

WELCOME

Marshall Space Flight Center

"NASA's Center of Excellence for Space Propulsion"

Industry Briefing

Video Image Stabilization and Registration

VISAR

March 24, 1999

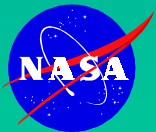


Agenda

VISAR Industry Briefing

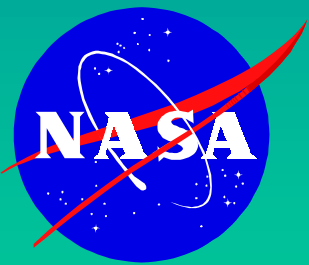
8:30 a.m.	Registration, Coffee, and Private Q&A Sign Up	
9:00 a.m.	Welcome	Sammy Nabors, Technology Transfer Office
9:10 a.m.	NASA Commercialization	Sally Little, Director of Technology Transfer Office
9:30 a.m.	VISAR—Technical Briefing and Demonstration	David Hathaway & Paul Meyer, MSFC Inventors
10:15 a.m.	Break and Private Q&A Sign Up	
10:30 a.m.	Intellectual Property and Partnership Agreements	Jim McGroary, MSFC Patent Counsel
10:45 a.m.	Commercialization Plans	Jody Page, RTI
11:00 a.m.	CruiseCam—VISAR & Law Enforcement Distribution	Scott Watkins, GRP
11:10 a.m.	SARGE—A Real-Time VISAR Application	Phil Jolley, Summa Technologies Inc.
11:20 a.m.	FaceCard—A Real-Time VISAR Application	Francine Prokoski, Mikos
11:30 a.m.	Questions	
12:00 p.m.	Private Q&A sessions with NASA and RTI	

March 24, 1999



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Welcome



Sammy Nabors
Technology Transfer Office
Marshall Space Flight Center

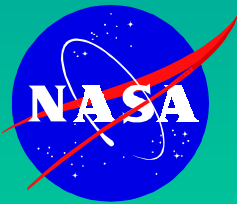
March 24, 1999

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Technology Commercialization

Partnerships for US Competitiveness



Sally Little, Director
MSFC Technology Transfer Office

March 24, 1999



MSFC then ...

***Our strong
history is the
basis for an
exciting
future.***

MSFC then ...

Our strong history is the basis for an exciting future.

- Wernher Von Braun
- Explorer satellites
- Jupiter and Jupiter-C rockets
- Pershing, the Redstone rocket
- Saturn rockets
- Skylab

MSFC now ...

*NASA's
premier
organization
for ...*

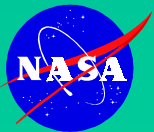


MSFC now ...

*NASA's
premier
organization
for ...*

- Space transportation and propulsion systems
- Microgravity research
- Space optics manufacturing technologies

TTO Mission Areas

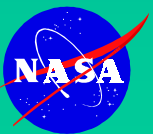


- National, Regional and Local Strategic Alliances
- Technology Education and Outreach for Economic Development
- Facilities Commercialization
- New Technology Reporting
- Technology and Software Commercialization
- Technology Deployment Partnerships
- (SBIR) Small Business Innovative Research and (STTR) Small Business Technology Transfer Research



Technology Commercialization

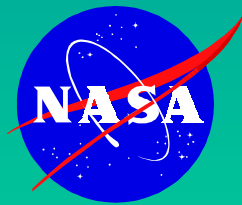
- Identifying new opportunities for the application of developed ideas
- Space Act of 1958
- Flexible approaches to facilitate government-industry partnerships
- Commercialization partnerships via license



The End

Technology Commercialization

Partnerships for US Competitiveness



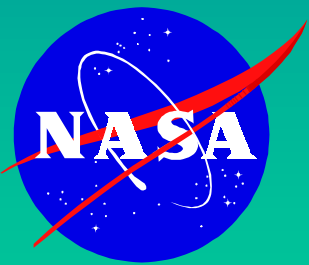
Sally Little, Director TTO
MSFC - A Resource for Industry

