

The background features a lush green tree with dense foliage on the left side, which fades into a white background on the right. A network diagram, consisting of interconnected nodes and lines, is overlaid on the bottom half of the image, extending from the left edge towards the right.

AI, Applied

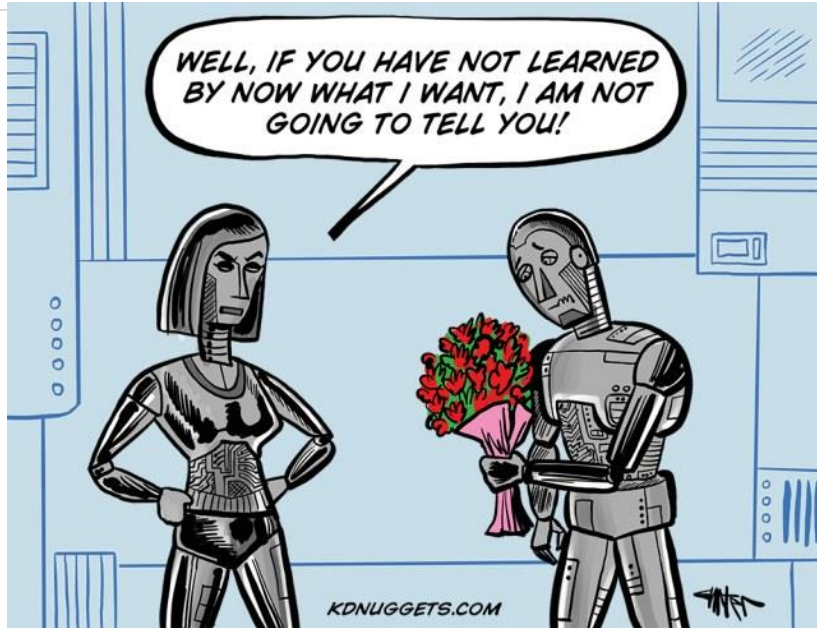
Contemporary uses & cases

Prof. Ramesh Loganathan, IIIT Hyderabad

Speaking at MCRHRD

Feb 2020

Learning is at core of Human Intelligence

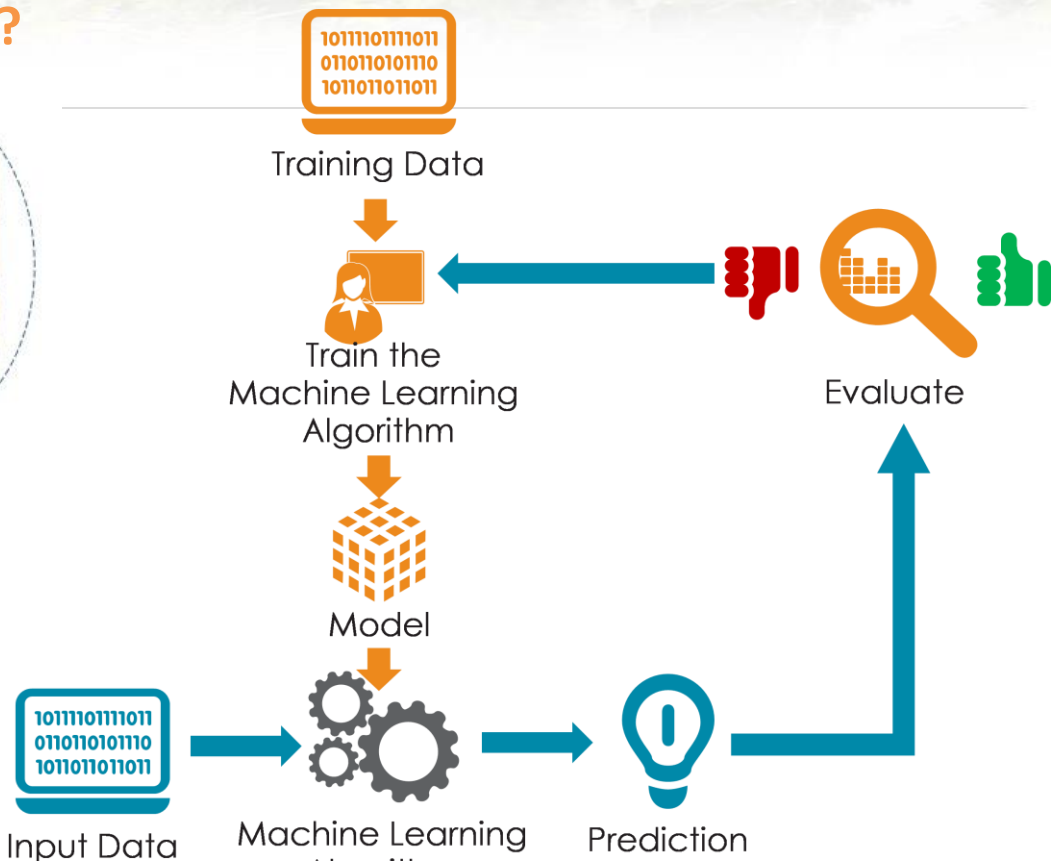
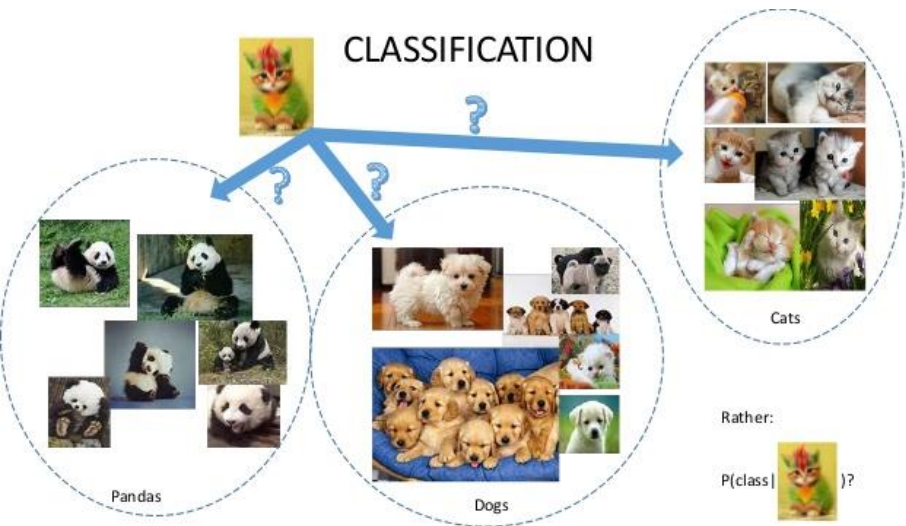


