

NPMICAV

National Program for MICRO AIR VEHICLES - DRDO (AR&DB) and DST

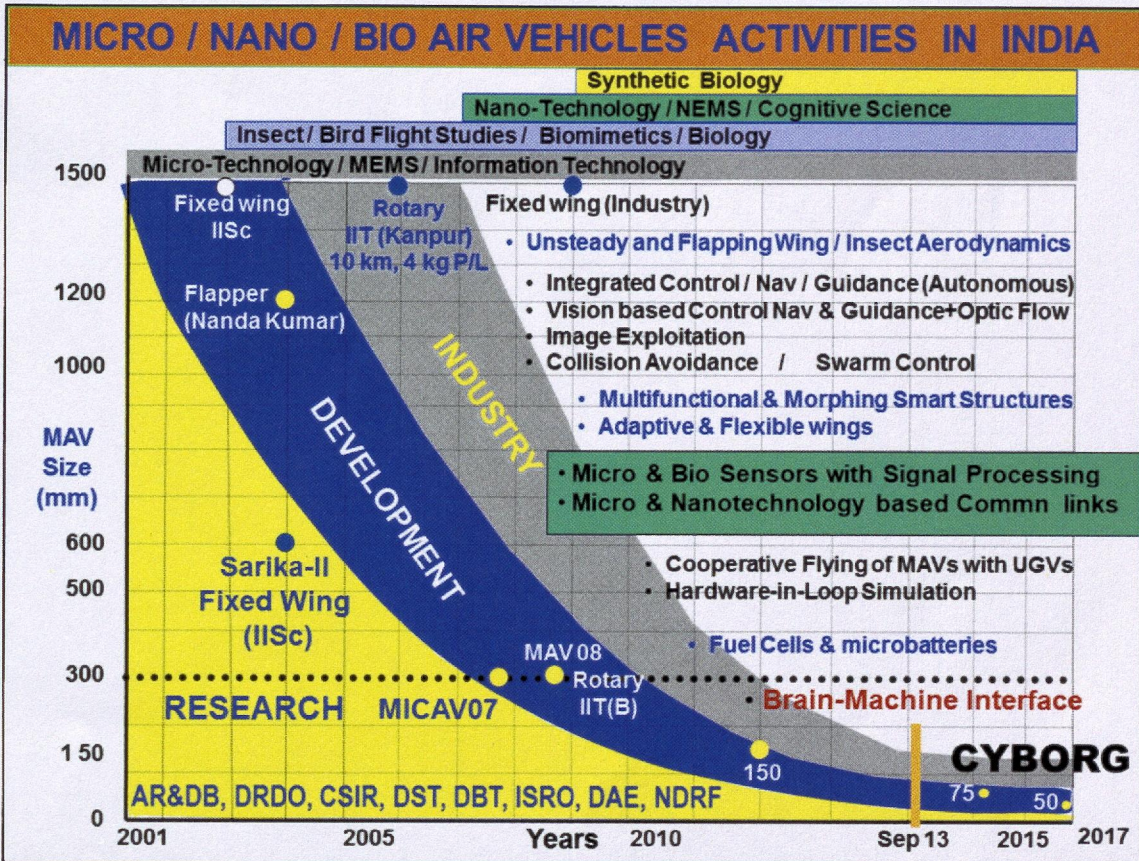
Suggestion at Aero Society of India Meeting 1998 by Outgoing
President - VJ Sundaram

MICRO / NANO AIR VEHICLE MISSIONS	
<p>Commercial</p> <ul style="list-style-type: none"> - Agriculture - Photography/TV/ Cinema 	<p>Defence / Security / Low Intensity Conflict</p> <ul style="list-style-type: none"> - Surveillance - Recce - Communication Relay - Electronic Warfare - NBC detection - Explosive / Mine detection - Riot Control - Crowd Monitoring - Traffic Control
<p>Disaster Management & Response</p> <ul style="list-style-type: none"> - Fire - Floods - Explosions - NBC/Explosive/Mine - Detection - Earthquakes - Landslides - Collapsed Buildings - Gas Leaks - Crowd Monitoring - Stampedes 	<p>Search & Rescue</p> <p>R&D - New concepts</p> <p>Rural Administration</p> <ul style="list-style-type: none"> - Alex Menon (Collector, Chhattisgarh)

