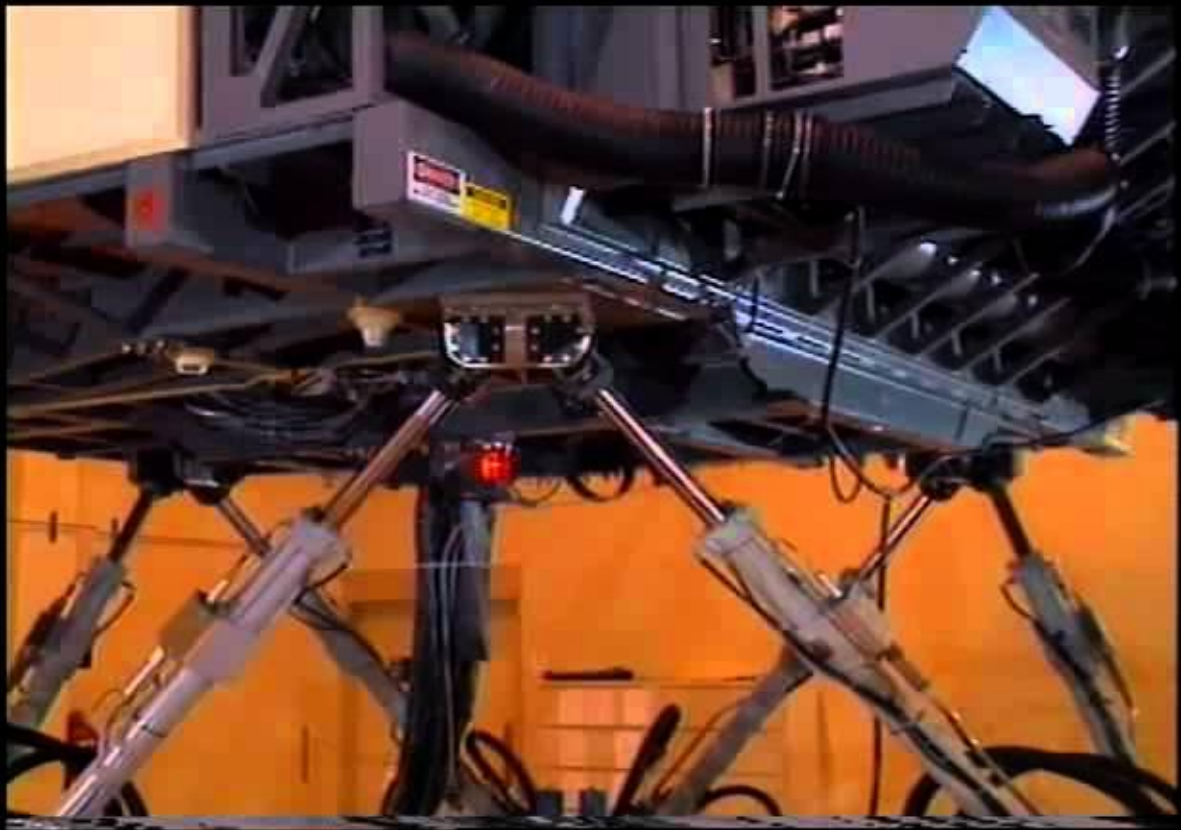

1
00:00:22,640 --> 00:00:41,910
so

2
00:00:47,430 --> 00:00:44,630
within the nasa ames research center an

3
00:00:49,750 --> 00:00:47,440
aircraft is taxing to a runway

4
00:00:53,990 --> 00:00:49,760
inside this building a pilot is being

5
00:00:58,790 --> 00:00:55,830
nasa zero seven one two cleared for

6
00:01:01,349 --> 00:00:58,800
takeoff inside this building researchers

7
00:01:03,349 --> 00:01:01,359
are doing experiments in human factors

8
00:01:09,030 --> 00:01:03,359
the relationship between humans and

9
00:01:25,109 --> 00:01:11,270
roger bay approach

10
00:01:34,870 --> 00:01:27,350
through these doors the sensation of

11
00:01:43,190 --> 00:01:37,190
you are inside the cockpit of a boeing

12
00:01:43,200 --> 00:01:46,550
the visual scene

13
00:01:46,560 --> 00:01:50,870

the controls

14
00:01:50,880 --> 00:01:53,590
the pilot

15
00:01:58,310 --> 00:01:55,830
the cockpit itself

16
00:02:00,630 --> 00:01:58,320
and the air traffic control system are

17
00:02:03,270 --> 00:02:00,640
all part of a unique research facility

18
00:02:05,190 --> 00:02:03,280
at nasa ames research center

19
00:02:08,469 --> 00:02:05,200
the manned vehicle systems research

20
00:02:11,670 --> 00:02:08,479
facility mbsrf

21
00:02:14,070 --> 00:02:11,680
this boeing 727 is one of two flight

22
00:02:19,430 --> 00:02:14,080
simulators doing human factors research

23
00:02:24,710 --> 00:02:21,430
designed primarily for the study of

24
00:02:28,150 --> 00:02:24,720
human factors human to human human to

25
00:02:31,110 --> 00:02:28,160
machine and human to system interactions

26
00:02:33,430 --> 00:02:31,120
the mvsrf provides an illusion of the

27
00:02:35,430 --> 00:02:33,440
real world and makes possible the

28
00:02:37,830 --> 00:02:35,440
accurate observation of flight crew

29
00:02:40,470 --> 00:02:37,840
behavior during normal and abnormal

30
00:02:41,990 --> 00:02:40,480
situations

31
00:02:43,910 --> 00:02:42,000
decision making

32
00:02:45,430 --> 00:02:43,920
workload management

33
00:02:48,470 --> 00:02:45,440
communications

34
00:02:50,550 --> 00:02:48,480
both in cockpit and air to ground

35
00:02:53,750 --> 00:02:50,560
problem solving

36
00:02:55,670 --> 00:02:53,760
all instruments controls and switches

37
00:02:56,790 --> 00:02:55,680
operate as they would in an actual

38
00:03:03,110 --> 00:02:56,800

aircraft

39
00:03:08,309 --> 00:03:05,670
the simulator accurately models changes

40
00:03:10,550 --> 00:03:08,319
to the aircraft both aerodynamic and

41
00:03:12,790 --> 00:03:10,560
environmental

42
00:03:14,949 --> 00:03:12,800
motion is provided by a six degree of

43
00:03:16,550 --> 00:03:14,959
freedom computer-controlled hydraulic

44
00:03:18,710 --> 00:03:16,560
system

45
00:03:21,110 --> 00:03:18,720
all of these elements combine to provide

46
00:03:22,790 --> 00:03:21,120
a flexible research environment capable

47
00:03:25,110 --> 00:03:22,800
of supporting a wide range of

48
00:03:27,509 --> 00:03:25,120
experiments

49
00:03:29,110 --> 00:03:27,519
the advanced concepts flight simulator

50
00:03:31,589 --> 00:03:29,120
is the facility's second flight

51
00:03:32,630 --> 00:03:31,599
simulator and represents a step into the

52
00:03:34,630 --> 00:03:32,640
