Through them we can live in the future that we are now creating.

1
00:00:15,589 --> 00:00:13,270
one cannot speculate for very long about

2
00:00:17,750 --> 00:00:15,599
life in the 21st century without

3
00:00:20,310 --> 00:00:17,760
mentioning the computer

4
00:00:21,429 --> 00:00:20,320
since the early 1940s its amazing

5
00:00:23,830 --> 00:00:21,439
development

6
00:00:26,150 --> 00:00:23,840
has influenced our discoveries our

7
00:00:28,790 --> 00:00:26,160
progress our knowledge and most of all

8
00:00:30,870 --> 00:00:28,800
the way we think

9
00:00:32,389 --> 00:00:30,880
by looking ahead to the future of

10
00:00:35,350 --> 00:00:32,399
computing

11
00:00:36,870 --> 00:00:35,360
we can glimpse our own future

12
00:00:39,430 --> 00:00:36,880
and in thinking about the machines of

13
00:00:40,869 --> 00:00:39,440

tomorrow we must also ask ourselves

14
00:00:42,549 --> 00:00:40,879
questions like

15
00:00:44,790 --> 00:00:42,559
where do we want to be

16
00:00:46,150 --> 00:00:44,800
what kind of society do we want what do

17
00:00:49,430 --> 00:00:46,160
we want to do

18
00:00:50,630 --> 00:00:49,440
what changes must we make

19
00:00:53,910 --> 00:00:50,640
just as

20
00:00:56,869 --> 00:00:53,920
sharing a network amplifies the power

21
00:00:59,910 --> 00:00:56,879
and intelligence of individual computers

22
00:01:01,750 --> 00:00:59,920
so too dialogue amplifies and extends

23
00:01:03,270 --> 00:01:01,760
human vision

24
00:01:04,710 --> 00:01:03,280
with this in mind we at the lewis

25
00:01:07,750 --> 00:01:04,720
research center

26
00:01:10,230 --> 00:01:07,760
offer our hopes and our dreams about the

27
00:01:12,789 --> 00:01:10,240
future of computing

28
00:01:15,510 --> 00:01:12,799
by sharing just a few of the many

29
00:01:16,789 --> 00:01:15,520
diverse perspectives that exist

30
00:01:18,950 --> 00:01:16,799
we hope

31
00:01:20,550 --> 00:01:18,960
to begin a provocative chain of thought

32
00:01:22,870 --> 00:01:20,560
that begins with you

33
00:01:56,230 --> 00:01:22,880
the viewer of this dialogue

34
00:01:59,670 --> 00:01:57,350
i think

35
00:02:03,429 --> 00:01:59,680
everything's going to come down to to

36
00:02:05,749 --> 00:02:03,439
information and communication computers

37
00:02:08,790 --> 00:02:05,759
today are about the same stage that the

38
00:02:10,710 --> 00:02:08,800

automobile was in about 1915 or so and

39
00:02:11,990 --> 00:02:10,720
the networks are going to have to expand

40
00:02:13,670 --> 00:02:12,000
in the same way that the highway system

41
00:02:15,830 --> 00:02:13,680
has expanded since then the most

42
00:02:17,910 --> 00:02:15,840
important component

43
00:02:20,070 --> 00:02:17,920
of division of the future

44
00:02:22,790 --> 00:02:20,080
is the emerging

45
00:02:28,150 --> 00:02:22,800
information super highway

46
00:02:30,630 --> 00:02:28,160
operate at 2.4

47
00:02:34,390 --> 00:02:30,640
gigabits per second

48
00:02:36,470 --> 00:02:34,400
that's 2.4 almost two and a half

49
00:02:39,110 --> 00:02:36,480
thousand million

50
00:02:41,270 --> 00:02:39,120
bits per second

51
00:02:43,990 --> 00:02:41,280
this highway will have

52
00:02:48,150 --> 00:02:44,000
entrance and exit ramps that will reach

53
00:02:50,710 --> 00:02:48,160
into every facet of your life

54
00:02:54,070 --> 00:02:50,720
this highway

55
00:02:55,589 --> 00:02:54,080
unlike the concrete highway that carries

56
00:02:57,430 --> 00:02:55,599
your car

57
00:02:59,350 --> 00:02:57,440
will be composed

58
00:03:01,350 --> 00:02:59,360
of fiber optics

59
00:03:03,589 --> 00:03:01,360
i just kind of picture that that most

60
00:03:05,350 --> 00:03:03,599
people will just have

61
00:03:07,350 --> 00:03:05,360
kind of the equivalent to a to a hand