March 24, 1999





Video Image Stabilization and Registration



Paul Meyer & David Hathaway
Marshall Space Flight Center

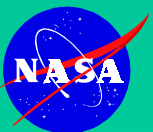
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What is VISAR

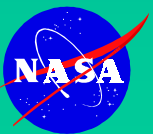
- Video processing algorithm to co-align video image fields by removing the effects of:
 - Translation
 - Magnification
 - Rotation
- Currently implemented in post-processing software.
- The algorithm may be implemented in firmware / hardware.





Why Did NASA Develop VISAR

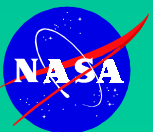
- Law enforcement requested NASA to aid them with video evidence from an important crime scene.
- They knew NASA understood imagery and was capable of working the problem.





VISAR Benefits

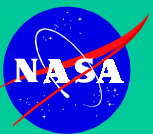
- Goes beyond horizontal and vertical jitter to stabilize camera rotation **AND** zoom effects
- Stabilizes images, even against moving backgrounds or foregrounds
- "Unblurs" moving images
- Smooths jagged edges of images
- Enhances still images from video (co-added frames)
- Reduces video noise, or "snow"





VISAR Applications

- Video production post-processing
- Law enforcement and security videos (forensics)
- Automobile cameras (race cars, police cars)
- Scientific and Medical Imaging
- Instant replays of sporting events
- Microscopes where cell or crystal activity move over time
- Security systems and security ID screening
- Moving or vibrating inspection platforms
- Aircraft and remote control vehicle cameras
- Targeting Systems-on board missiles, laser guidance
- Engineering analysis-automobile crash tests, rocket motor test firings

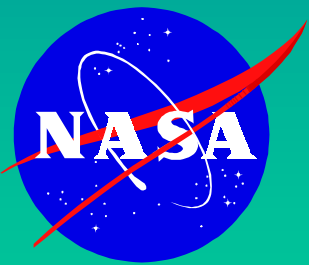


Demonstration

- Video tape
- Run software



Licensing and Partnership Aspects



Jim McGroary

Office of the Chief Counsel

Marshall Space Flight Center

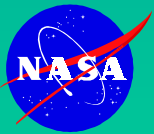
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Why Does NASA License Technology?

- Transfer technology to benefit U.S. economy
- Protect investments made by industry to commercialize the NASA technology
- Income from Royalties
- Sharing of Royalties with Inventors provides Incentive to participate in technology transfer



LICENSING
PROGRAM

Licensing Process

NASA Files Patent

**Market & Announce
Availability for Licensing**

**Review License Applications/
Initial Selection of Licensee(s)**

**Publish Notice in the Federal
Register (exclusive only)**

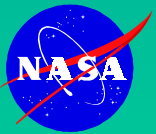
Final Selection of Licensee(s)

**Negotiate/Execute
License Agreement**



Patent Status

- Completed Patent Novelty Search
- Filed U.S. Provisional Patent Application
- No licenses can be signed until a U.S. Patent Application is filed (mid-summer 1999)

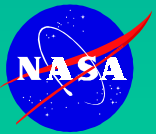


LICENSING
PROGRAM



Types of Licenses

- **Exclusive or Partially Exclusive**
 - Substantial development or production costs
 - Fields of Use, Period of Time, or Geographic Area
 - Federal Register Notice with 60-Day Comment Period
- **Nonexclusive**
 - Minimum development and production costs
 - Multiple applications

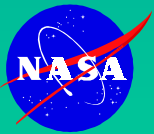


LICENSING
PROGRAM



License Agreement

- Consistent with Federal Regulations (37 CFR Part 404)
- Licensed Technology Must Be Substantially Manufactured in the U.S.
- U.S. Government Retains Irrevocable, Royalty-free Right to Use Technology
- Royalties/Fees
- Schedule and Key Milestones
- Annual Reports Required