Children learn languages just like that.
By 'observing'.

- That's exactly kind of behavior that we are trying to teach to machines. We are trying to teach machines to ***“Learn from Experience”***.

Machine learning.. Core to AI!

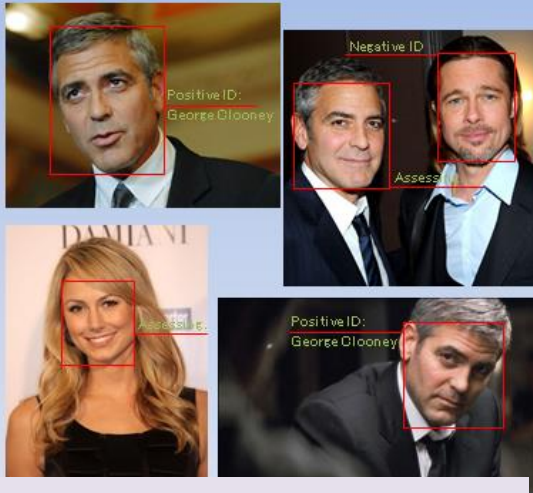
How does Comp Vision ML work?



Different types of Machine Learning...

Past Data is used for Machine Learning

Supervised Learning



“Supervised learning is the Data mining task of inferring a function from labeled training data.”

Unsupervised

Unsupervised learning is a type of machine learning algorithm used to draw inferences from datasets consisting of input data without labeled responses.



Reinforcement Learning is a *hit and trial* method of learning. The machine learns good (Reward) or not good (Penalty) for each action it performs.

Learning from mistakes



We learn
from
mistakes



Deep Learning

Deep learning is a machine learning technique that teaches computers to learn by example

Examples:

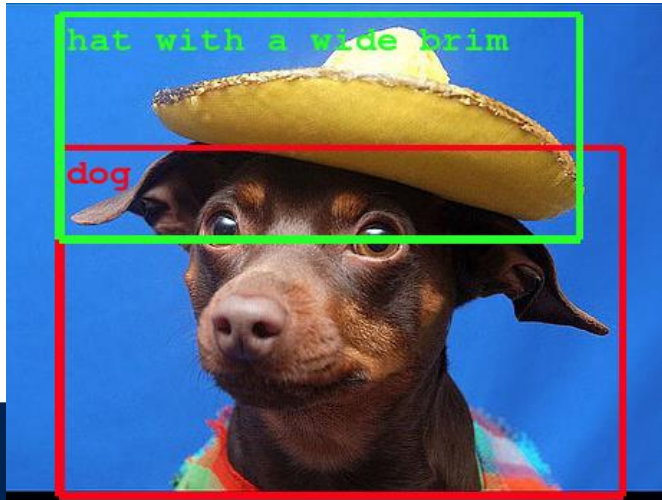
Colorization of Black and White Images.

Object Classification in Photographs.

Image Caption Generation.



"man in black shirt is playing guitar."



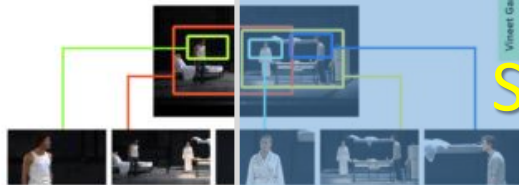
IIIT Hyderabad's Research group on AI



Largest Artificial Intelligence (AI) Research group in the country. Leading for Comp Vision & NLP

Computational Imaging

Computational cinematography



CVPR 2013, CVMP 2014
Patented in France,
European patent pending

- Single high resolution camera covering the entire actions
- Virtual pan/tilt/zoom camera in real time
- Automated editing

360° Stereo Video Camera



- Single camera to capture panoramic videos
- Unique mirror facilitates a set of virtual cameras, allowing stereo capture
- Unwrap the captured image to recover two 360 degree videos
- Set up a company to produce the work

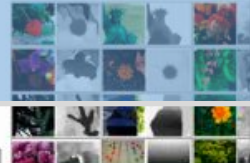
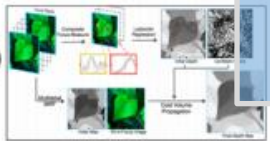


Safety & Security

Traffic monitoring & Violations

Road conditions

Depth Capture for All



Depth from focus
Capture multiple focal slices
An effective focus measure
Efficient pipeline

Depth capture practically
in everyone's hands!!

