SUMMARY OF RESEARCH ACCOMPLISHMENTS

Title of Cooperative Agreement:
"Online Learning Flight Control for Intelligent
Flight Control Systems (IFCS)"

Type of Report: Final - Summary of Research Accomplishments

Principal Investigator: Kevin R. Niewoehner

Period Covered: February 3, 2000 – March 16, 2001

Name and Address of Institution:
Institute for Software Research, Inc.
1000 Technology Drive, Ste. 1110
Fairmont, WV 26554
(304) 368-9300

Institution Point of Contact: Paul E. Parker, III/Vice-President

NASA Cooperative Agreement No.: NCC4-125

Date Submitted: June 15, 2001

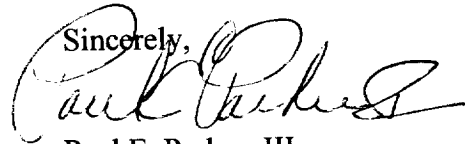# Summary of Research Accomplishments

1. Previous IFC Program (1998-1999) Data Collection and Analysis

2. IFC Program Support Site
   - Configured IFC systems support network
   - Configured Tornado/VxWorks OS development system
   - Internet accessible Configuration Management System
   - Internet accessible Documentation Management System
   - Internet accessible System Trouble Report, Engineering Change Proposal, and Contact List tracking system

3. Airborne Research Test System (ARTS) II Hardware
   - Developed Hardware Requirements Specification (Prime Item Development Specification)
   - Developing Environmental Testing Requirements
   - Developing hardware design
   - Developing hardware design document (Prime Item Product Function Specification)
   - Hardware and vendor selection
   - Hardware Procurement

4. ARTS II Software Development Laboratory Unit
   - Procurement of lab style hardware
   - Configured lab style hardware
   - Designing Interface Module equivalent to ARTS II faceplate
   - Ground Support Equipment procurement
     - Hardware and vendor selection
     - External interface simulation S/W and H/W selection

5. NASA F-15 #837 External Interface definition
   - MIL-STD-1553B MUX bus definition
   - Developing Interface Control Document

6. Program Support Documentation
   - Developed Software Development Plan
   - Developed Configuration Management Plan
   - Developing Software Verification and Validation Plan
   - Reviewed IFC V&V Process Guide Book
   - Developing System Test Plan and Description Document

7. LWR Algorithm Analysis
   - Performed timing and profiling on algorithm
   - Re-host to VxWorks 5.4 OS

8. Pre-Trained Neural Network Analysis
   - Developed Pre-Trained Neural Network Design Report
   - Performed timing and profiling on algorithm
   - Re-hosted to VxWorks 5.4 OS

9. Dynamic Cell Structures (DCS) Neural Network Analysis
   - Performing timing and profiling on algorithm
   - Developed DCS Neural Network Design Report

10. Conducted Technical Interchange and Quarterly Meetings to define IFC research goals

John Carter
June 15, 2001
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Please advise if additional reporting to your office, or otherwise, is required.

Thank you.

Sincerely,

Paul E. Parker, III
Vice-President/General Counsel

Enclosure
xc: Rhoda Parker
        John Chiappe
        CASI

Institute for Software Research, Inc.

COPY

June 15, 2001

John Carter
Technical Officer
NASA -Dryden Flight Research Center
P.O. Box 273
MS D-4840
Edwards, CA 93523

By U.S. Mail, Certified
Return Receipt Requested

Re: *Cooperative Agreement No. NCC4-125*
       Intelligent Flight Control System (IFCS) Project
       Summary of Research Accomplishments

Dear Mr. Carter:

As part of the close-out process of the above-referenced Cooperative Agreement, the Institute for Software Research, Inc. hereby submits the enclosed *Summary of Research Accomplishments*. This Summary document is submitted in compliance with Section 1260.22(b)(2) of the NASA Grant and Cooperative Agreement Handbook.

As required by 1260.22(e), copies of this report have been provided to the following:

> Rhoda Parker - DFRC Grant Negotiator
> John Chiappe – ONR Delegated Property Administrator
> NASA Center for Aerospace Information (CASI)

As you know, even though the subject Cooperative Agreement (CA) has expired, the IFCS Project continues with the follow-on work being performed under NCC4-128. The initial system development stages of the effort, including development of hardware requirements and the acquisition of hardware, conducted under the subject CA in cooperation with your office, as accomplished under the subject award laid the foundation for more extensive efforts, particularly software requirements development, now underway under the new award. The Summary provided herewith is intended to highlight the major accomplishments of the program through the expiration of NCC4-125.