



सत्यमेव जयते

Ministry of
Electronics &
Information
Technology

Indigenously developed ITMS Components and its use cases

सुस्वागतम्

நல்வரவு

ସୁସ୍ବାଗତମ

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सुस्रागतम्

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सुस्रागतम्

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सुस्वागतम्

خوش آمدید



Prakash Rosayyan
Joint Director
CDAC-Thiruvananthapuram

Centre for Development of Advanced Computing - C-DAC

Vision: To emerge as the premier R&D Institution for the design, development and deployment of world class electronic and ICT solutions for economic & human advancement.



1988

Year Established

12

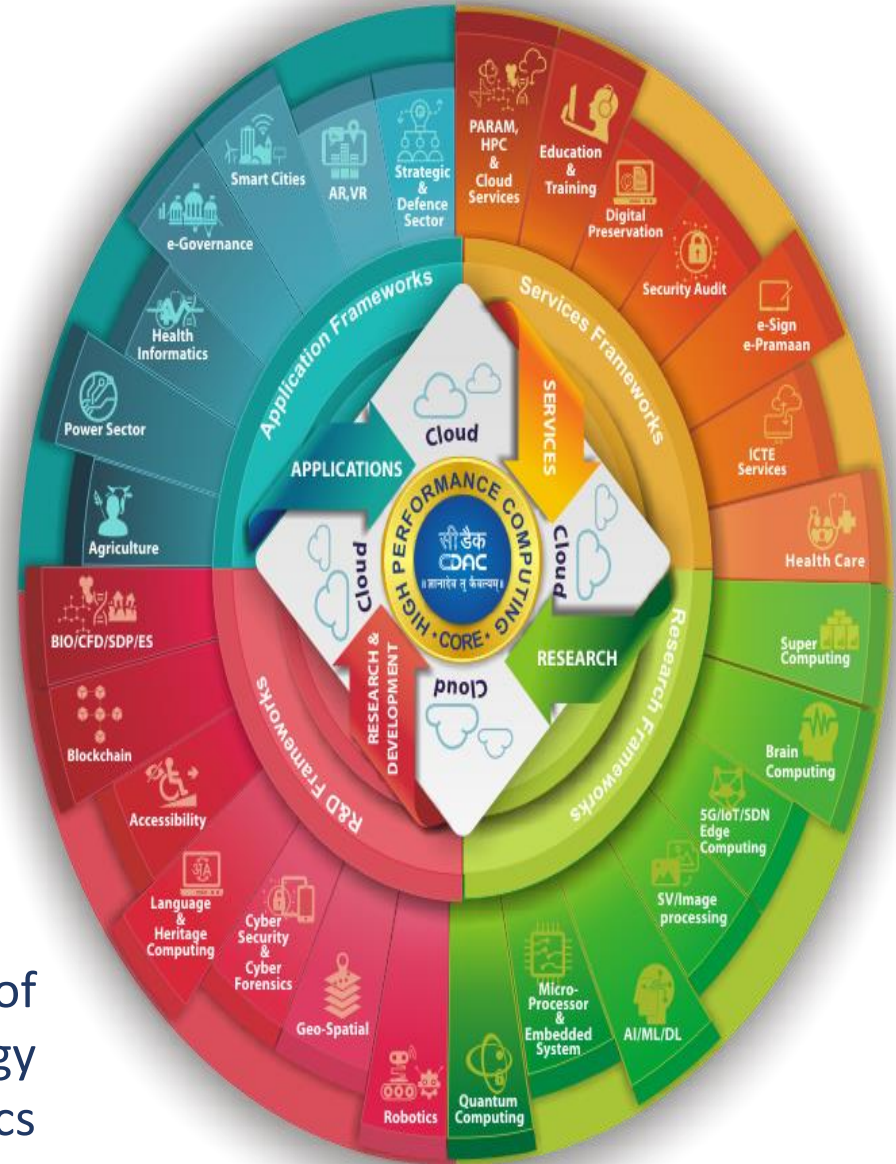
Locations

3000
+

Professionals

Premier R&D organization of the Ministry of Electronics & Information Technology (MeitY) to carry out R&D in ICT, Electronics & Associated Domains

One Vision. One Goal... Advanced Computing for Human Advancement...