ICCV 2017

Synchronized Capture of Mobile Cameras



SynCam
An end-to-end system for seamless sub-frame multicamera media capture for mobile devices
Everyone has cameras
Groups can do more collaborative things



HDR Video

3D Capture

4D Performance Capture

- Impact/Applications
- Interactive AR/VR Environments
 - Heritage Preservation
 - Medical Analysis (BVI, Gait)
 - Sports Analytics
 - Animation Industry

- Problem
- Aim: Capturing human bodies in motion
 - Research challenges: Complex body poses (topological noise, self-occlusions), Real-time performance, Complex Clothing
 - Desired: Real-Time, Textured 3D models from a few Kinects



Split screen Video Generation

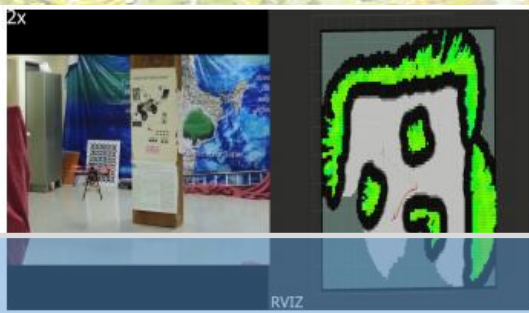
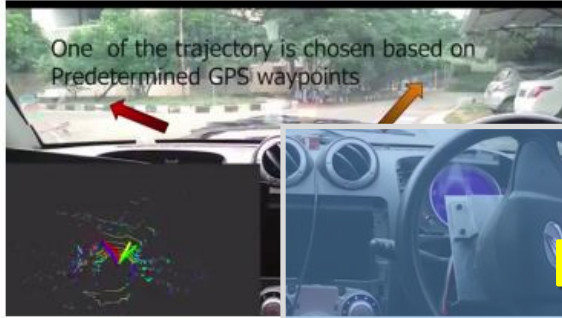


Eurographics 2017
Patent Pending

- Focus + Context
- No editorial decision
- Easily automatable
- Staged performances for aurally challenged



Robotics



Demining Robot

Autonomous Mapping for a Payload Carrying Drone

Autonomous driving on campus roads

Driver Assistance: Single Camera Reconstruction of Moving Vehicles [ICRA 17, IROS 17]

Disaster recovery

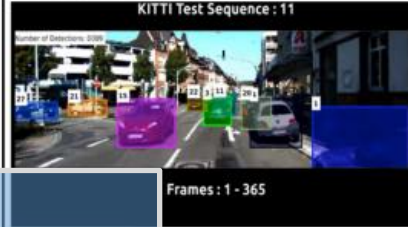


- Very Difficult Problem, as per [18, 19].
- Typical solutions involve 3D range sensors
- Single camera a viable alternative.
- Currently best results on KITTI datasets

The numbers on top of the car in yellow indicate depth as estimated by a single camera 3D reconstruction shown as wireframes in RED

K Madhava Krishna

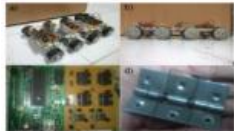
Driver Assistance: Tracking Moving Vehicles in Cluttered Traffic



K Madhava Krishna

- Extremely difficult to get consistent tracks of vehicles
- Handles occlusions seamlessly
- **3rd best solution in the world currently on KITTI dataset**
- **1st among universities on KITTI dataset**

Novel Robotic Mechanisms: [ICRA'14, 17, IROS'17]

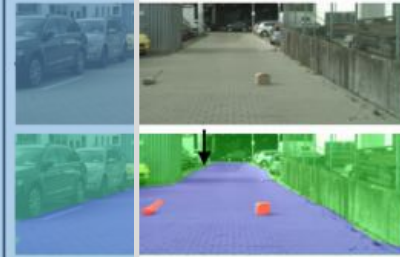


- Can climb steep vertical obstacle
- Can climb stairs
- Can detach itself to become multiple robots on a level plane
- Can attach itself to become a stair climber
- **Technology transferred to DRDO lab**



K Madhava Krishna

Small obstacle detection



- Autonomous driving in Indian conditions
- Semantic segmentation trained from just 100 images
- Our solution beats the benchmarks set by Daimler on their dataset

Vineet Gandhi, Madhav Krishna [submitted] ICRA 2018

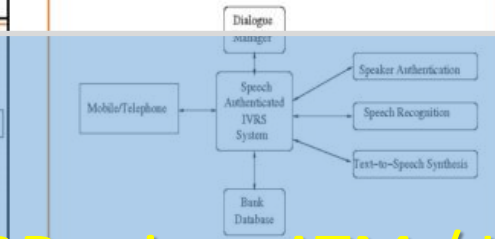
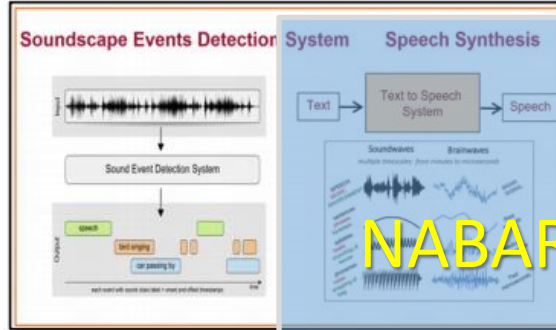
KCIS Governing Board Meeting