62
00:03:10,229 --> 00:03:07,360
calculator that will just patch them

63
00:03:12,309 --> 00:03:10,239

into the local network wherever they

64
00:03:14,550 --> 00:03:12,319
happen to be just because of their

65
00:03:15,830 --> 00:03:14,560
their presence to it in the future i

66
00:03:18,550 --> 00:03:15,840
think 30 years from now you'll see a

67
00:03:21,110 --> 00:03:18,560
combination of a telephone and a

68
00:03:23,270 --> 00:03:21,120
computer probably in

69
00:03:25,509 --> 00:03:23,280
in 20 or 30 years

70
00:03:27,589 --> 00:03:25,519
everyone will have a pc

71
00:03:28,470 --> 00:03:27,599
then like we carry around credit cards

72
00:03:30,710 --> 00:03:28,480
now

73
00:03:32,630 --> 00:03:30,720
maybe they'll even be that small

74
00:03:35,509 --> 00:03:32,640
i remember looking at the cartoon the

75
00:03:38,149 --> 00:03:35,519
jetsons and for some reason i have in my

76
00:03:40,149 --> 00:03:38,159
vision that eventually that would

77
00:03:43,830 --> 00:03:40,159
actually happen to where computers would

78
00:03:46,229 --> 00:03:43,840
be everywhere something that part of you

79
00:03:48,789 --> 00:03:46,239
will respond to you it will respond to

80
00:03:51,509 --> 00:03:48,799
voice commands we respond to motion

81
00:03:53,990 --> 00:03:51,519
we'll respond to video

82
00:03:55,509 --> 00:03:54,000
it will be an extension of you as a

83
00:03:57,270 --> 00:03:55,519
human being

84
00:03:59,589 --> 00:03:57,280
it'll just be all around us and we won't

85
00:04:01,509 --> 00:03:59,599
even think about it anymore

86
00:04:03,589 --> 00:04:01,519
i think the classroom of the future

87
00:04:06,149 --> 00:04:03,599
won't be in one place

88
00:04:08,550 --> 00:04:06,159

we've all heard about

89
00:04:11,190 --> 00:04:08,560
distance learning

90
00:04:14,309 --> 00:04:11,200
in most aspects this is still

91
00:04:16,629 --> 00:04:14,319
in pilot project form

92
00:04:18,949 --> 00:04:16,639
i imagine with the super highway i

93
00:04:21,349 --> 00:04:18,959
vision or my vision is

94
00:04:22,710 --> 00:04:21,359
it will be part of our way of doing

95
00:04:25,110 --> 00:04:22,720
business

96
00:04:27,030 --> 00:04:25,120
as we are able to provide

97
00:04:29,909 --> 00:04:27,040
remote communication

98
00:04:33,189 --> 00:04:29,919
and remote methods of access and much

99
00:04:35,590 --> 00:04:33,199
more user-friendly access the librarian

100
00:04:37,990 --> 00:04:35,600
will no longer be needed to

101
00:04:40,230 --> 00:04:38,000
identify what types of information to

102
00:04:41,749 --> 00:04:40,240
collect but more

103
00:04:45,030 --> 00:04:41,759
they will be needed to collect

104
00:04:47,749 --> 00:04:45,040
information beyond the factual level

105
00:04:49,189 --> 00:04:47,759
towards the knowledge level at oai one

106
00:04:51,030 --> 00:04:49,199
of the things that we've started to do

107
00:04:53,110 --> 00:04:51,040
is to put in a television classroom at

108
00:04:55,110 --> 00:04:53,120
each of our member universities

109
00:04:58,150 --> 00:04:55,120
distances will disappear

110
00:04:59,030 --> 00:04:58,160
we are linking together students

111
00:05:00,950 --> 00:04:59,040
here

112
00:05:03,670 --> 00:05:00,960
at in the workplace at nasa lewis

113
00:05:05,590 --> 00:05:03,680

research center and instructors and

114
00:05:07,830 --> 00:05:05,600
students

115
00:05:08,830 --> 00:05:07,840
at universities all over the state if

116
00:05:13,110 --> 00:05:08,840
you

117
00:05:15,670 --> 00:05:13,120
have team members who are located at

118
00:05:18,070 --> 00:05:15,680
geographically separated distances

119
00:05:20,390 --> 00:05:18,080
and can be connected so that

120
00:05:22,550 --> 00:05:20,400