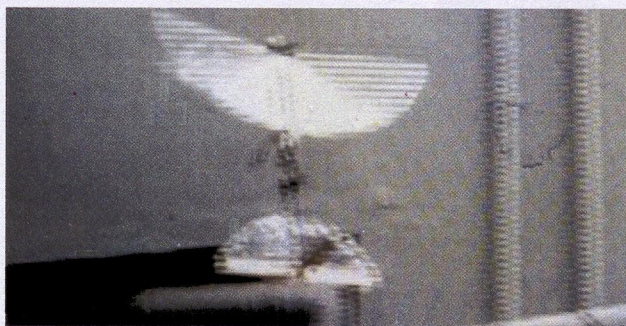


General has gone PAGAL

ROAD MAP SUBMITTED by National Design & Research Forum (IEI) to AR&DB in
1998



Dir NAL, Start-up, Chmn HAL, NDRF IISc



AR&DB, NDRF, DC Enterprises-Start-up

AGILITY ACROSS INTERNATIONAL BOUNDARIES

**1st US - Asian Demo for
Micro Air Vehicles-Agra, March 2008**

**AIM -Demonstrate MICAV Techys
- Identify Working Groups**

MISSION: Search & Rescue Hostages
Held By Terrorists

**Max.Size of Micro Air Vehicle
Fit into 300 mm sphere**

Participants

Australia, France, Germany, Japan,
India (NAL, IIT-B, NDRF -Consortium) Netherlands,
Spain, USA

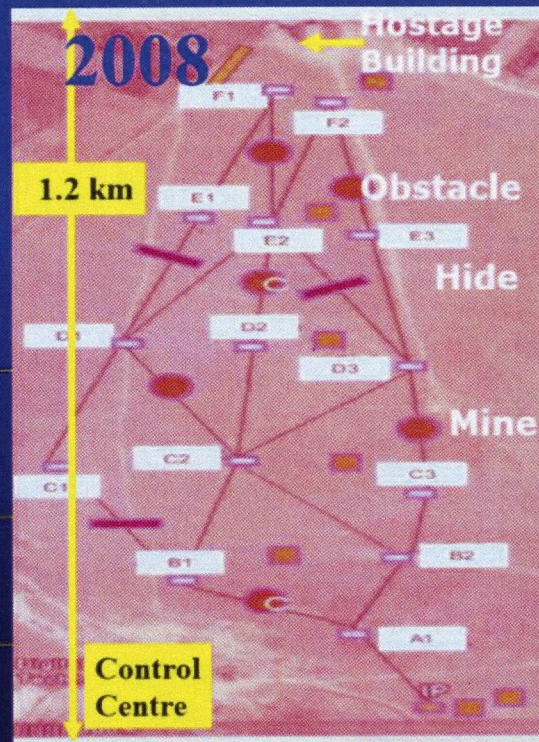
Sponsors

USA - Army, Navy, Air Force
India - CSIR, DRDO

Overall Coordination - NAL

Local Organization - ADRDE (DRDO)

Networking - NDRF



MAV Demo (Kolar) to National Disaster Management Authority

National Flying Competition for Micro Drones (2014) was conducted at Jain University campus. The mission was to enter a shelter 700 meters away, without direct Line of Sight and send pictures to the base. Fig 20.11