Technical Expertise



- High Performance Computing
- Artificial Intelligence & Multilingual Computing and Heritage Computing
- Microprocessor & Professional Electronics
- **Intelligent Transportation System**
- Health Informatics
- Cyber Security & Cyber Forensics
- Software Technologies
 - e-Governance / Geo-informatics
 - Blockchain Technologies
- 5G, IoT, SDN, Edge Computing
- Education and Training



One Vision. One Goal... Advanced Computing for Human Advancement...

C-DAC is the major ITS Technology Provider in the Country

- **Time-tested ITS Products**

- Solar Power Operated Vehicle Actuated Traffic Signal Controller **(WiTraC/CUTE)**
- Adaptive Traffic Control System (ATCS) capable of handling non-lane based, mixed traffic flow conditions **(TraMM/CoSiCoSt)**
- Differently able friendly Pedestrian Accessible Controller **(PeSCo)**
- Emergency Service Vehicle Priority System **(EmSerV)**
- Red Light Enforcement System **(iRIDS)**
- Off-street Parking Management System **(ePARK)**

On Going Projects

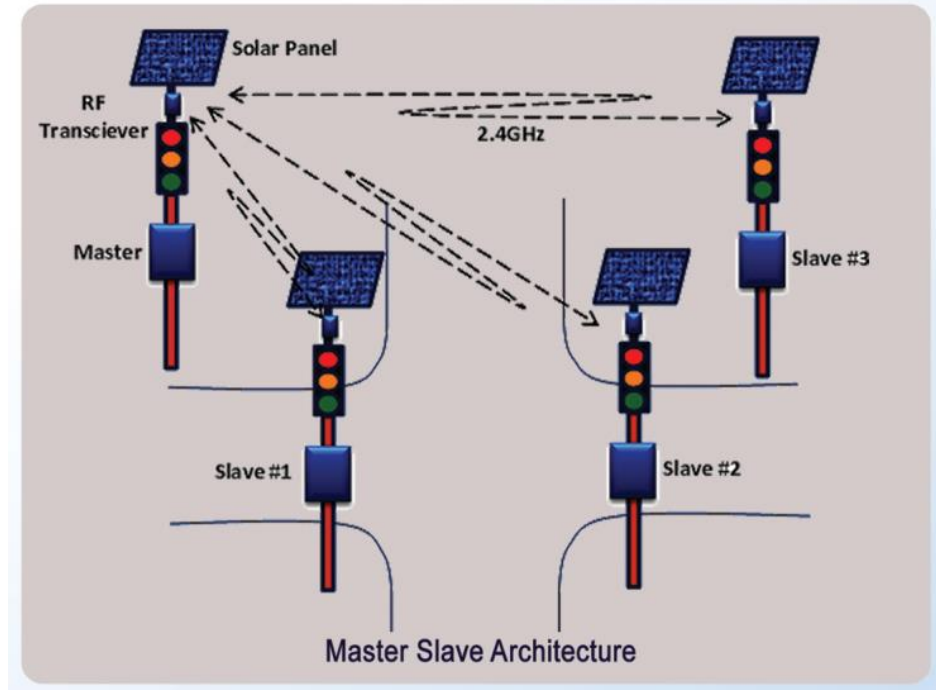


Sl. No	Title	Collaboration
1	Promoting Road Safety through Deployment of Driver Assistance and Warning System	IIT Madras
2	Development of a Bus Priority System at Signalized Intersections using V2I Communication	IIT Madras
3	Departure Time Planner using V2V and V2I Communication	IIT Madras
4	Data-driven Models and Decision Support Tools for Improved Transit Reliability in Indian Cities	IIT Madras IISc Bangalore
5	Development of Smart Vision Sensors for Road traffic and Industrial applications	C-DAC (T)
6	Development of Common Service Layer based on Global standard for Intelligent Transportation Systems	C-DAC (T)
7	Development of Desktop-Based Driving Simulator for Non-Lane Based Mixed Traffic System	IIT Bombay

Wireless Traffic Signal Controller (WiTraC)



- Controls signal lamps over wireless medium
- Supports Remote Monitoring and Management of Signal (TraMM)
- ATCS Compatible (CoSiCoSt)
- GPS Enabled
- Supports above ground and inductive loop vehicle detection
- Solar Power Operated
- Pole mountable
- IEC 60068 (ERTL Certified)