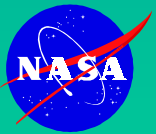


LICENSING
PROGRAM



Royalties

- Initial License Fee
- Minimum Annual Royalty
- Running Royalty

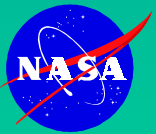


LICENSING
PROGRAM



Schedule & Key Milestones

- **Monitor Licensee's Commercialization Efforts**
 - NASA May Terminate License if Key Milestones are Not Met
 - Extremely Important for Exclusive Licenses
- **Examples of Key Milestones**
 - Commercial Prototype Complete
 - "Practical Application" - Manufacture and Commercialize Licensed Product



LICENSING
PROGRAM



Commercialization Process



Jody Page

NASA Technology Applications Team
Research Triangle Institute

March 24, 1999



Research Triangle Institute



- Not-for-profit, independent research institute that serves clients in the US and abroad
- Established in 1958 as the initial R&D center in the Research Triangle Park
- Technology transfer assistance to NASA for over 30 years



RTI's Role

- **Identify potential licensees, handle invitations, responses, and instructions**
- **Single point of contact for questions**
- **Non-voting advisor to MSFC for evaluation of commercialization plans**



Commercialization Process

- **Attend technology briefing**
 - Create a fair selection process
 - Select best commercialization partner(s)



Commercialization Process

- Attend technology briefing
- Preparation and submission of Summary of Intent
 - Accepted up to 21 days from briefing date (April 14, 1999)
 - Three (3) copies
 - Indicate primary contact information
 - 8-page limit (excluding appendices)



Commercialization Process

- Attend technology
- Preparation and submission of Summary of Intent
- **NASA selects finalists**
 - **Finalists** chosen approximately 21 days from Summary of Intent due date
- **Finalists submit license application**
 - 30 days
 - CFR guidelines
 - Selection of **commercial partner(s)** (30 days)



Commercialization Process

- Technology briefing and formal selection process
- Preparation and submission of commercialization plans
- NASA selects finalists
- Finalists submit license application
- **Implementation of legal documentation enabling transfer/commercialization**
 - License Agreement Types
 - Exclusive
 - Partially exclusive (geographic or field-of-use)
 - Non-exclusive



Summary of Intent

1. Company Description

- One-page limit
- Manufacturing/Technical capabilities
- Small business?
- Commercial history

2. Indication of License TYPE Sought

- Exclusive, partially exclusive, non-exclusive
- Rationale (development costs, market share, etc.)

3. Detailed Commercialization Approach

- Business and management strengths
- R&D plans
- Manufacturing, distribution, and marketing
- Specific activities to be carried out
- Role of NASA MSFC (if required)



Summary of Intent (continued)

1. Company Description
2. Indication of License TYPE Sought
3. Detailed Commercialization Approach
4. Appendices
 - Resumes of key personnel
 - Dun and Bradstreet, annual report, 10K, or comparable audited report on company
 - Other supporting documentation



Selection Criteria

■ Technical Factors

- Understanding the technology
- Available technical capabilities and facilities
- Awareness of technical challenges and constraints, plan for solving



Selection Criteria

■ Technical Factors

■ Business Factors

- Goals of project agree with company's overall mission and goals
- Clear identification of existing and potential customers
- Characterization of market, including size and estimate of penetration
- Competitive advantage and position
- Clear work/business plan, including well-defined road map to commercialization
- Demonstrated development, manufacturing, and marketing capabilities
- Financial condition of company
- Leadership and commitment of management

