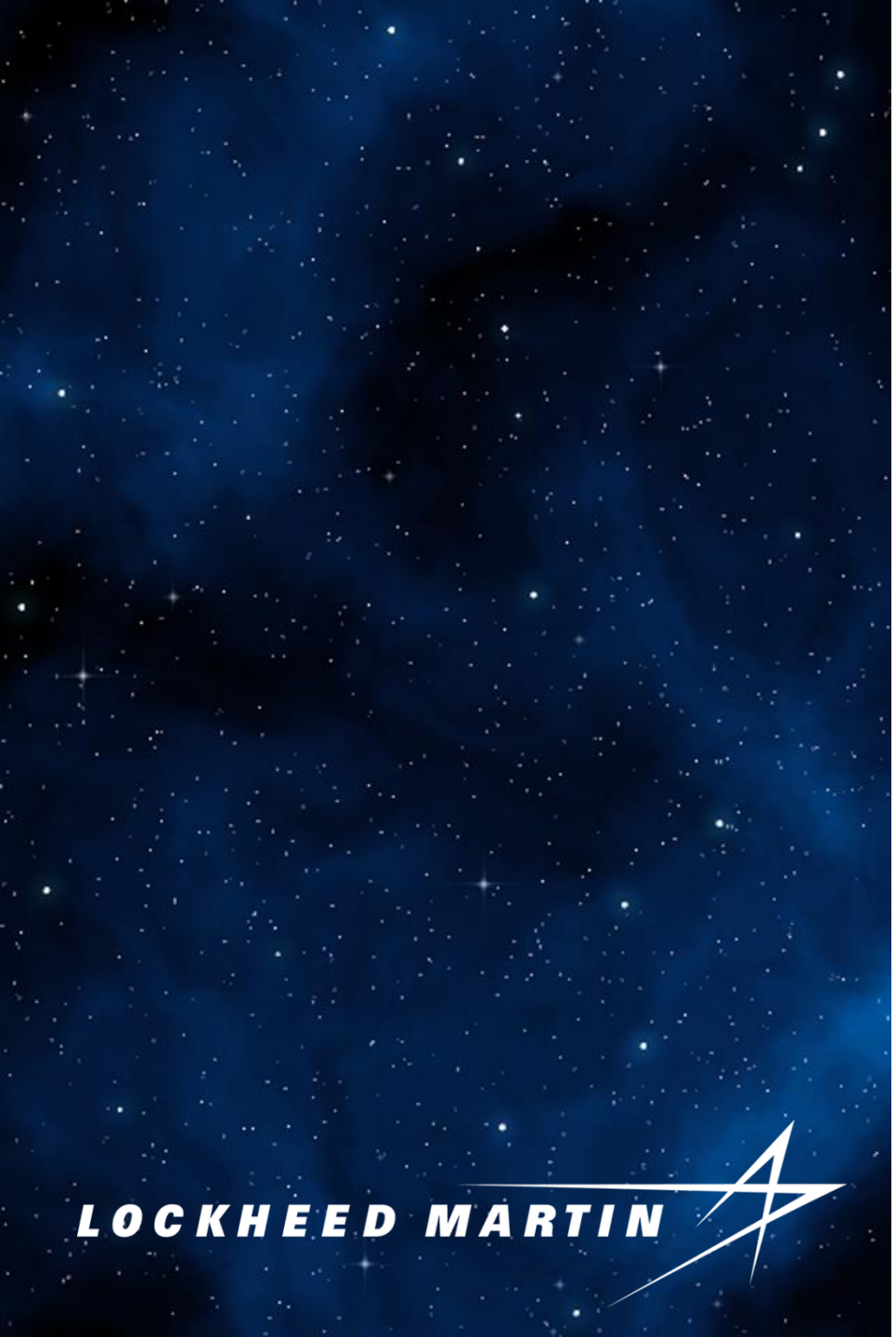



# ASTRONAUTS OF HISPANIC ORIGIN

## THE RACE is ON

MIGUEL AYALA | SENIOR MECHANICAL ENGINEER, MECHANICAL & PROPULSION ENGINEERING
LOCKHEED MARTIN SPACE SYSTEMS COMPANY

# LOCKHEED MARTIN

Our Mission:  We solve complex challenges, advance scientific discovery and deliver innovative solutions to help our customers keep people safe

Our Vision: Be the global leader in supporting our customers' missions, strengthening security and advancing scientific discovery

Our Values:

Do What's Right

Respect Others

Perform With Excellence

Aeronautics: With approximately $17.8 billion in 2016 sales which includes tactical aircraft, airlift, and aeronautical research and development lines of business.