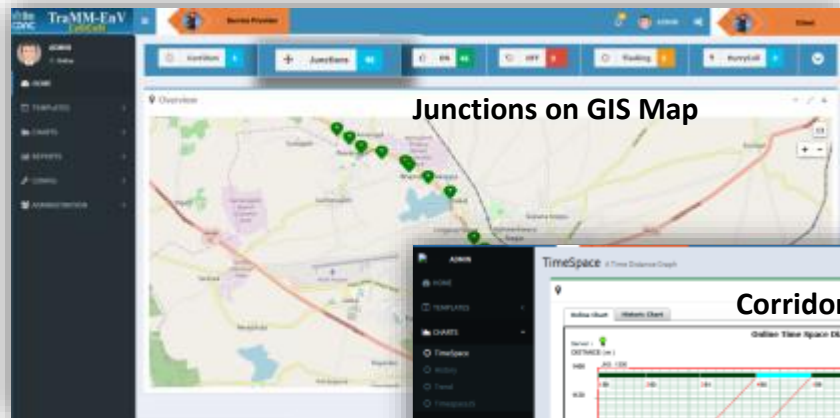


ATCS compatible Solar Power operable Flexible Mode of Operation

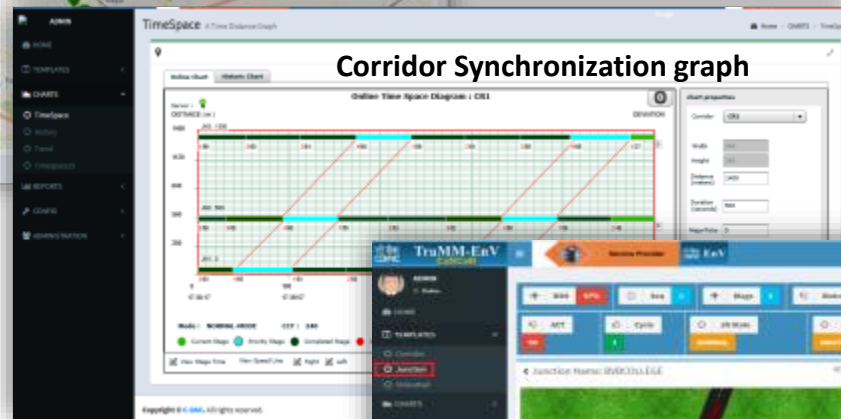
- Pre-timed
- Vehicle Actuated
 - With or without Stage Skipping
- Semi-Actuated
 - With or without Stage Skipping
- Time of Day (ToD) Synchronization
 - Pre-timed and Vehicle Actuated
- Adaptive Traffic Control System
- Combination of the above modes



Model:CUTE



Products: TraMM-EnV & CoSiCoSt



- **C-DAC's expertise in turnkey implementations**

- | | |
|-------------------|-------------------------------------|
| • Pune (2006) | Pune Municipal Corporation |
| • Jaipur (2009) | Jaipur Development Authority |
| • Indore (2013) | Atal Indore City Transport Services |
| • Hubballi (2020) | HDBRTS Co. Ltd / DULT |

Multi-vendor support through Technology Partners (6nos.)

Turnkey implementations by Technology Partners at various Indian cities

- | | |
|---------------|-----------|
| • Bhubaneswar | Kanpur |
| • Patna | Jammu |
| • Gwalior | Srinagar |
| • Ahmedabad | Faridabad |
| • Surat | Agartala |

Implementation sites of WiTraC



CDAC - Keltron Junction, Trivandrum – October 2011



Vellayambalam Junction, Trivandrum – April 2012



Sayarkar Bhawan Junction, Pune – June 2012



Indore

Emergency Service Vehicle Priority System



- Smooth passage of Emergency Vehicles
- Respond quickly and safely to emergency situations.
- Reduction in average travel time up to 48 %
- Achieve interoperability with most traffic light controllers
- Accommodate hills, curves and extended distances without additional detectors



- **RF ID based**
 - Huge Infrastructure required
 - High Implementation cost
 - Hectic to get Permission from local authorities
- **GPS and Server based**
 - Network delays
 - Network failures.