36

Speech, Machine Learning

Multilingual Voice-based Mobile Banking



Analysis of Lane Level Dynamics

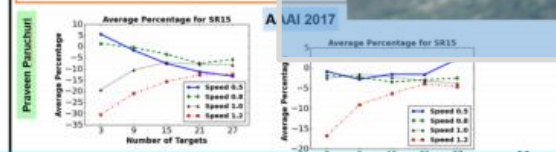
- Slow moving traffic in heavily populated cities is a major issue
- Recent advances in ITS can make things better
- We introduce BLS algorithm to optimize lane level dynamics



NABARD micro-ATM / Indian languages

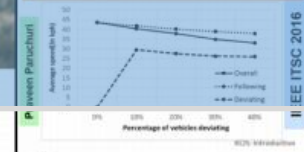
Improving Surveillance using CTO

- In large gatherings/protests, #people possibly considered suspicious (targets)
- Micro drones aim to perform surveillance of maximum number of targets
- Explore-Exploit with Adjustable Randomization



Traffic Patterns in Emergency

- Police have lot more information during traffic emergency
- Police may prescribe routes but humans may not follow
- Analyze the effect of human behavioral factors and biases



Deep Reinforcement Learning for Robotic Servoing, Puzzle Solving

- Visual Servoing : Allows Robot to focus Camera on Object of Interest.
- Ongoing : Subham (RA), Girish Varma, CV Jawahar



- New Benchmark for Puzzle Solving using Machine Learning
- New Deep Reinforcement Learning Solutions
- Ongoing : Momammed, Pranav, Vidit, UG, Girish Varma



NLP and Text Mining

Mining Research Trends



Published @ AAAI, WWW, ICDM, etc.



- Help researchers explore significant trends in the growing collection of research papers, topics, conferences, and authors.
- Solution includes paper2topic, paper2paper, paper2problem, paper2similar papers, competing algorithms, recommending papers, topics and collaborators.

Information extraction and summarization from large set of documents

Hate Speech Detection

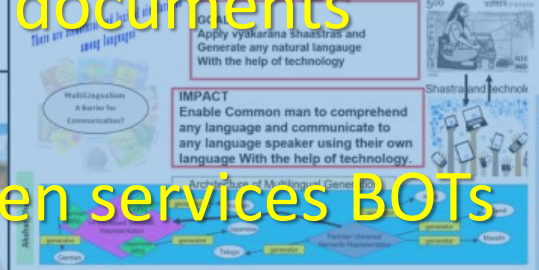


- Detecting the sources and content of the Hate Speech in social networks
- Automatically filtering Hate speech content and analyzing public sentiment to get to the root of the problem
- Challenge: Inherent complexity of the natural language constructs: Different forms of hatred, Different kinds of targets, Different ways of representing the same meaning
- Solution: Deep learning Based approach

WWW-2017 Best poster award

- Automated filtering of tweets in large systems
- Filter tweets before content recommendation/learning AI chatterbots from tweets
- Prevent violence due to abusive language in public

Paninian Applied Grammar (PAGrammar)



Advanced Document Summarization and Repurposing



- Create a summary of documents that is closer to what a human might express
- Make use of deep-learning-based models to learn representations for large documents
- Incorporate local as well as global document features to capture the saliency of sentences
- Create readable as well as topically and structurally coherent summaries
- In collaboration with Adobe

CIKM 2017 and AAAI 2018

- Applications
- Gisting of high volume product/service reviews
 - Sentence compression and headline generation
 - Event understanding and timelines
 - Automated question answering systems
 - Content generation for search engine results



Computational Journalism

- Discover patterns in a users' reading behaviour for news personalisation
- Leverage news content for better recommendations
- Automatically identify unconventional news (Fake News, Bizarre News)
- Summarise news in multiple languages
- Translate news from one language to another for quicker spread



CODS-COMAD 2018, ICDM 2017

- Applications
- Automatically cater to users needs using implicit information: dynamically adjusts to users changing behaviour
 - Recommendation approach which is language agnostic: useful for multi-lingual news aggregators
 - Prevent spread of fake news: provide users with authentic content
 - Faster spread of important events across the globe



Computational Humor

Radhika Mamidi

Understanding humour



Event: Christmas
Illocutionary force: Greeting
Language: Bilingual

Punning technique: Compounding of two words X-mas and maska 'butter'.
Resolution: Yule referring to Christmas and 'You'll' as in 'You'll love it.' 'It' referring to butter.

Humour Generation

Two examples of jokes generated by our system are:

1. Dur se dekha to Obama tha, dur se dekha to Obama tha, paas jaake dekha to pajama tha.
2. Dur se dekha to Mussadi tha, dur se dekha to Mussadi tha, paas jaake dekha to fissanadi nikla.

KCIS Governing Board Meeting

Every sector has AI applications



AI AND BANKING

FEAR NOT

TOP REASONS BANKS USE ARTIFICIAL INTELLIGENCE



DATA ANALYSIS
& INSIGHT

60%



INCREASED
PRODUCTIVITY

59%



COST BENEFITS
/SAVINGS

54%

ARTIFICIAL INTELLIGENCE PAYS OFF FOR BANKING

CONNECTS
THE DOTS



AI computes and connects data sets to help banks make smarter, data-driven decisions.

IMPROVES
CLIENT EXPERIENCE



AI helps streamline customer interactions (such as applying for a loan) by removing manual steps.