they really feel like they are together

121
00:05:24,390 --> 00:05:22,560
it's got to help it's just got to add to

122
00:05:26,150 --> 00:05:24,400
this this ability

123
00:05:29,189 --> 00:05:26,160
on demand

124
00:05:31,510 --> 00:05:29,199
you will form dialogue groups

125
00:05:34,310 --> 00:05:31,520
well beyond anything that group

126
00:05:36,790 --> 00:05:34,320
philosopher plato ever envisioned as he

127
00:05:38,710 --> 00:05:36,800
lectured his student aristotle

128
00:05:40,150 --> 00:05:38,720
i think you see in the world today that

129
00:05:42,870 --> 00:05:40,160
there's more of a common global

130
00:05:44,469 --> 00:05:42,880
understanding and maybe a lot of the

131
00:05:46,390 --> 00:05:44,479
barriers that we have international

132
00:05:59,110 --> 00:05:46,400
barriers will begin to melt at least i

133
00:05:59,120 --> 00:06:15,430
so

134
00:06:19,029 --> 00:06:18,230
the ability to design

135
00:06:24,230 --> 00:06:19,039
a

136
00:06:25,670 --> 00:06:24,240
going to free us up with the computer

137
00:06:27,990 --> 00:06:25,680
freeing up

138
00:06:30,629 --> 00:06:28,000

the engineer in the sense that his

139
00:06:33,189 --> 00:06:30,639
wildest thoughts can be tested out in a

140
00:06:34,469 --> 00:06:33,199
sense of reality will free him almost

141
00:06:37,430 --> 00:06:34,479
from the rigid

142
00:06:39,590 --> 00:06:37,440
constraints of of the past

143
00:06:41,189 --> 00:06:39,600
you may have a theory you may have an

144
00:06:43,029 --> 00:06:41,199
equation or formula that tells you how

145
00:06:45,189 --> 00:06:43,039
something is supposed to behave

146
00:06:47,110 --> 00:06:45,199
but most people i know can't visualize

147
00:06:49,110 --> 00:06:47,120
formulas very effectively it would be

148
00:06:52,710 --> 00:06:49,120
very nice to be able to have a system

149
00:06:54,950 --> 00:06:52,720
for example a truly intelligent computer

150
00:06:57,029 --> 00:06:54,960
system that allowed you to interact with

151
00:06:59,430 --> 00:06:57,039
a with the computer capabilities that

152
00:07:00,629 --> 00:06:59,440
you have both symbolic and numeric and

153
00:07:02,390 --> 00:07:00,639
graphic

154
00:07:04,629 --> 00:07:02,400
on a high level it is what you might

155
00:07:07,029 --> 00:07:04,639
want to really like to do is go into a

156
00:07:09,749 --> 00:07:07,039
rotating engine if you could in a

157
00:07:11,510 --> 00:07:09,759
numerical model and perhaps using a

158
00:07:12,390 --> 00:07:11,520
glove

159
00:07:14,629 --> 00:07:12,400
or

160
00:07:16,309 --> 00:07:14,639
your body walking through the engine and

161
00:07:18,870 --> 00:07:16,319
positioning through it to see a

162
00:07:21,110 --> 00:07:18,880
graphical image of whether it's pressure

163
00:07:25,270 --> 00:07:21,120

data temperature data accelerometers

164
00:07:27,350 --> 00:07:25,280
velocimeters displacement transducers

165
00:07:29,990 --> 00:07:27,360
whatever phenomenon physical phenomena

166
00:07:33,029 --> 00:07:30,000
you're trying to see to see a graphical

167
00:07:35,510 --> 00:07:33,039
image or video image of that data as you

168
00:07:37,589 --> 00:07:35,520
would move around through the engine i

169
00:07:39,749 --> 00:07:37,599
envision some kind of holographic type

170
00:07:41,909 --> 00:07:39,759
workstation where you'll have

171
00:07:43,510 --> 00:07:41,919
an imaging setup where you'll actually

172
00:07:45,990 --> 00:07:43,520
see engineering models in the

173
00:07:47,510 --> 00:07:46,000
three-dimensional form and that that

174
00:07:49,110 --> 00:07:47,520
might change a little bit exactly

175
00:07:51,430 --> 00:07:49,120
instead of having a monitor you're gonna

176
00:07:53,430 --> 00:07:51,440
more have more or less have a stage