- GNSS and Radio frequency based local solution
- Geo fencing for resolving vehicle position
- Easy installation
- No permission hazels
- No network failures and delays
- Ensures safety

- **Vehicle Mount Unit (VMU)**

- Mounted on the dash board of the Emergency Vehicle



- **Controller Unit(CU)**

- Mounted in side the traffic controller box



Field implementation



- Installed EmSerV Controller Unit in Kumarapuram Junction, Thiruvananthapuram
- Installed VMU in one of the ambulance of KIMS Hospitals, Thiruvananthapuram
- System is operational from 15th December 2017.



EmSerV – Delay Analysis by NATPAC



- Date : 11th January 2018
- Time : 8:00 A.M to 7:00 P.M
- Done by : Transport Planner, NATPAC & CDAC
- Study Results : Reduction in average travel time up to 48 %



Intelligent Parking Management System

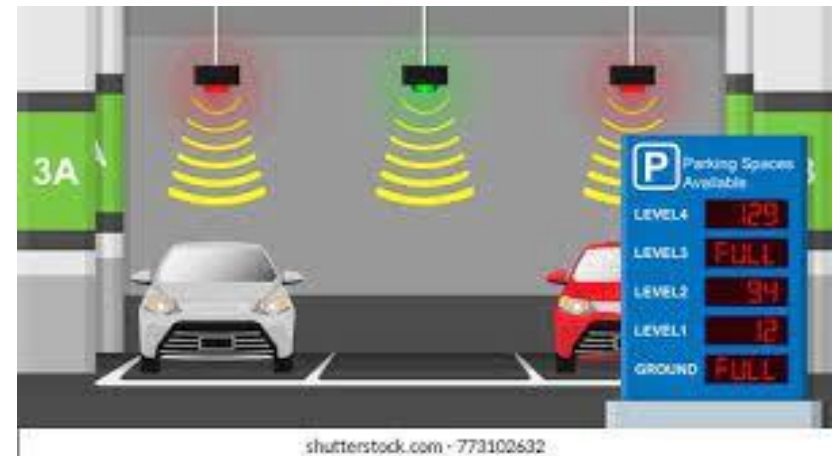


IPMS Components

1. Entry Gate Sub system
2. Parking Lot Sub System
3. Exit Gate Sub system
4. Parking Navigation and Driver Guidance Sub system
5. Communication infrastructure