Missiles and Fire Control: With approximately $6.6 billion in 2016 sales that includes the Terminal High Altitude Area Defense System, PAC-3 Missiles as some of its high-profile programs

Rotary and Mission Systems. With approximately $13.5 billion in 2016 sales, which includes Sikorsky military and commercial helicopters, naval systems, platform integration, simulation and training and energy programs lines of business

Space Systems, With approximately $9.4 billion in 2016 sales which includes space launch, commercial satellites, government satellites, and strategic missiles lines of business

# ASTRONAUTS OF HISPANIC ORIGIN

- Arnaldo Tamayo Mendez (flew in space)
- Rodolfo Neri Vela (flew in space)
- Franklin Chang-Diaz (flew in space)
- Sidney M. Gutierrez (flew in space)
- Ellen Ochoa (flew in space)
- Michael Lopez-Alegria (flew in space, EVA)
- Carlos I. Noriega (flew in space, EVA)
- Pedro Duque (flew in space)
- John D. Olivas (flew in space)
- George D. Zamka (flew in space)
- Joseph M. Acaba (flew in space)
- Jose M. Hernandez (flew in space)
- Serena M. Auñon (candidate)
- Jose Lopez Falcon (backup)
- Ricardo Peralta & Fabi (Backup)
- Fernando Caldeiro (trained)
- Christopher Loria (trained)

# ARNALDO TAMAYO MENDEZ

First person from Latin America to fly in space.
First black person to fly in space

Born in January 29, 1942 (age 75)

Guantánamo, Cuba

Nationality: Cuban

Status: Retired

School: Cuban Air Force Academy

Other Occupation: Cuban Air Force Pilot

Selection: 1978 Intercosmos Group

Missions: Soyuz 38

Time in Space: 7d 20h 43m

# RODOLFO NERI VELA

First Mexican in space

Born in February 19, 1952 (age 65)

Chilpancingo, Guerrero, Mexico

Nationality: Mexican

Status: Electrical Engineering Professor

School: UNAM-Mexico, University of Essex-England, University of Birmingham

Other Occupation: Electrical Engineer

Selection: 1985 NASA Group

Missions: STS-61-B

Time in Space: 6d 21h 04m

# FRANKLIN CHANG-DIAZ

First Costa Rican Hispanic Astronaut

Born in April 5, 1950 (age 67)

San José, Costa Rica

Nationality: Costa Rican, American

Status: Head of Ad Astra Rocket Company

School: University of Connecticut, MIT

Other Occupation: Physicist

Selection: 1980 NASA Group

Missions: STS-61-C, STS-34, STS-46, STS-60, STS-75, STS-91, STS-111

Time in Space: 66d 18h 16m

# SIDNEY M. GUTIERREZ

First U.S.-born Hispanic astronaut

Born in June 27, 1951 (age 65)

Albuquerque, New Mexico

Nationality: American

Status: Chairman & CEO of Rocket Crafters

School: US Air Force Academy

Other Occupation: US Air Force Test Pilot

Selection: 1984 NASA Group

Missions: STS-40, STS-59

Time in Space: 20d 08h 03m

# ELLEN OCHOA

First female Hispanic astronaut

Born in May 10, 1958 (age 58)

Los Angeles, California

Nationality: American, Mexican Parents

Status: Director of NASA Johnson Space Center

School: San Diego State University, Stanford University

Other Occupation: Electrical Engineer

Selection: 1990 NASA Group

Missions: STS-56, STS-66, STS-96, STS-110

Time in Space: 40d 19h 36m

# MICHAEL LOPEZ-ALEGRIA

First Spanish-born astronaut

Born in May 30, 1958 (age 58)