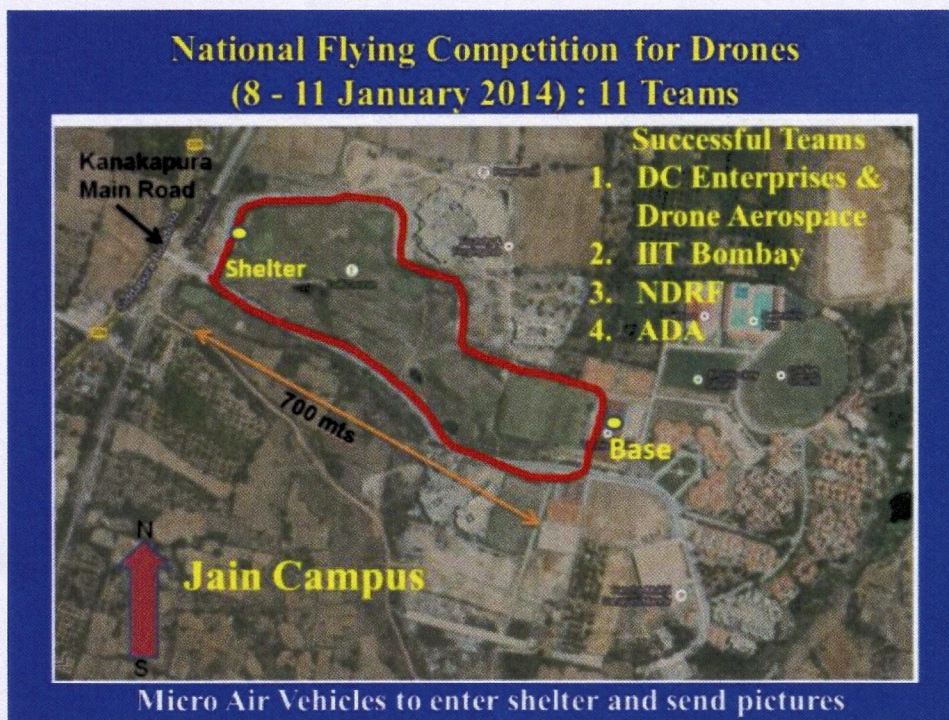


Fig: Mission Competition course



ATMA NIRBHAR

Becoming 'Atma Nirbhar' (Self Reliant) helped NPMICAV technologies

1. Global Tender by Army for Mini drones in 2015

There was stiff competition from USA and other countries. Result was a surprise.

First -Idea Forge: IIT-Bombay boys whose design was adjudged best in MAV 08. They flew the Quadrotor in "3 Idiots ". Then founded a Start-up, Idea Forge, and participated in a demo to the National Disaster Management Authority (Fig 20.9)

Second- Larsen & Toubro

Decision of Sri Manohar Parrikar, the Raksha Mantri that the tender for mini drones will be issued to Indian companies is shown in Fig20.13. This was a very major success for India in the field of Mini Drones as well as encouragement for Micro Drones



2. **Micro Autopilots for autonomous flight.** Many doubted indigenous capability. They were developed indigenously by start-ups like Idea Forge, Drone and DC Enterprises.
3. **Miniature Motors** were denied even to academic institutions like IISc, but DC Enterprises stepped in and built the smallest brushless motor in the World, weighing just 0.25gm. Later, DC exported their micro-motors to Europe & USA.

Work is urgently required for

1. **Anti-Drone Systems** eg: Grene Robotics, BEL, RCI
2. **Air Traffic Control Systems for Drones** to be used commercially as well as in Defence, Security and Disaster management
3. **3D Printing/Additive Manufacturing**, including Bio-printing

Invoking micro, nano and artificial intelligence, Mini/Micro drones have become game changers in war. Quantum computing will raise the bar.