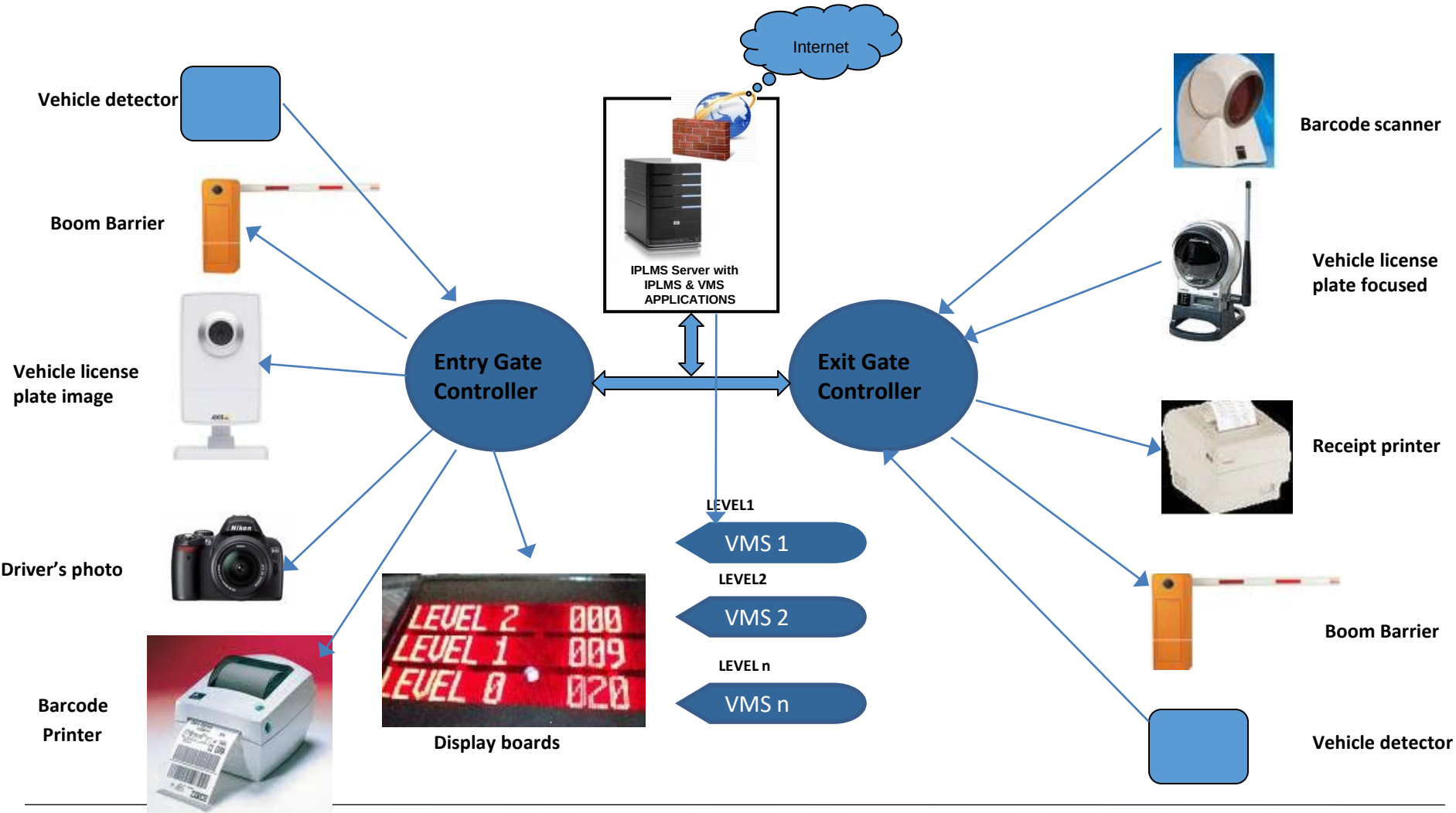


Web source



Web source

System Architecture



Hardware components



Bay Sensor



Indicator lamp



Data Concentrator



Entry Exit Hardware





Entry Gate display - Indoor

VMS Software Integration

- Serial communication
 - Entry gate display
 - Level display
- GPRS communication
 - Outdoor display



Level display - Indoor



Online Vacancy information -
Outdoor

Implementation Site



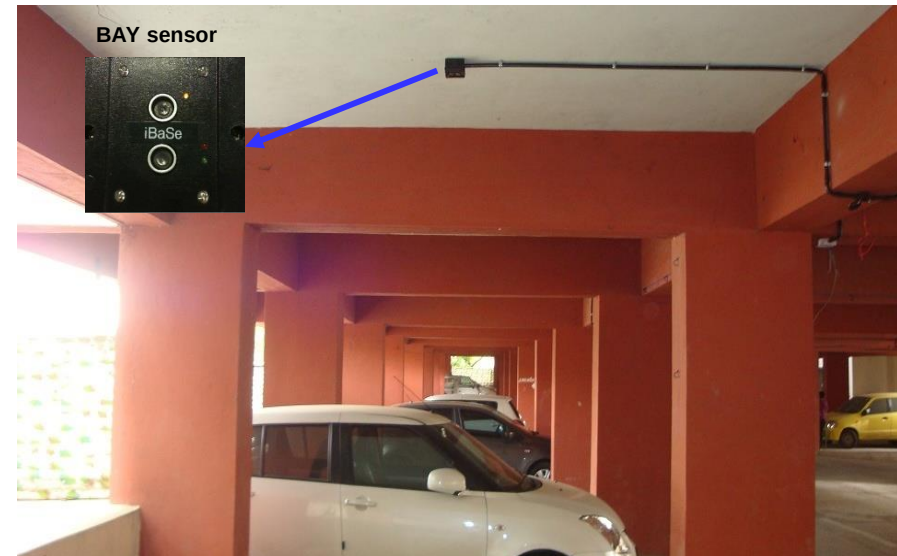
Location : Haribhau Car park, Narayan Peth, Pune

No. of levels : 6 (including roof top)