AI EMPOWERS
EFFICIENCY



AI isn't robots eliminating jobs. It helps bankers use data to be more productive and efficient.

Financial..Banks

- SOP quick ref
- Credit scoring
- KYC
- Loan processing

SNEAK PEEK INTO AI & ML STARTUPS AT IIITH

YOURSTORY




SocialStory SMBStory YourStoryTV More ▾ Language

STARTUP

Meet top startups from IIIT-Hyderabad's CIE - Avishkar Deeptech and MedTech Programme

IIIT-Hyderabad's Centre for Innovation and Entrepreneurship (CIE) is known for its accelerator programme that focusses on deeptech startups across different sectors.

By **Sindhu Kashyaap** 8th Sep 2019

102 claps   

0:00 / 7:07

The Centre for Innovation and Entrepreneurship (CIE) cell of IIIT-Hyderabad has announced **the success of the eighth cohort of Avishkar Deeptech and Medtech Accelerator Programme**. Every year, the programme shortlists a few startups and offers them with mentorship and support.



Diagnostics

Warc

Onward Health

- Automating medical diagnostics. Starting with Oncology Histopathology

Doctu S'ir

Docturnal

- Diagnosing from the sound of cough. Started with TB.




Rady8

- Tele diagnostic and eye health reports using a mobile based solution

Servicing customers

Scholar



Solutions

ty

QUESTION

Available 24x7

Play

Scholar is an academic platform to get most accurate solutions to all academic questions. Get instant answers to questions from homework, assignment and ...

Answerwise



Hey, I've placed my order for pizza but would like to cancel it. Can I get a refund?

Hi! You are eligible to receive 40% (\$8) of the order value as refund on this order.

You can read more about our refund policy [here](#).

Would you like to go ahead with your refund?

- AI Powered Customer Service
- ...existing helpdesk and CRM systems to provide instant query resolutions,

DAVE.AI

DAVE

Customer information chat bots

Listen. Speak. Decide.

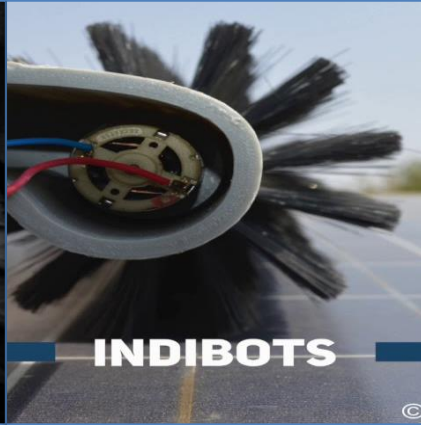


CyberPhysical systems..



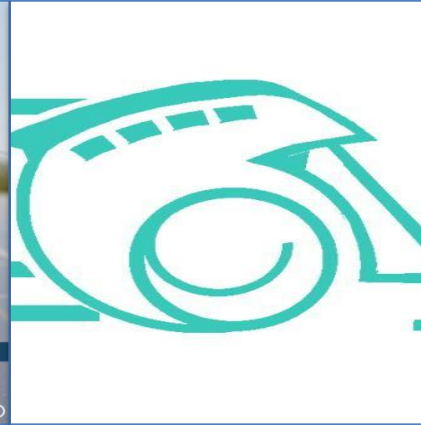
Xmachines

- Robotic vehicle platform for custom solutions



Indibots

- Solar panel cleaning robot



Altor

- Smart helmets



Thanos.. Pesticide spraying

- Drone based solution. To leverage CV to identify exactly where pests are

Healthcare



Nexrea

AR & AI powered sales & service solution for Medical equipment

Logy.ai

Intelligence in Pathology- to improve pathology workflow. Starting with cervical cancer

Nano health

Manage chronic diseases like diabetes, hypertension through a health coach tech

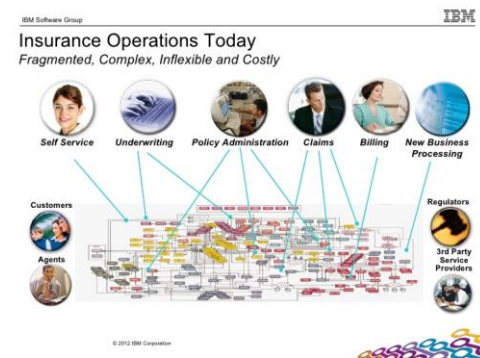
Insurance claim processing

Automatically process images, Extracting discharge summaries and text from reports



NanoHealth

logy.AI



Co-creating deep-
IP startups,
imperative to bring
more tech to
market



Thanks

Ramesh.Loganathan@iiit.ac.in



'Creation'

1. Reenacting politicians

A group from the University of Washington created a system that uses audio and synthesizes it with lip motion of a face in a video. The video shows quite a striking example of Obama. [Here is the original paper.](#)



PM, speaking .Mann Ki Bath' in
15 Indian languages

2. Restore colors in B&W photos and videos

Don't like black and white images? No worries, "[Let there be color!](#)" is a computer system that can automatically restore colors in B&W photos. You can read more about it [here](#) and see plenty other examples [here](#).



