



2004 DARPA Grand Challenge

Colonel Jose Negrón, USAF

in association with:





Colonel Jose Negron

Grand Challenge 2004
Program Manager



GC 04 Entrants/Locations

University of Washington
 Seattle, WA
 NN Team 4 - LFOOT
 Dayton, WA
 Vista Engineering
 Carson, WA
 Amadeus
 Bellevue, WA
 Viva Las Vegas
 Portland, OR
 Team 1010Delta
 Lake Oswego, OR
 Team Rolo
 Beaverton, OR
 Mech I.Q. &
 The Blue Team
 Berkeley, CA
 Team Overbot
 Redwood City, CA
 Team Summerhill
 Los Altos, CA
 G-Threat
 Los Gatos, CA
 Digital Auto Drive
 Morgan Hill, CA
 Team Mackenzie
 Salinas, CA
 Desert I&I
 Atascadero, CA
 Team Remote-i &
 Santa Barbara
 Grand Challenge Team
 Santa Barbara, CA
 Team Spirit of Las Vegas
 Edwards, CA
 "R" Junk Works
 Palmdale, CA
 SciAutonics I&I
 Thousand Oaks, CA
 Team Caltech &
 The Golum Group
 Pasadena, CA
 A.I. Motorvators
 Los Angeles, CA
 Palos Verdes Road Warriors
 Palos Verdes Estates, CA
 Terra Engineering
 Ranch Palos Verdes, CA
 Rover Systems
 Santa Ana, CA
 Maximum Exposure &
 Orange
 Newport Beach, CA
 CyberRider
 San Juan Capistrano, CA
 5 BEST
 San Diego, CA

West Coast Autonomous Robotics Group
 Vancouver, BC



106 Applications

Not shown: Los Buitres – Argentina; Creatnz – New Zealand



Teams Invited California Motor Speedway



25 Teams



Opening Ceremony California Motor Speedway



Pole Position - Main Event

<u>Pole</u>	<u>Bot#</u>	<u>Team</u>
1)	22	The Red Team
2)	21	Elbit-SciAutonics II
3)	05	Team CalTech
4)	07	Digital Auto Drive
5)	25	Virginia Tech
6)	23	Axion Racing
7)	02	Team CajunBot
8)	13	Team ENSCO
9)	04	CIMAR
10)	10	Palos Verdes HS
11)	17	SciAutonics I
12)	20	Team TerraMax
13)	15	TerraHawk
14)	09	The Golem Group
15)	16	The Blue Team