Capacity : 192 Cars



Bay sensor & Indicator lamps



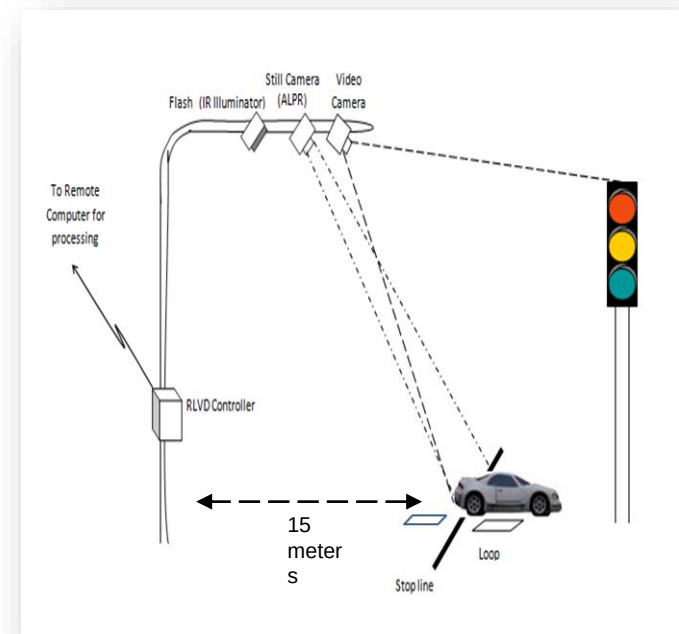
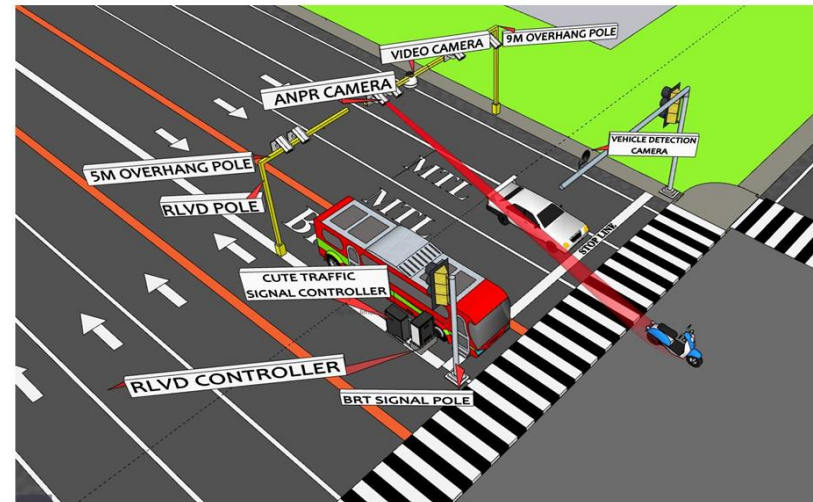
First Floor with bay indicators



Red Light Violation Detection System



- Identifies red light violations at signalized road traffic junctions
- Generates digital evidence of the violation
- Retrieves License Plate details from the image of the red running vehicle
- Retrieves registered owner details of the red running vehicle from RTO database
- Generate tickets
- Presents ticket for verification before dispatch



Typical Evidence



RED LIGHT VIOLATION STATEMENT

Token ID	: 10082015_000195
Vehicle Number	: TN72AC9691
Owner name & address	:
Vehicle Type	:
Date & time of violation	: 10-08-2015 13:25:33
Place of violation	: CDAC
Penalty amount	: 100/-
Due date	: Tue Aug 25 17:00:00
Fine after due date	: 600/-
Payment Status	: Not Paid, Need to pay Rs 600/-

Mon Aug 10 2015 14:47:41

[Make Payment](#)

[Print Violation Statement](#)



Three snapshots of progressive movement of violating vehicle

Rear number plate image from ANPR camera

3-5 second video evidence of violating vehicle



- Industrial grade hardware
- Local storage
- Vehicle sensor input (48 channel)
- Red Channel input (12 channel)
- Junction client software



Features and challenges



Features

- One controller per junction
- Simultaneous monitoring of multiple arms
- Universal interface to tap Red signal
- Universal interface for vehicle detectors
- Violation image extraction from video
- Local storage
- Integrated evidence

Challenges

- ALPR accuracy in Indian conditions with different fonts / language /types of number plates



Pedestrian friendly signals - PeSCo



- Improved version of **A**ccessible **P**edestrian friendly **S**ignal
 - Conventional APS register pedestrian demand only through **Pushbutton Switch**
 - PeSCo APS addresses pedestrian demands additionally through **RFID, Smart cane sensor, Braille keypad**
- PeSCo identifies different class of pedestrians crossing the motorway and regulates the crossing time accordingly
 - Normal
 - Differently Able
 - Physically Challenged
 - Visually Challenged
 - Other needy people
 - Elderly, Women, Children