future

53
00:03:37,190 --> 00:03:34,640
based on the expected technology of the

54
00:03:39,430 --> 00:03:37,200
mid-1990s

55
00:03:41,350 --> 00:03:39,440
the instrument panel contains seven

56
00:03:44,390 --> 00:03:41,360
electronic displays

57
00:03:46,470 --> 00:03:44,400
five with touch sensitive screens

58
00:03:49,190 --> 00:03:46,480
these displays have multiple functions

59
00:03:51,190 --> 00:03:49,200
to control aircraft systems and provide

60
00:03:52,869 --> 00:03:51,200
the majority of information presented to

61
00:03:55,350 --> 00:03:52,879
the pilot

62
00:03:57,589 --> 00:03:55,360
a voice command system allows the spoken

63
00:04:03,509 --> 00:03:57,599

word to control aircraft system

64
00:04:08,390 --> 00:04:05,750
the advanced concepts flight simulator

65
00:04:10,309 --> 00:04:08,400
system has been designed to be flexible

66
00:04:12,309 --> 00:04:10,319
allowing for rapid changes to the

67
00:04:14,470 --> 00:04:12,319
pilot's cockpit environment while

68
00:04:16,229 --> 00:04:14,480
maintaining the simulator's full mission

69
00:04:17,909 --> 00:04:16,239
capabilities

70
00:04:20,150 --> 00:04:17,919
both simulators are equipped with

71
00:04:23,270 --> 00:04:20,160
computer generated out the cockpit

72
00:04:25,110 --> 00:04:23,280
window visual displays which depict dusk

73
00:04:27,510 --> 00:04:25,120
to night scenes of many different

74
00:04:29,830 --> 00:04:27,520
airports and surroundings

75
00:04:31,990 --> 00:04:29,840
both the simulators use a four window

76
00:04:35,510 --> 00:04:32,000
visual system that shows the pilot

77
00:04:38,150 --> 00:04:35,520
forward and side views of the airport

78
00:04:40,310 --> 00:04:38,160
a unique feature of the visual system is

79
00:04:42,790 --> 00:04:40,320
its ability to present a continuous

80
00:04:44,870 --> 00:04:42,800
visual scene while flying from airport

81
00:04:47,110 --> 00:04:44,880
to airport

82
00:04:49,189 --> 00:04:47,120
an air traffic control simulator makes a

83
00:04:51,430 --> 00:04:49,199
very significant contribution to the

84
00:04:56,950 --> 00:04:51,440
realism of the experiments conducted at

85
00:05:00,710 --> 00:04:59,110
the flight crews not only communicate

86
00:05:03,510 --> 00:05:00,720
either verbally or through data

87
00:05:05,590 --> 00:05:03,520
transmission with the atc controllers

88
00:05:07,670 --> 00:05:05,600

but also hear the normal chatter

89
00:05:10,230 --> 00:05:07,680
associated with controllers talking to

90
00:05:12,390 --> 00:05:10,240
pseudo aircraft pilots controlling other

91
00:05:14,629 --> 00:05:12,400
simulated aircraft flying within their

92
00:05:16,950 --> 00:05:14,639
immediate vicinity

93
00:05:18,790 --> 00:05:16,960
action taken by the pseudo aircraft

94
00:05:20,950 --> 00:05:18,800
pilots and the test subjects in the

95
00:05:23,510 --> 00:05:20,960
flight simulators are seen on the

96
00:05:25,830 --> 00:05:23,520
simulated radar displays operated by the

97
00:05:27,670 --> 00:05:25,840
air traffic controllers in the atc

98
00:05:29,749 --> 00:05:27,680
simulator

99
00:05:31,270 --> 00:05:29,759
three independent controller stations

100
00:05:33,350 --> 00:05:31,280
are provided

101
00:05:36,150 --> 00:05:33,360