177
00:07:55,430 --> 00:07:53,440
where a lot of these things will be uh

178
00:07:58,309 --> 00:07:55,440
projected and you might even be able to

179
00:08:00,790 --> 00:07:58,319
do tests and run them and see the 3d

180
00:08:02,390 --> 00:08:00,800
holographic image move into animation

181
00:08:04,790 --> 00:08:02,400
while you're doing some kind of test on

182
00:08:06,550 --> 00:08:04,800
it we're already seeing some changes in

183
00:08:08,790 --> 00:08:06,560
that because you can do parametric

184
00:08:10,790 --> 00:08:08,800
studies with mathematical models you

185
00:08:12,390 --> 00:08:10,800
very seldom do parametric studies in the

186
00:08:15,110 --> 00:08:12,400
experiment anymore

187
00:08:17,110 --> 00:08:15,120
you do experiments very carefully with

188
00:08:19,589 --> 00:08:17,120

lots of instrumentation and you do a few

189
00:08:21,990 --> 00:08:19,599
experiments very very well instead of

190
00:08:23,830 --> 00:08:22,000
doing lots of different experiments

191
00:08:26,309 --> 00:08:23,840
where you would just change a parameter

192
00:08:28,390 --> 00:08:26,319
slightly and rerun the experiment you

193
00:08:29,990 --> 00:08:28,400
also use mathematical models and

194
00:08:31,909 --> 00:08:30,000
computers to

195
00:08:34,790 --> 00:08:31,919
predict where the interesting phenomena

196
00:08:36,709 --> 00:08:34,800
will occur i think that the future of

197
00:08:39,269 --> 00:08:36,719
computers to predict the performance of

198
00:08:41,909 --> 00:08:39,279
liquid chemical rocket engine systems

199
00:08:43,829 --> 00:08:41,919
entire systems from tank to nozzle exit

200
00:08:46,070 --> 00:08:43,839
is very promising and we'll be able to

201
00:08:47,110 --> 00:08:46,080
do some amazing technical things at that

202
00:08:48,790 --> 00:08:47,120
point

203
00:08:51,430 --> 00:08:48,800
people already are doing

204
00:08:53,590 --> 00:08:51,440
some some calculations with the direct

205
00:08:55,910 --> 00:08:53,600
numerical simulation of turbulence and

206
00:08:57,350 --> 00:08:55,920
transition types of studies for

207
00:09:00,070 --> 00:08:57,360
navier-stokes equations you'll be able

208
00:09:01,990 --> 00:09:00,080
to do that for chemically reacting flows

209
00:09:03,350 --> 00:09:02,000
you'll be able to do very complex

210
00:09:05,110 --> 00:09:03,360
problems

211
00:09:07,190 --> 00:09:05,120
one of the projects that's going on at

212
00:09:09,110 --> 00:09:07,200
lewis right now is this project of

213
00:09:11,350 --> 00:09:09,120

trying to simulate an entire jet engine

214
00:09:13,509 --> 00:09:11,360
as it's running we'll have a much better

215
00:09:16,790 --> 00:09:13,519
handle i think on on

216
00:09:18,790 --> 00:09:16,800
methods of failure and materials on on

217
00:09:19,750 --> 00:09:18,800
things that allow us to design things

218
00:09:23,430 --> 00:09:19,760
design

219
00:09:24,949 --> 00:09:23,440
objects airplanes spacecraft whatever

220
00:09:27,269 --> 00:09:24,959
a lot more cutting edge in the sense

221
00:09:30,550 --> 00:09:28,470
we can make things strong where they

222
00:09:31,829 --> 00:09:30,560
need to be strong we don't need to put

223
00:09:33,670 --> 00:09:31,839
excess weight where they don't need to

224
00:09:35,670 --> 00:09:33,680
be heavy i do see

225
00:09:37,670 --> 00:09:35,680
developing as time goes on and is

226
00:09:40,389 --> 00:09:37,680
starting to happen now is a change in

227
00:09:42,550 --> 00:09:40,399
the way we develop algorithms

228
00:09:44,790 --> 00:09:42,560
in particular what i'm talking about

229
00:09:46,870 --> 00:09:44,800
first is that if you're going to specify

230
00:09:48,150 --> 00:09:46,880
the algorithm explicitly you would be

231
00:09:50,470 --> 00:09:48,160