Typical Installation



Visual
Indication

SmartCane
Reader

Pushbutton

RFID
Reader

PSI Board

EcP Board

Volume
Control



Braille Inscription

SmartCane
Reader

Pushbutton
Switch

RFID Reader

Live Web interface of PeSCo



सी डी ऐक
CDAC

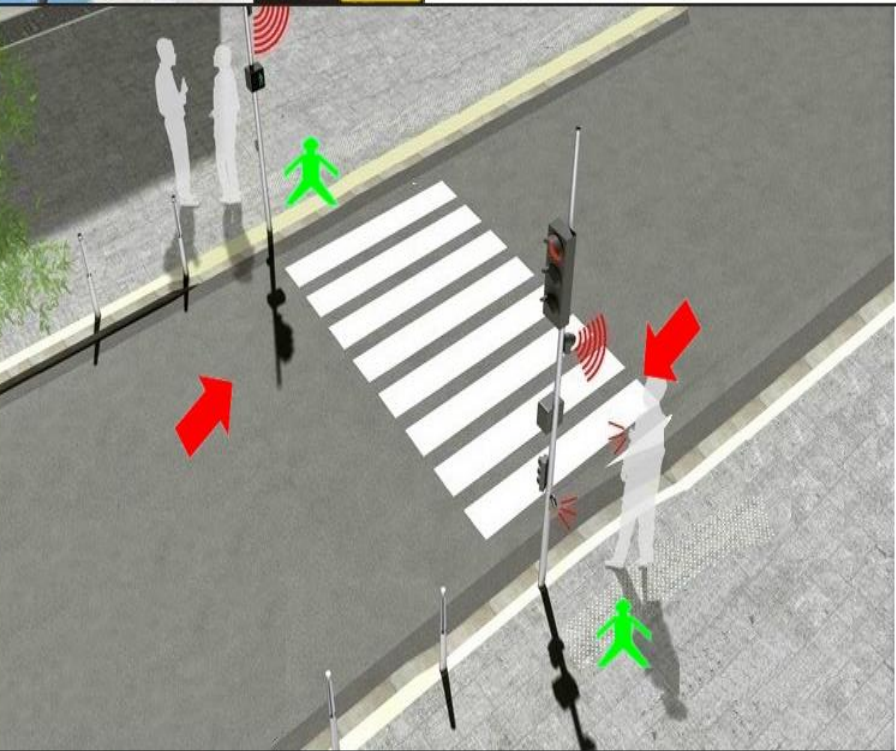
प्रगत संगणन विकास केंद्र
CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING THIRUVANANTHAPURAM



ITS Solution For Pedestrian Safety Enhancement (PeSCo)



Ministry of Electronics and Information Technology
Government of India



PHASE	PEDESTRIAN TYPE	ELAPSED TIME	PHASE TYPE	INPUT TYPE
2	VISUALLY CHALLENGED	12	PEDESTRIAN	SMARTCANE

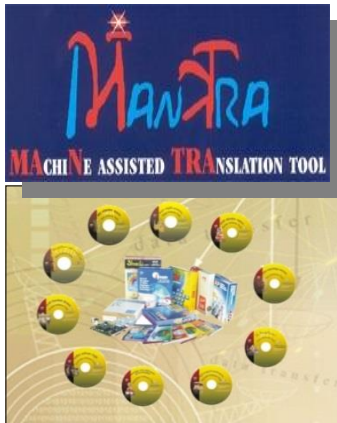
SAFE CROSS TIME	10
PEDESTRIAN TYPE	ALLOCATION TIME
Visually Challenged	29
Physically Challenged	26
Elderly Person	25
Children	27
Normal Pedestrian	20

30 May 17 12 18 50

Govt. School for Visually Impaired,
Thiruvananthapuram
(GSVT)

Pedestrian mid-block in
front of Govt. Girls'
Higher Secondary School,
Cotton Hill,
Thiruvananthapuram





One Vision.

One Goal..

Thank You !



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*Advanced Computing
for Human Advancement...*

धन्यवाद आभार आभार यन्त्राद धन्यवाद नृणां नमो कृतज्ञता



Microprocessor
and Quantum
Computing



Exascale
Computing



AI and Language
Computing



GenNext
Applied
Computing



IoT, Dependable
and Secure
Computing



Thank You !