the air traffic sectors assigned to the

102
00:05:38,230 --> 00:05:36,160
controller stations are easily changed

103
00:05:40,310 --> 00:05:38,240
to follow the progress of a flight from

104
00:05:44,550 --> 00:05:40,320
takeoff to landing

105
00:05:49,510 --> 00:05:46,629
it is the function of the facility to

106
00:05:51,749 --> 00:05:49,520
support research objectives

107
00:05:53,990 --> 00:05:51,759
the experimenter operating station has

108
00:05:56,390 --> 00:05:54,000
been designed to be flexible

109
00:05:58,870 --> 00:05:56,400
it is capable of being modified to meet

110
00:06:01,270 --> 00:05:58,880
individual goals

111
00:06:02,310 --> 00:06:01,280
there are two experimenter laboratory

112
00:06:05,270 --> 00:06:02,320
stations

113
00:06:07,350 --> 00:06:05,280

one for each flight simulator

114
00:06:09,029 --> 00:06:07,360
each station contains the necessary

115
00:06:11,590 --> 00:06:09,039
equipment to communicate with the

116
00:06:14,390 --> 00:06:11,600
simulator operators control the flight

117
00:06:17,830 --> 00:06:14,400
simulator conduct the experiment and

118
00:06:21,909 --> 00:06:20,309
traffic arriving and parting runway 30

119
00:06:25,110 --> 00:06:21,919
inform approach you have information

120
00:06:32,150 --> 00:06:30,309
roger 712 heading 0-9-0

121
00:06:34,390 --> 00:06:32,160
the monitoring equipment for data

122
00:06:36,550 --> 00:06:34,400
collection and analysis provides

123
00:06:38,469 --> 00:06:36,560
time-coded recordings of hundreds of

124
00:06:40,550 --> 00:06:38,479
flight parameters

125
00:06:43,749 --> 00:06:40,560
we have a real-world fire we'd like to

126
00:06:46,150 --> 00:06:43,759
return back to san francisco

127
00:06:48,950 --> 00:06:46,160
audio and video recording systems

128
00:06:51,510 --> 00:06:48,960
capture the communications behavior and

129
00:06:53,430 --> 00:06:51,520
performance of each flight crew as well

130
00:06:57,510 --> 00:06:53,440
as the communications of the air traffic

131
00:06:59,990 --> 00:06:57,520
controllers and pseudo piloted aircraft

132
00:07:02,790 --> 00:07:00,000
the data collected is then analyzed in

133
00:07:05,270 --> 00:07:02,800
detail by the researcher to explain how

134
00:07:07,430 --> 00:07:05,280
pilots perform under actual situations

135
00:07:10,550 --> 00:07:07,440
that have been simulated

136
00:07:12,469 --> 00:07:10,560
the mvsrf is an extremely valuable

137
00:07:15,029 --> 00:07:12,479
research tool for those conducting

138
00:07:20,150 --> 00:07:15,039

studies requiring the simulation or

139
00:07:25,589 --> 00:07:22,150
the research being conducted here is

140
00:07:27,909 --> 00:07:25,599
intended to achieve two vital objectives

141
00:07:29,510 --> 00:07:27,919
improved operational efficiency of the

142
00:07:32,070 --> 00:07:29,520
airspace system

143
00:07:33,749 --> 00:07:32,080
and of greater importance improved

144
00:07:35,749 --> 00:07:33,759
aviation safety through the

145
00:07:37,270 --> 00:07:35,759
understanding and reduction of human

146
00:07:39,749 --> 00:07:37,280
error

147
00:07:42,309 --> 00:07:39,759
the nasa ames research center's manned

148
00:07:44,710 --> 00:07:42,319
vehicle systems research facility is

149
00:07:47,589 --> 00:07:44,720
contributing to the nation's present and