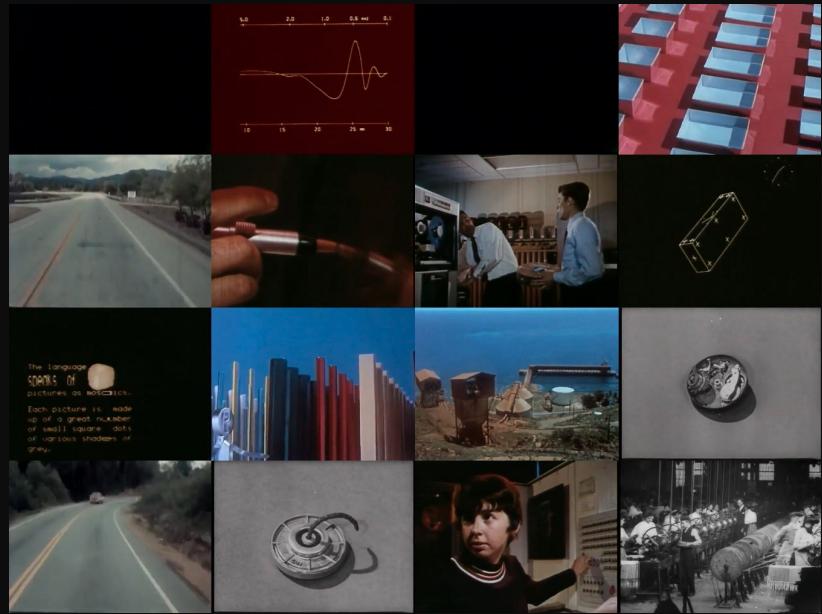


Machine Sees More Than It Says

2022

Video (color, silent) composed of archival footage and software

3:47



Art work

ASCII Art

Art work

"<`+ 3_...jdF.dgM10[!#gdH]00HC? '113?2?^P^" g;3%XV1VT!!1X1^
.,<\$kq;Uc10tHq0E1#)d~]19Hs;:mqqaaau, " " ~uJn7^!!1ZxV^
??~M 1e9d#n9QD<#KHM#EdYdE\da#UUU%1UwQr^Qk Mn7?Ag,?XvC=j,vZxxP
,xadUx - -1kXuH2d#8d#kdAFJfJ?#3#k_4QuaWQUMHRRH9AM80Uca379?<40XY?^
?Y?!,aqGr 'Uc10*4#P<PTUF,j@ IMJ1dONOPAP,u~WQ_JFd1z,t.^?Yg'
's,d0HY^,x_ - -U0#t1DX,djY3V2JR-Q5w-,:i#aQvdpNu~Se#Fk-dTz?;~!y`
aa#e~ jaHv~,atujYndY2F,YjDFJC =1?13VuhdPqjQEd#eFjPn25aYuwd/?,,
Q#P = -0P~jdP~aPae~jP\dfd1d#fdk*?adH21d@FjMfQe?jYp\dt j\hdz?1
?Y dj1UT:uPqd+jdP^jF,jd,jl=#R,iQ(jKjP=d#f3Uf+j0F9"jYjX^<P\k^
^~3de^d^j#iU^o#P JY,jP1WE1FC^<U(ck?##WaI_wDckdE [1_3rJ/a=^
dJMF :0P^iME^C^jFqP,jc3D,JM1IE<19k#0<4C4EQs#F JMF .dE 4E] <C<MK
WV^,jde^ldh^iOP^j~jQF1?UE^?1Q_?^1:Ud[1MAJQd#H#as9Qk dP U:JL?g\5z\,
W_jY,jd^#qQMeqe:jM^jX#E-9#<Z1JK#kKH1u#U??"Y9P,zj;P^jE 3E 1/L'1g^
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OpJ#et^de^QJt#:j#[1#Q1tJQ#FqCoMz?"#0Q0Awd42Hdne1uk Je1!r^
@ q#^d^OF-VU#K^JU:#Q_4/3#FjQ0<5#qax?90#Q#9A?#ms9#<3]J]sr
=U#F#=j@^#0K^Q[kkH#1^k1P3wPSg51WQ0a-YM0#kQs19#C]JUL.L!L,k]
M#Grdvd[~J0R^#x#tss1WQ_TQwxD#car+uQ#0#0QnXU1Y?#0z38f98,X1(k2=
j#^=V3#[11QO<]##g!9#[4#e]UQE]UK=19eYY9#&bxi1N?UQz29bZQl}3*x=
Q#P^dQ#o[1]Q#l=]##b-d]Q#]#D#M#WQFS<?N1;iaQMQQAxo?RaNLJG<V41.
#ef# JUM]Qb-b-:HOOL]!k#?#000E1D0Ce?t:d#d#0#0#H#Ss?H07#MrCVt*
#e' ! #bb#d3##D ^<]U#r9#0(3#b#(UQe3B)P3:#tY!#?W#0#QgdHb3G3b]31c
#e=dQ0E# .#b0L=V 3###a.##\$z90#50#tJL'6cHMMVPH1)WOTYH8{1YH4(9zVVK
Mf=^JQ#['dD#tM ^'H<<Q0Qg9Q]#>40F?(dUTh;aGm;Q i Y)sVsTqaadrr
Q13#4#b=-###a_-=?0## Y##x#?30#L4#F=S_~Ujd##M#VY!uQ#QqqQWQ0Mn
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#ce*]Q#Qa_ <9##0#Qa_29000QUUVmUz?9#fN9tH"YHMYT???';snd{?93%TT\$
#K1V?h##QD#r0Q?####\$a_?HeYSUY-' JF#R4(D=r.,aaqUQAndDV31d>3N3<1Q3k

ADVANTAGES

Increased Efficiency

automation of visual inspection improves operational efficiency and reduces the need for manual intervention

Enhanced Safety

detection of safety hazards in industrial environments minimizes risks and ensures a safer working environment for employees



Improved Quality

consistent and accurate inspection results enhance the quality of products and processes

Cost Efficient

reduction in manual labor and production errors leads to cost savings and improved overall profitability

CHALLENGES

Complex Environments

handling variations in lighting, texture, and occlusions poses challenges for machine vision systems, requiring robust solutions to ensure reliable performance

Initial Cost

initial investment and ongoing maintenance costs associated with machine vision systems can be significant, particularly for smaller scale projects

Scalability

adapting machine vision systems to different applications and environments would necessitate careful planning and allocation of resources

Ethical Concerns

privacy implications of surveillance and facial recognition systems raise ethical concerns, necessitating responsible deployment and regulation