NASA Points of Contact

- **NASA MSFC Technology Transfer Office**
 - Manages commercialization of Marshall technologies
 - Sammy Nabors — (256) 544-5226
- **NASA MSFC Patent Counsel**
 - Jim McGroary, Patent Attorney — (256) 544-0013
 - Manages patent licensing, intellectual property rights, and partnership agreements
- **NASA's Technology Application Team**
 - Jody Page, Research Triangle Institute — (919) 541-6258
 - Assists with commercialization for six NASA centers



CruiseCam

VISAR and Law Enforcement Distribution

Scott Watkins, GRP

March 24, 1999



Law Enforcement Vehicles

Local police	175,570
Sherriff	81,024
State Police	44,443
Federal	30,000 (estimate)
Total	331,037

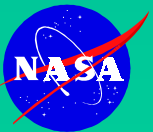
5% Increase from 1995 Data yields

Total **347,037**



Car Camera Systems

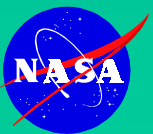
- Dash camera
- In-Compartment Camera
- In-Trunk Systems





Common Failures

- Cables and wiring
- Environmental
- Recording and camera mechanical failure
- Detachment
- Tampering



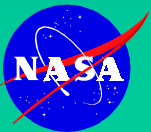


CruiseCam VSS

■ Patent Pending-February 17, 1999

■ CruiseCam Objectives

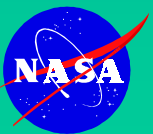
- Tamper proof
- Standardized components and workmanship
- Reduce wiring
- Potential for adding features
- Reduce cost by mass production
- 360 degree potential
- Improve space efficiencies, ergonomics, and accessibility
- Improve officer safety and passenger seat utility
- More reliable
- Primary financing
- National distribution
- Covert
- Reliable suppliers –
Panasonic, Sony, Watec, etc.





CruiseCam Markets

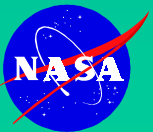
- Local, state, and federal law enforcement
- Insurance and general adjusting
- FHWA, DOT, Depart. of Commerce
- News and Broadcast
- Private Investigators
- Racing
- Real Estate
- Security
- Automobile manufacturers
- Military
- Industries using drivers
- Surveying
- Taxi cabs
- Limousines
- Aircraft





VISAR Distribution

- Marketing channels into law enforcement
- Arrange site licenses for large police departments who need multiple VISAR stations
- Offer VISAR as an option with CruiseCam in all markets





SARGE

A Real-Time VISAR Application

Phil Jolley, Summa Technologies Inc.

March 24, 1999





FaceCard

A Real-Time VISAR Application

Francine Prokoski, Mikos

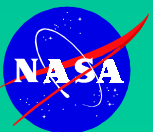
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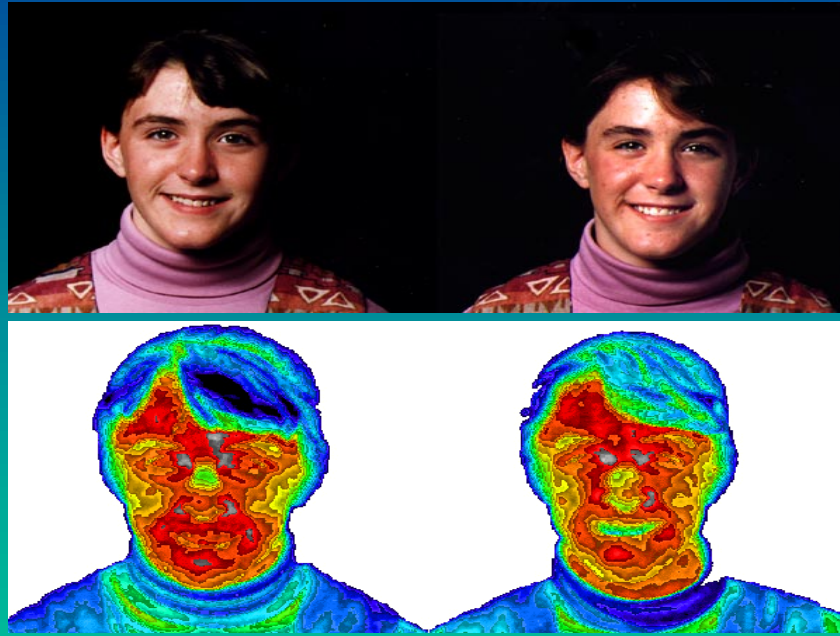