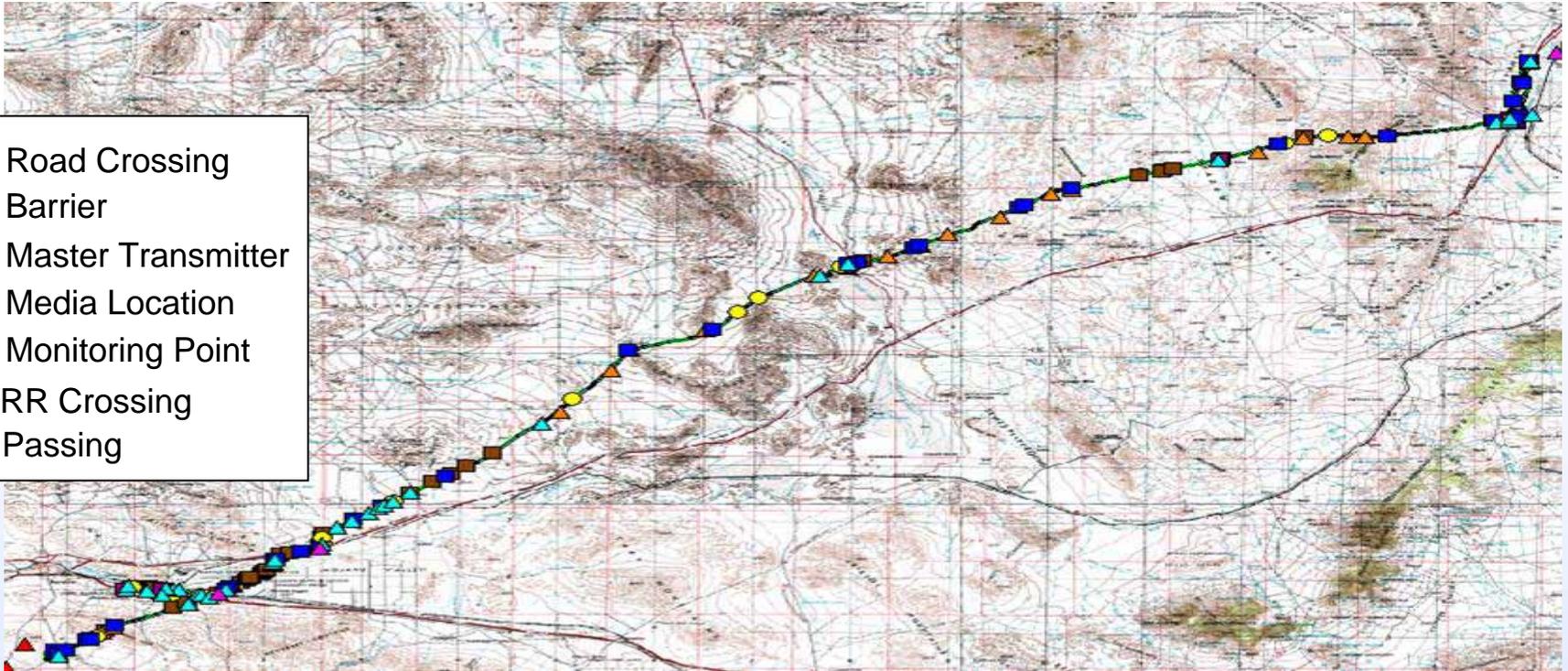
15 Teams



Route Safety Features



- ▲ Road Crossing
- Barrier
- ▲ Master Transmitter
- Media Location
- ▲ Monitoring Point
- ▲ RR Crossing
- Passing



- **Multiple Safety Layers**
 - Control Vehicles
 - GPS Tracking
 - Command Operations Center
 - Others along the course
- **Three sets of eyes on each vehicle**



Route Stats



Total Miles	142
GPS Waypoints	2586
Road Crossings	40
RR Crossings	2
Controlled Passing Zones	19
Media Locations	8
Critical Tortoise Habitat	33%



Environmental Safety

Training provided to all staff and volunteers

- Mitigation planning
- Desert Tortoise protection
- Spill prevention
- Crowd Control