writing a

232
00:09:52,470 --> 00:09:50,480
dealing with a program which is writing

233
00:09:54,630 --> 00:09:52,480
the program that his programs will be

234
00:09:57,430 --> 00:09:54,640
writing programs to the extent that

235
00:09:59,750 --> 00:09:57,440
computing can model and help us

236
00:10:02,070 --> 00:09:59,760
understand and deal with irrational

237
00:10:02,949 --> 00:10:02,080
things fuzzy logic neural network

238
00:10:04,710 --> 00:10:02,959

whatever

239
00:10:07,430 --> 00:10:04,720
i'm not sure what those will be but i

240
00:10:10,310 --> 00:10:07,440
think the challenge for computing is

241
00:10:12,150 --> 00:10:10,320
in modeling what goes on in the world

242
00:10:14,470 --> 00:10:12,160
computing particularly high performance

243
00:10:16,550 --> 00:10:14,480
computing offers us a chance of

244
00:10:18,150 --> 00:10:16,560
investigating those concepts

245
00:10:19,910 --> 00:10:18,160
another thing that it allows us to do

246
00:10:21,350 --> 00:10:19,920
which we weren't able to do in the very

247
00:10:23,030 --> 00:10:21,360
early days

248
00:10:25,350 --> 00:10:23,040
is to work together

249
00:10:28,150 --> 00:10:25,360
in teams when we're not living together

250
00:10:30,470 --> 00:10:28,160
or at least co-located in teams with

251
00:10:31,990 --> 00:10:30,480
high-speed networking and with powerful

252
00:10:34,069 --> 00:10:32,000
workstations

253
00:10:35,990 --> 00:10:34,079
it's possible to carry on a conversation

254
00:10:37,990 --> 00:10:36,000
among four or five people right through

255
00:10:39,990 --> 00:10:38,000
the uh the computer

256
00:10:41,350 --> 00:10:40,000
where ideas can be bounced off each

257
00:10:42,310 --> 00:10:41,360
other and

258
00:10:45,509 --> 00:10:42,320
tested

259
00:10:46,870 --> 00:10:45,519
and with simulation of what's actually

260
00:10:48,790 --> 00:10:46,880
going to happen

261
00:10:49,990 --> 00:10:48,800
ideas can be tested

262
00:10:50,790 --> 00:10:50,000
quickly

263
00:10:53,670 --> 00:10:50,800

and

264
00:10:55,509 --> 00:10:53,680
that makes it kind of neat it's it's the

265
00:10:56,949 --> 00:10:55,519
ability to do things that not only are

266
00:10:57,990 --> 00:10:56,959
going to be cheaper to do now that we

267
00:10:59,590 --> 00:10:58,000
couldn't do

268
00:11:00,949 --> 00:10:59,600
but in ways we can get information that

269
00:11:03,110 --> 00:11:00,959
we couldn't have gotten

270
00:11:05,990 --> 00:11:03,120
and so we can make decisions based on

271
00:11:31,190 --> 00:11:06,000
more information now with the computing

272
00:11:38,470 --> 00:11:35,670
i i have seen computing change from uh

273
00:11:40,949 --> 00:11:38,480
from the card program calculator where

274
00:11:44,310 --> 00:11:40,959
you had those horrible cards to what

275
00:11:46,550 --> 00:11:44,320
we're having now we put the cards uh in

276
00:11:48,790 --> 00:11:46,560
a uh in a tray and be picked up in a

277
00:11:50,550 --> 00:11:48,800
truck from the deb and carried over to

278
00:11:51,829 --> 00:11:50,560
the 10 by 10 where the computer was and

279
00:11:54,150 --> 00:11:51,839
then run

280
00:11:56,710 --> 00:11:54,160
and then transported back one of the

281
00:11:59,750 --> 00:11:56,720
first big machines we got was the 704

282
00:12:01,829 --> 00:11:59,760
that had 32k

283
00:12:04,230 --> 00:12:01,839
words of 36

284
00:12:07,990 --> 00:12:04,240
words of memory

285
00:12:09,910 --> 00:12:08,000
and that now i can get on a pc for about

286
00:12:12,150 --> 00:12:09,920
less than two thousand dollars at that

287
00:12:14,310 --> 00:12:12,160
point we paid a good deal of money for

288
00:12:15,750 --> 00:12:14,320

that machine

289
00:12:16,949 --> 00:12:15,760