Madrid, Spain

Nationality: American

Status: President of Commercial Spaceflight Federation, Consultant

School: US Naval Academy

Other Occupation: US Navy Test Pilot

Selection: 1992 NASA Group

Missions: STS-73, STS-92, STS-113, Soyuz TMA-9

Time in Space: 257d 22h 46m

# CARLOS I. NORIEGA

First Peruvian-born astronaut

Born in October 8, 1959 (age 57)

Lima, Peru

Nationality: American, Peruvian

Status: Manager of Advanced Projects at NASA Johnson Space Center

School: University of Southern California, Naval Postgraduate School

Other Occupation: USMC Marine Aviator

Selection: 1994 NASA Group

Missions: STS-84, STS-97

Time in Space: 20d 01h 18m

# PEDRO DUQUE

First Spanish astronaut

Born in March 14, 1963 (age 54)
Madrid, Spain

Nationality: Spanish
Status: Active ESA Astronaut
School: Universidad Politecnica de Madrid
Other Occupation: Aerospace Engineer
Selection: 1992 ESA Group
Missions: STS-95, Soyuz TMA-3/2
Time in Space: 18d 18h 46m

# JOHN D. OLIVAS

Born in May 25, 1966 (age 50)

North Hollywood, California

Nationality: American

Status: Director of Center for the Advancement of Space Safety and Mission Assurance Research (CASSMAR) at UTEP

School: University of Texas at El Paso, University of Houston, Rice University

Other Occupation: Mechanical Engineer

Selection: 1998 NASA Group

Missions: STS-117, STS-128

Time in Space: 27d 17h 5m

# GEORGE D. ZAMKA

Born in June 29, 1962 (age 54)

Jersey City, New Jersey

Nationality: American, Colombian parents

Status: Director of BA330 Crew & Cargo Program at Bigelow Aerospace

School: US Naval Academy, US Air Force Academy

Other Occupation: USMC Test Pilot

Selection: 1998 NASA Group

Missions: STS-120, STS-130

Time in Space: 28d 20h 32m

# JOSE M. ACABA

First Puerto Rican astronaut

Born in May 17, 1967 (age 49)

Inglewood, California

Nationality: American

Status: Active NASA Astronaut

School: University of California Santa Barbara, University of Arizona

Other Occupation: Hydrogeologist, Teacher

Selection: 2004 NASA Group

Missions: STS-119, Soyuz TMA-04M (Expedition 31/32), Soyuz MS-06 (Expedition 53/54)

Time in Space: 137d 19h 22m

# JOSE M. HERNANDEZ

Son of migrant farm workers

Born in August 7, 1962 (age 54)