Start Area



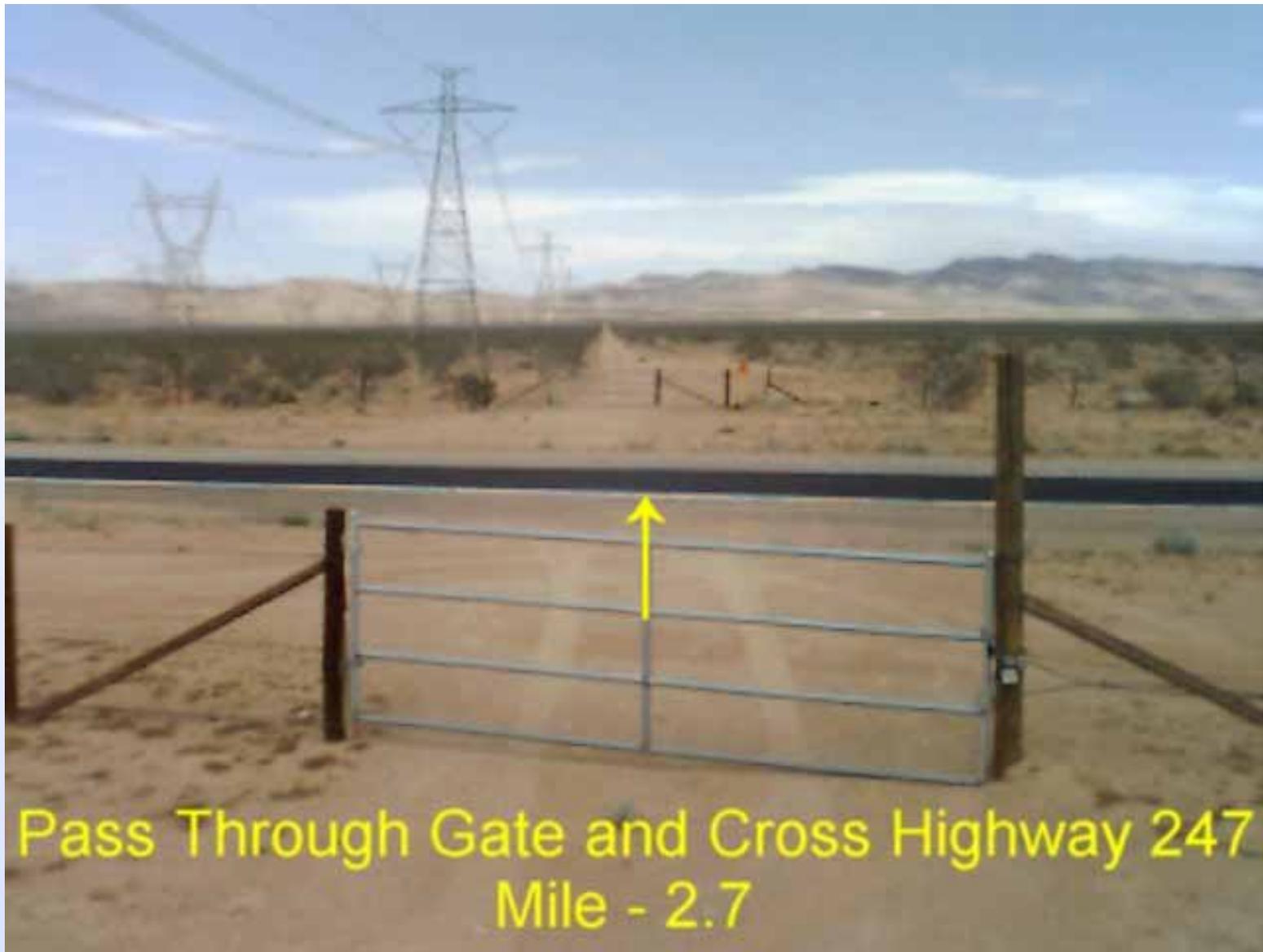
Slash X Cafe – 13 Mar 04



Road to the Grand Challenge

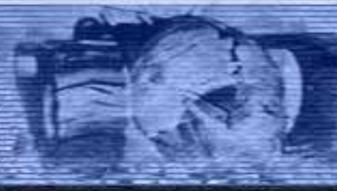
2004 Grand Challenge Movie Clip

2004 Route Obstacles





Daggett Ridge



Results



<u>Bot #</u>	<u>Team Name</u>	<u>Distance Traveled</u>
22	The Red Team	7.36 miles
21	SciAutonics II	6.75 miles
07	Team D.A.D.	6.25 miles
09	The Golem Group	5.2 miles
05	Team CalTech	1.3 miles
20	TerraMax	1.2 miles
17	SciAutonics I	0.75 miles
04	CIMAR	0.50 miles
13	Team ENSCO	0.25 miles
25	Virginia Tech	50 meters
23	Axion Racing	50 meters
02	CajunBot	50 meters
10	Palos Verdes HS	30 meters
16	The Blue Team	1 meter
15	TerraHawk	Did not start





Lessons Learned

- **Team composition is crucial**
- **Spiral integration – don't wait until the end**
 - Sensors, computers, and vehicle
- **Testing**
- **More testing**
- **Keep on testing**

Teams should plan on several hundred miles of vehicle testing



2004
CONGRATULATIONS

SPARKING INTEREST IN SCIENCE AND TECHNOLOGY IN AMERICA

THE GRAND CHALLENGE

BUILD A FULLY AUTONOMOUS VEHICLE THAT CAN NAVIGATE 142 MILES OF RUGGED TERRAIN BETWEEN BARSTOW, CA AND PRIMM, NV IN UNDER 10 HOURS

BARSTOW

PRIMM