This is the crazy face-aging app that's taking social media by storm

Andy Meek [@oomeek](#)
July 17th, 2019 at 12:53 PM

Share

Tweet

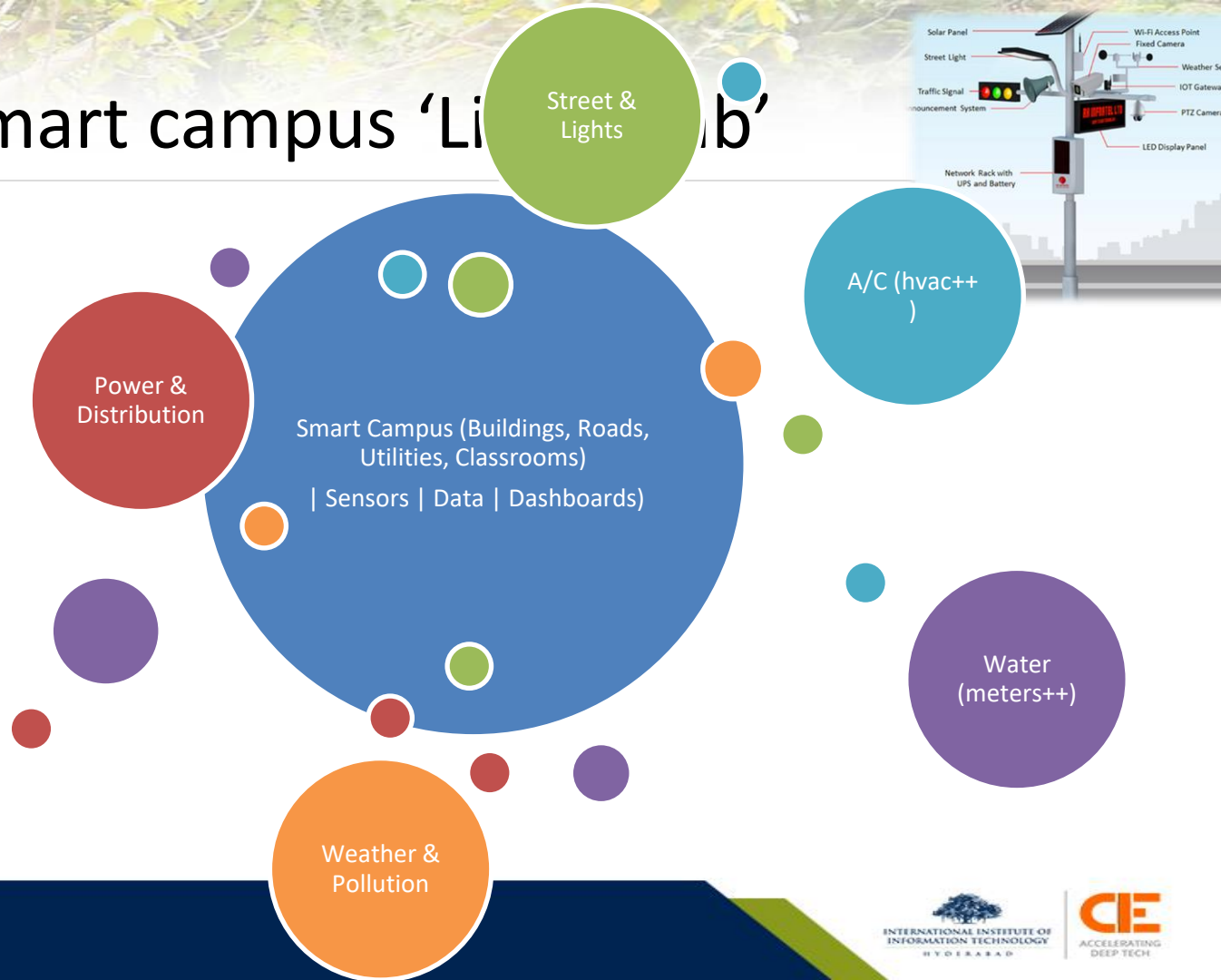
If you've opened any of your social media accounts over the past several days, you've no doubt seen a procession of old, wrinkled yet slightly familiar-looking faces taking over your feed.

Areas of healthcare that AIML TIH will enable

- Diagnostics
 - New algorithms/techniques for diagnostics
 - Point of care diagnostics (remote/tele)
 - Precision diagnostics
 - Low cost / rapid disgnostics
- Health service optimization
 - Ayushman/Arogyasri insurance service optimization
 - People & Facility use optimizations
 - Supply chain optimizations (medicines, ..)
 - Asha workers' efficacies
- Person/village specific 360 degree health & social strategy
 - Culture/geo specific interventions
 - Equitable benefits distribution
 - Vulnerable groups
 - Insights from seemingly unconnected datasets (poverty, NFHS, census, DLHS, literacy)
- Proactive (Preventive++) public health
 - Risk profiling & 360 degree view of data
 - Data based targeted preventive measures
 - Predicting outcome of health initiatives
 - Contributory effects of broader Ecosystem
- Treatment protocols discovery
 - New treatment models From data (Thru understanding disease mechanism, biomarkers, other data)
 - Multi-sensor based treatment models
 - Models from Genomics /other data
 - Bio/Chemistry models