French Camp, California

Nationality: American

Status: Businessman, Politician

School: University of the Pacific, University of California Santa Barbara

Other Occupation: electrical Engineer

Selection: 2004 NASA Group

Missions: STS-128

Time in Space: 13d 20h 54m


# MIGUEL A. AYALA

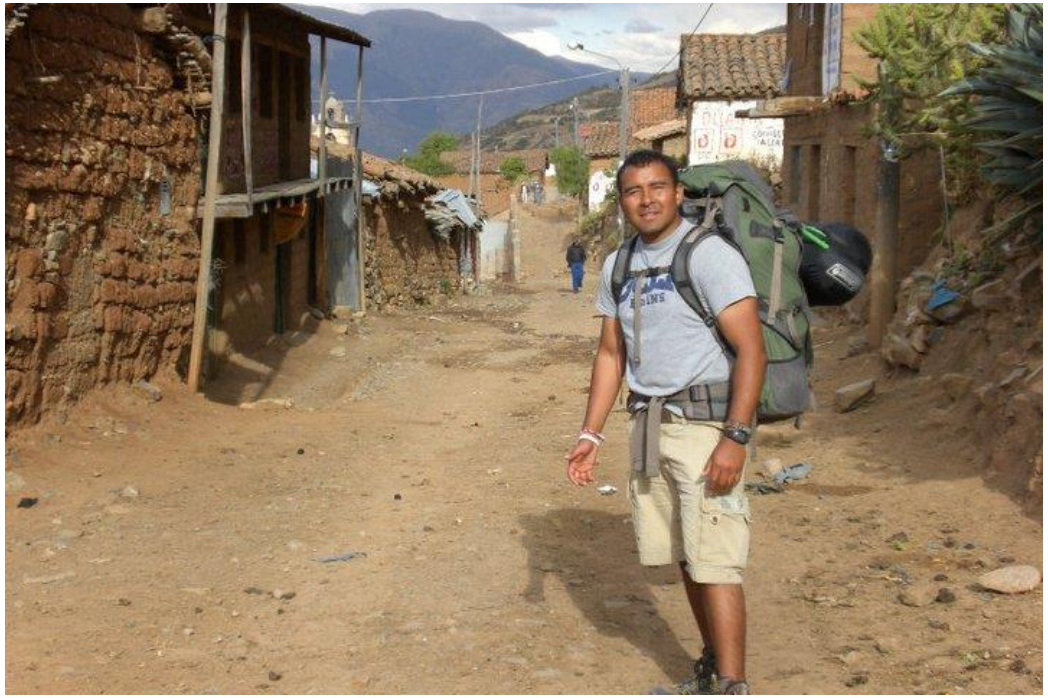
# Background Summary

- Originally from Belen, Ayacucho, Peru
- Attended Elementary through High School in Belen & Lima, Peru and Anchorage, Alaska
- BS in Mechanical & Aerospace Engineering from Arizona State University (ASU)
- MS in Mechanical Engineering from University of California – Los Angeles (UCLA)
- Previous employers include SpaceX, L3 Technologies, Honeywell, Orbital ATK
- Currently Structural Analyst at Lockheed Martin – Space Systems

# Life Journey

## STARTED HERE

## Belen, Ayacucho, Peru



## NOW WORKING HERE

## Littleton, Colorado, USA

# K-12 Education

- Elementary School
  - Belen, Ayacucho, Peru
    - Remote village in the Andes Mountains at 10,500 ft. above sea level
    - There was no running water, roads, electricity or concept of money
    - Built toys from plant leaves, wood sticks and rocks
    - Started dreaming of building spaceships to explore space
- Middle School
  - Jorge Basadre – San Juan de Miraflores, Lima, Peru
    - Continuously among top 3 students in class
    - Regularly top finisher in Math competitions
    - 1st Place in schoolwide K-12 Writing Composition Challenge
- High School
  - Robert Service High School – Anchorage, Alaska, USA
    - Honor Student immediately after arriving from Peru
    - Honorable Mention in statewide Architectural Design Competition
    - 1st Place in Balsa Wood Bridge Competition
    - 1st Place & School Record in Mouse Trap Car Competition

**Belen, Ayacucho, Peru**

# College Education

- Master of Science in Mechanical Engineering – Completed in 2008
  - University of California – Los Angeles (UCLA)
    - Notable Project
      - MATLAB code to analyze air properties across a hypersonic shock wave at varying altitudes within the Earth atmosphere
- Bachelor of Science in Aerospace Engineering – Completed in 2005
  - Arizona State University – Tempe, Arizona (ASU)
    - Senior Design Project
      - Design & Analysis of Mach 2.0 Supersonic Business Jet Airframe & Propulsion System using SolidWorks, MATLAB, ANSYS
- Bachelor of Science in Mechanical Engineering – Completed in 2002
  - Arizona State University – Tempe, Arizona (ASU)
    - Senior Design Project
      - Design & Analysis of Underwater Autonomous Vehicle (UAV) Hull & Propulsion System using SolidWorks, MATLAB, ANSYS
- Associate of Science in Electronics Technology – Completed in 1997
  - High-Tech Institute – Phoenix, Arizona
    - Electronic Testing Equipment, Soldering, Computer Systems, Coding