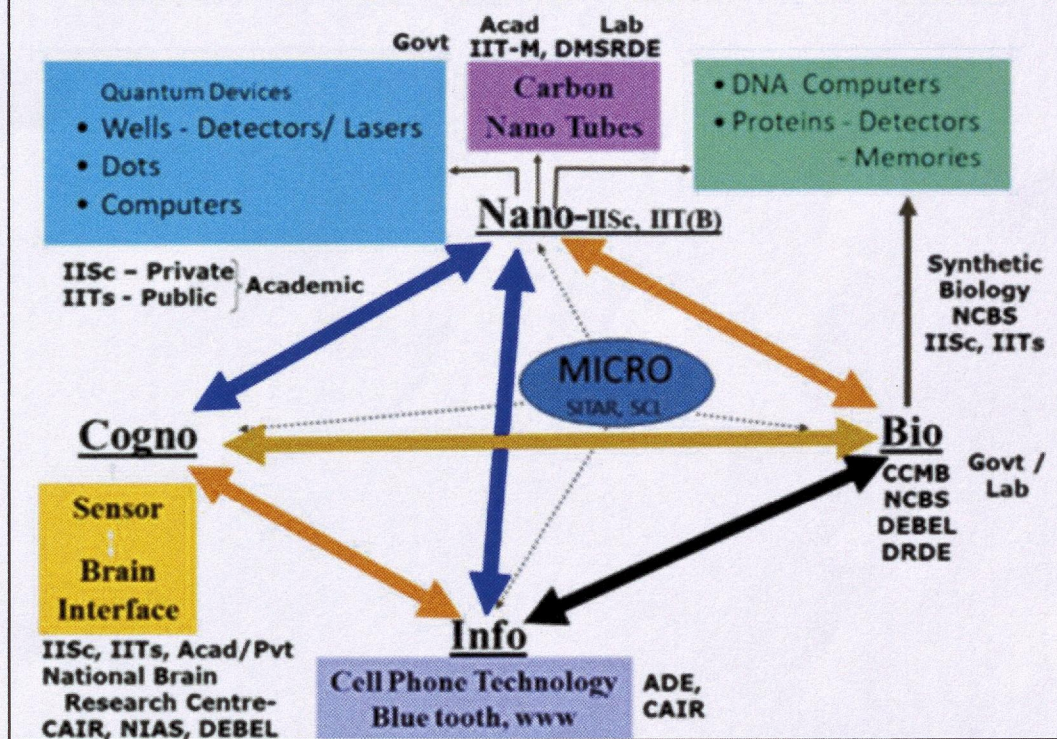
Vijaybabu Ankit



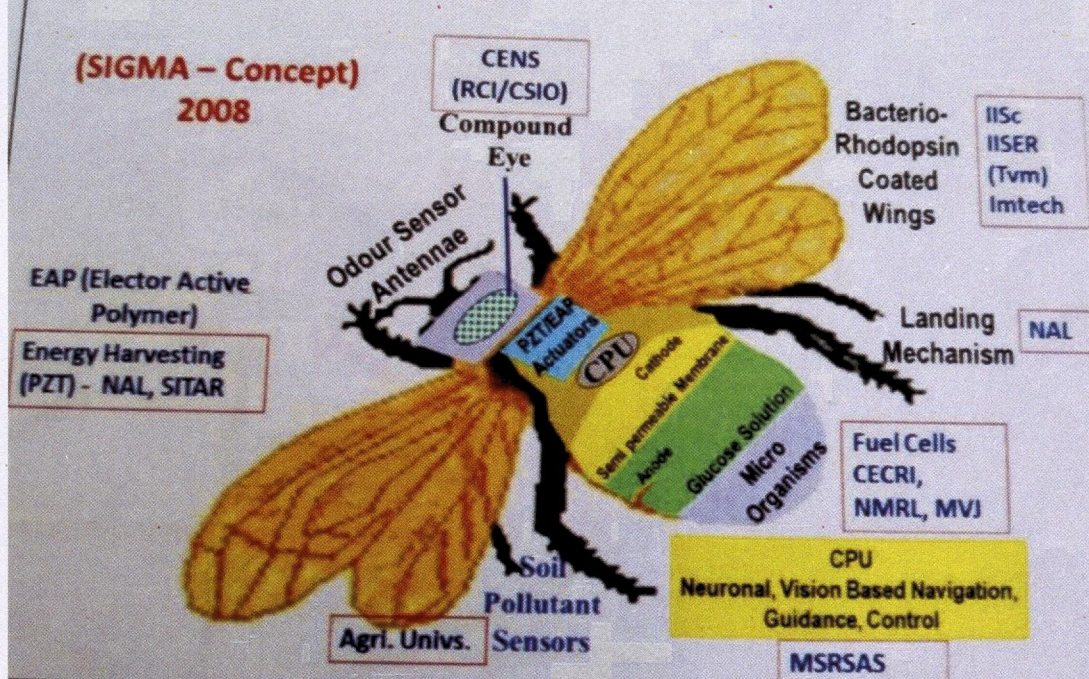
Patil Nabhanita-DRDO Sundaram

Ankit(Idea Forge) and Patil (L&T)

INTEGRATION OF MICRO-NANO-BIO-INFO-COGNO TECHNOLOGIES



BUMBLEBORG



BANGALORE BORG

CRAWLING BEETLE

Anthia Sexguttata

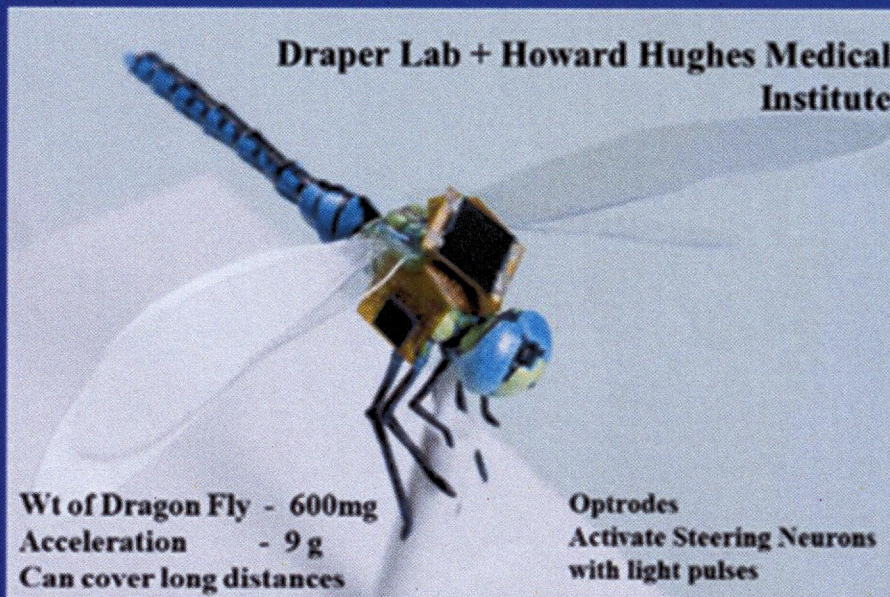


- Indigenous Beetle - Institute of Wood Science & Technology
- Neural Implants - University of Agricultural Sciences, Raichur
- Biomechanics - JNCASR, NAL
- Micro-Controller - SITAR, Bangalore
- RFID, IR Sensor
- Piezo - Energy Harvester - NAL
- System Integration - NDRF

REDMI NOTE 6 PRO

Dragonfly Model with Optogenetic Insect Control Backpack (2017)

Draper Lab + Howard Hughes Medical Institute



Wt of Dragon Fly - 600mg
Acceleration - 9 g
Can cover long distances

Optrodes
Activate Steering Neurons
with light pulses

Micro Nav / Guidance + Neuro Technology + Synthetic Biology



Insect Cyborgs and Rodent Cyborgs were proposed by NDRF

Indian Science Congress Jan- 2020

The Prime Minister of India, Sri Narendra Modi, announced at the Indian Science Congress at Bangalore in January 2020 that DRDO would be setting up a laboratory for working on Nanotechnology, Unmanned Aerial Vehicles and Cyborgs.

“Asymmetric Technologies Laboratory” has been set-up by DRDO at Dindugal near Hyderabad with Dr P Shiva Prasad as the Director.