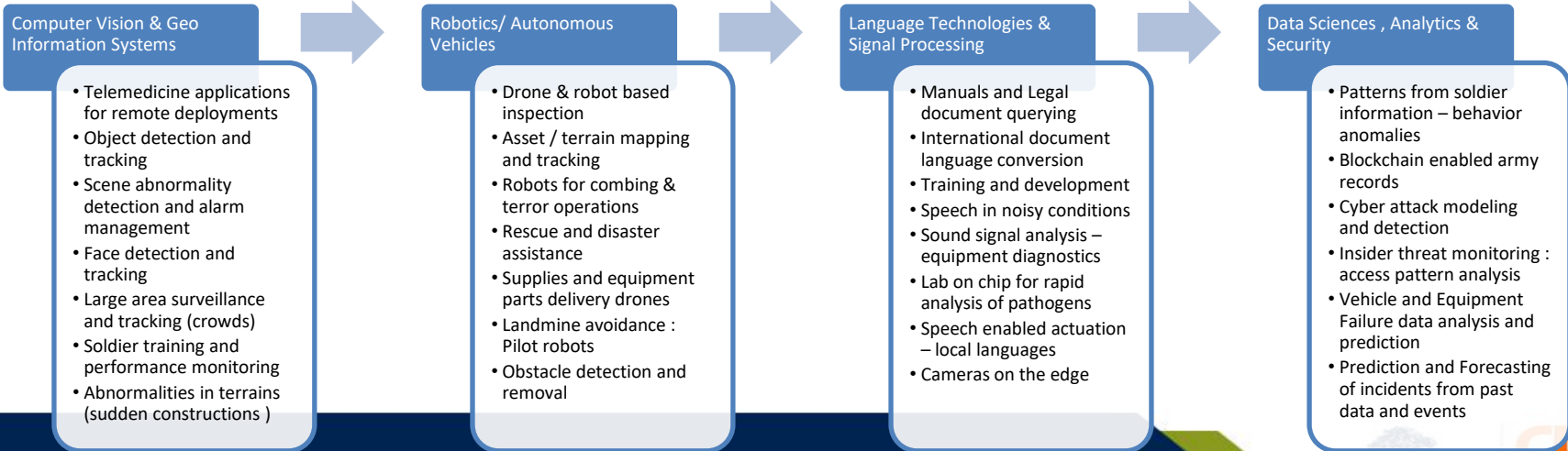
Smart campus 'Living Lab'

- The campus will be wired
 - 'Living' demo setup
 - Smart campus. Smart poles.
 - Network/Utilities:
 - For research & startups
 - Data- with models
 - Per OneM2M standards
 - Living Lab: POCs
- Plan: Phase 1:
Dec 2019



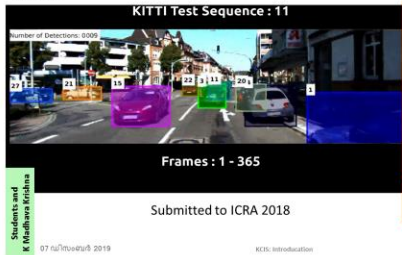
Strategic sector (Defence++)

- Artificial intelligence is now an essential component of defence and security strategies globally — from combat systems to operational processes. It is essential for india to harness the potential of AI to transform all functions in an affordable, effective, and enhance speed of defense operations.
- The use cases for AI in defense and internal security are many fold. AI can be embedded into weapons and surveillance systems to enhance performance. It can be used to improve target recognition, combat simulation and training, and threat monitoring. It can be used in logistics and transportation systems, to help the military get the right equipment and people to the right places at the right time.



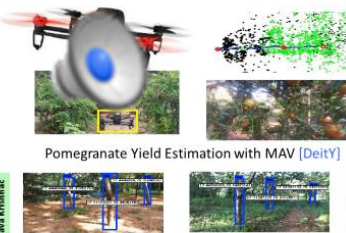
Indicative products, from Robotics

Driver Assistance: Tracking Moving Vehicles in Cluttered Traffic

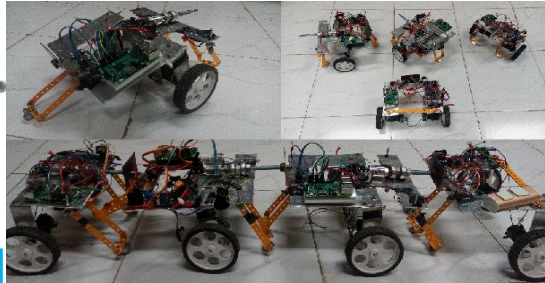


- Extremely difficult to get consistent tracks of vehicles
- Handles occlusions seamlessly
- 3rd best solution in the world currently on KITTI dataset
- 1st among universities on KITTI dataset

Micro Air Vehicle Initiatives: Environmental Audit [ICRA 16, 17]

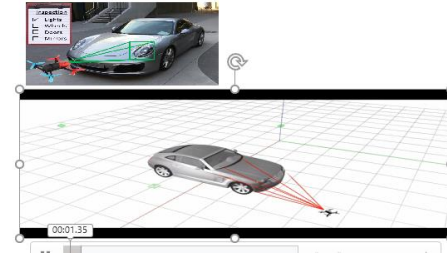


- Using drones to count fruits in orchards, trees in a vegetation
- Localizing trees with GPS coordinates
- Working towards automating the drone for such audit tasks
- Immense potential in forestry and agriculture
- Two patents pending



Stair and pipe climbing robots

Automated Parts Inspection



Self Driving Car Development



Obstacle avoidance maneuver of self driving car in collaboration with a major private company

Senses

Restoring touch



In a landmark event announced Thursday, researchers revealed that a paralyzed man's feelings of touch were restored with a mind-controlled robotic arm and brain chip implants. [[Bionic Humans: Top 10 Technologies](#)]

Customer service
calls- Abusive
Language and Anger

HUMOR
SARCASM

Where next

7:53 39.4 K/s 88%

Google

ai in 2025

ALL NEWS IMAGES VIDEOS MAPS SHOPPING



The **artificial intelligence** market is forecasted by Research and Markets to grow to USD 191 Billion by **2025** from USD 21 Billion in 2018, at a CAGR of 36.62% during the forecast period. ... China is investing tens of billions into **AI**. These larger investments should accelerate the growth and adoption of **AI**.