# Mechanical Engineering Internships

- Orbital ATK – Promontory Point, Utah – Summer 2001
  - ATK Launch Systems, NASA Space Shuttle Program
    - Design & analysis of complex machinery used in propellant processing and final integration of NASA Space Shuttle Solid Rocket Boosters (SRB) using I-DEAS CAD/FEA
- Medtronic – Tempe, Arizona – Fall 2001
  - Microelectronic Failure Analysis Laboratory
    - Research Assistant in the study of microscopic structural failures in semiconductors of portable medical devices
- General Motors – Romulus, Michigan – Summer 2000
  - Powertrain Division
    - Design updates of machinery used in the production line of V8 and V12 automobile and truck engines

# Honeywell International

- Honeywell Aerospace Division, Defense & Space Markets, JSF F-35 Program, JAXA JEM Program
  - ***Mechanical Engineer – Component Development & Test Engineer***
    - Supported qualification & acceptance testing of DoD Joint Strike Fighter F-35 aircraft engine components
    - Supported design & development of the human-rated JAXA Japanese Experimental Module (JEM) 'Kibo' Environmental Control & Life Support System (ECLSS)
      - Kibo is the largest habitat module of the International Space Station (ISS)

Honeywell

Aerospace

# L3 Technologies & Thales Group

- Aviation Communication & Surveillance Systems (ACSS), Joint-Venture Company, $T^2$CAS Program
  - ***Mechanical Engineer – Avionics Development & Test Engineer***
    - Used a Model Based Systems Engineering approach in a multi-disciplinary, geographically-dispersed engineering team with French nationals to develop, test, integrate & obtain FAA/EASA certifications for Terrain & Traffic Collision Avoidance System ($T^2$CAS), a commercial & military aircraft GNC unit
      - $T^2$CAS subsystems included
        - GPS – Global Positioning System
        - SafeRoute – Takeoff/Landing Optimizer
        - TCAS – Traffic Collision Alert System
        - TAWS – Terrain Awareness Warning System
        - Windshear – Microburst Wind Shear Warning System
        - Others


# Aerospace Service & Controls (ASC) Process Systems

- World's top producer of specialized tooling for processing of advanced aerospace composite structures
  - ***Mechanical Engineer – Structural Project Manager & Cost Account Manager (CAM)***
    - Managed product development of composite tooling for commercial corporations & government research facilities including Boeing, Raytheon, Air Force Research Lab, NASA-MSFC, NASA-LaRC


**Composite Curing Autoclave**

ASC
Process Systems

**Composite Curing Oven**

# Space Exploration Technologies (SpaceX)

- Launch & Test Group, Development & Test Facility, Falcon Rocket & Dragon Spacecraft Programs
  - ***Mechanical Engineer – Principal Structural Engineer & Cost Account Manager (CAM)***
    - Supported development, testing & integration of LOX/Kerosene & hypergolic engines, Falcon rocket stage structures & Dragon spacecraft. Managed design, analysis & fabrication projects of propulsion & structural test equipment ranging in scope and duration, valued between $10K to over $10 million

# Lockheed Martin (LM)

- Space Systems Company (SSC), NASA Orion Program, Multiple Satellite Programs
  - ***Mechanical Engineer Senior – Lead & Supporting Structural Analyst***
    - Lead & conduct structural analysis of primary & secondary structures of human-rated Orion spacecraft subsystems including:
      - Thermal Protection Systems (TPS)
      - Propulsion Systems
      - Crew Module (CM) Structures
      - Crew Module Adapter (CMA) Structures
      - Environmental Control & Life Support Systems (ECLSS)
      - Launch Abort System
      - Avionics Power & Wiring (APW)
      - Mechanisms
    - Support design, assembly, test & integration of LEO & GEO satellites of the A2100 platform

# Life Interests & Hobbies

- Very active in the community leading or participating in STEM outreach activities geared for K-12 and college students from underrepresented and/or underserved populations
- Continuously learning design & analysis tools and full spectrum leadership skills
- Enjoy spending time with family, trying ethnic foods, exploring the outdoors, traveling, playing and watching soccer, snowboarding and mountain biking
- Live in Littleton, Colorado, married to Pansy and have three kids Evan, Ryan & Amy