FaceCard

- Uses IR facial profile — like a fingerprint
- Smart Surveillance automatically matches every face seen in every frame against Watch Lists of persons
- Possible match produces allow / alarm / record / alert condition
- System is non-contact and operates from a distance
- Requires no cooperation or awareness by subjects



Even Identical Twins are Unique in IR



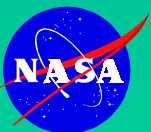
Identification utilizes the Vascular Structure seen in the IR image, not the apparent temperature values



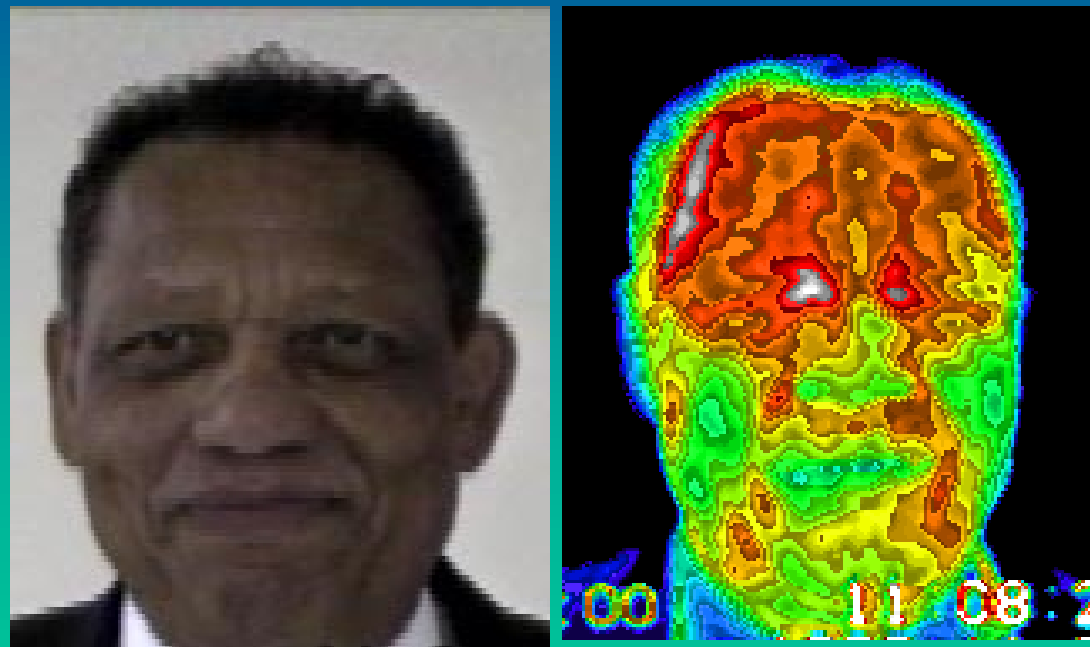
FaceCard Surveillance

Matching against a watch list

- Can utilize induced cooperation — install behind clock, alongside directory or flight display, in metal detector arch, etc.
- Systems, fixed or portable, can be deployed throughout a facility
- Both IR and visual images can be collected simultaneously
- Avoids confused files from persons with identical names and similar appearances



IR Image is Independent of Skin Tone



Variations in Visible Access Images



Variations in Corresponding IR Images





FaceCard and VISAR

- 300 ms per frame — less costly hardware
- Clarification of images needed when subject is moving
- Mikos may license VISAR, but prefers to be able to purchase a real-time VISAR solution