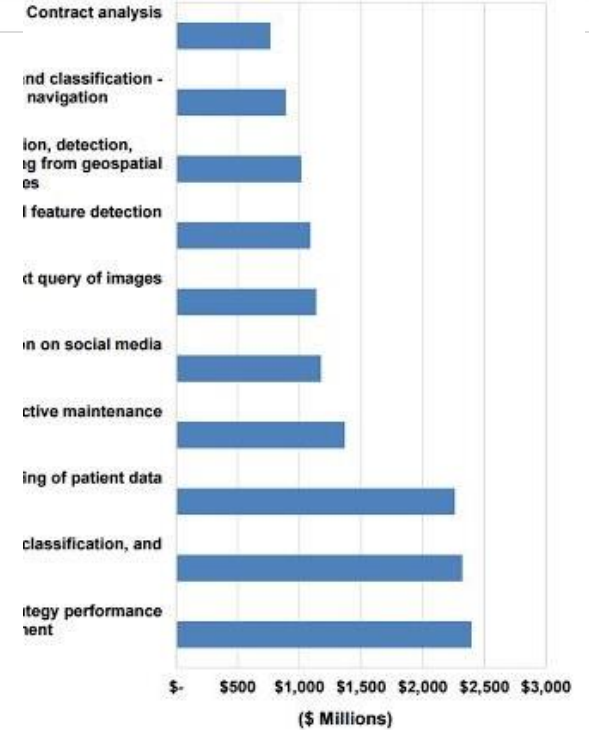
<https://www.nextbigfuture.com>

\$191 billion estimate for global AI in 2025 could be an underestimation ...

About this result Feedback

VIDEOS [View all](#)

Revenue, Top 10 Use Cases, World Markets: 2025



(Source: Tractica)

Cognitive Science, Others

360° Display: Cognitive Ergonomic Study



- Developed 360-degree virtual simulation
- Assess tele/ remote spatial awareness, Local Area Awareness (LAA) and Local Situation Awareness (LSA)
- Challenges using desktop & VR 360-degree displays
- Develop Cognitive – Ergonomic Profile and Battery for testing dynamic environments
- Develop Training Protocols

Supported by INMAS, DRDO and DST funding

Structural and functional brain-markers that predict rehabilitation success



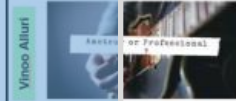
In collaboration with National Institute of Psychiatry, Mexico
 Symbolic Institute of Technology

Truck drivers safety

Deep Learning with Music

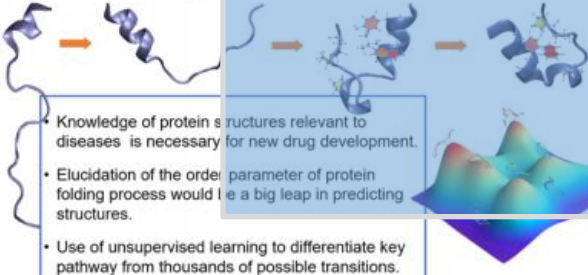


Can we classify "musicality" based on brain data (sMRI + fMRI)?



also: + and =

Protein Folding: Learning the Order Parameter



- Knowledge of protein structures relevant to diseases is necessary for new drug development.
- Elucidation of the order parameter of protein folding process would be a big leap in predicting structures.
- Use of unsupervised learning to differentiate key pathway from thousands of possible transitions.

JACS 2017, in press; JCTC 2016, 5190; Biochem. 2016, 5653; JPCB 2015, 3755

R&D Socio-Technical System of Quality Testing in India

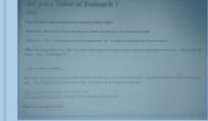
INTRODUCTION

The consequence of viewing work automation as a face-off between human potential and smart technology denies the role of business acumen, market forces and social contexts that provide for and constitute work environments in any country. A vibrant quality testing community in India took at their work as a creative endeavour to maintain QA standards. Technical Up-skilling emerged as a key response to survive in an automated work environment. A Skill Tutoring IT Hub has spawned in Hyderabad in response to this need to up-skill.



METHOD

✓ We adopt an anthropological approach and a socio-technical framework to analyse, qualitatively, the QT work in times of process driven work flows and automated testing replacing manual work practices.



Three different methods for data collection were adopted:
 ✓ A deep investigation and analysis of blogs maintained by Quality Testers.
 ✓ Depth interviews with Testers, Solution Architects, and QA Managers.
 ✓ In-situ observations of RPA inside IT offices.

AIM

An inquiry into the socio-technical impacts of automation work practices on the quality testing segment in the IT industry of India.

CONCLUSIONS

✓ A variety of testing methods still drive practices in India - manual to RPA.
 ✓ Expanding tester to be beyond the box of testing to include a range of testing practices.
 ✓ Contextual decisions are needed to work automation shaping the culture of technology driven work profiles.

Key Takeaway

The voices of testers challenge the idea of testing as purely a "tool smith" or mechanical work in re-imagining the job of QT as critical in rendering a well-tested and bug-free product.

Tarek, Anil, Bhagya, Jyoti and Nivedita Rangaswamy
 Center for Social Innovation