and thought we had something really

290
00:12:20,230 --> 00:12:16,959
great

291
00:12:22,230 --> 00:12:20,240
we had theories and theories

292
00:12:25,190 --> 00:12:22,240
always were far ahead of what we were

293
00:12:27,350 --> 00:12:25,200
capable of doing and in less than five

294
00:12:29,590 --> 00:12:27,360
years most of the theories were all

295
00:12:34,150 --> 00:12:29,600
caught up with in terms of the calculate

296
00:12:38,310 --> 00:12:34,160
the computers as of today i think that

297
00:12:40,470 --> 00:12:38,320
we're seeing the the seeds of a

298
00:12:42,550 --> 00:12:40,480
different type of machine that i think

299
00:12:43,829 --> 00:12:42,560
is going to become

300
00:12:45,509 --> 00:12:43,839
much more

301
00:12:47,910 --> 00:12:45,519
predominant in the future and the seeds

302
00:12:49,750 --> 00:12:47,920
i'm referring to is the infant work in

303
00:12:51,670 --> 00:12:49,760
neural networks so

304
00:12:52,710 --> 00:12:51,680
what you're looking for is a symbiosis

305
00:12:54,870 --> 00:12:52,720
between

306
00:12:57,910 --> 00:12:54,880
the number crunching capabilities of

307
00:12:59,750 --> 00:12:57,920
current day computers

308
00:13:02,389 --> 00:12:59,760
the qualitative decision making

309
00:13:03,990 --> 00:13:02,399
capability of expert system

310
00:13:06,790 --> 00:13:04,000
style ai

311
00:13:07,910 --> 00:13:06,800
and then the intuition

312
00:13:10,150 --> 00:13:07,920
sort of

313
00:13:13,509 --> 00:13:10,160

that neurons can capture

314
00:13:15,750 --> 00:13:13,519
then you have something that

315
00:13:16,870 --> 00:13:15,760
starts to look like and behave like

316
00:13:19,430 --> 00:13:16,880
perhaps

317
00:13:22,069 --> 00:13:19,440
like us humans do with

318
00:13:24,150 --> 00:13:22,079
one side of our brain being the logical

319
00:13:25,030 --> 00:13:24,160
decision maker another side uh bringing

320
00:13:29,110 --> 00:13:25,040
the

321
00:13:30,629 --> 00:13:29,120
brain that specialize in areas i see a

322
00:13:32,389 --> 00:13:30,639
parallel computer doing the same sort of

323
00:13:34,629 --> 00:13:32,399
thing a part of the parallel computer

324
00:13:37,670 --> 00:13:34,639
would handle the vision part part would

325
00:13:39,750 --> 00:13:37,680
handle the number crunching part

326
00:13:41,509 --> 00:13:39,760
it would specialize in different areas i

327
00:13:43,430 --> 00:13:41,519
think we're going to be moving to arena

328
00:13:45,269 --> 00:13:43,440
where you won't ask

329
00:13:48,550 --> 00:13:45,279
questions relative to the speed of a

330
00:13:51,269 --> 00:13:48,560
machine or its memory but how fast can

331
00:13:53,430 --> 00:13:51,279
it learn you could almost send him to

332
00:13:55,910 --> 00:13:53,440
training or to school

333
00:13:58,150 --> 00:13:55,920
maybe overnight with computer speeds

334
00:13:59,590 --> 00:13:58,160
and they would become a technician in

335
00:14:02,470 --> 00:13:59,600
some limited

336
00:14:04,389 --> 00:14:02,480
area of application the society of these

337
00:14:05,269 --> 00:14:04,399
technicians working together in various

338
00:14:06,710 --> 00:14:05,279

fields

339
00:14:08,470 --> 00:14:06,720
then we have another

340
00:14:09,990 --> 00:14:08,480
level of

341
00:14:12,230 --> 00:14:10,000
collective

342
00:14:14,230 --> 00:14:12,240
pseudo or virtual intelligences

343
00:14:18,710 --> 00:14:14,240
operating together and where my role is

344
00:14:20,790 --> 00:14:18,720
in that of course is to utilize them and

345
00:14:23,430 --> 00:14:20,800
input my creativity which will be very

346
00:14:25,509 --> 00:14:23,440
hard to duplicate in machines we have

347
00:14:27,350 --> 00:14:25,519
two eyes two ears and that's all we

348
00:14:29,509 --> 00:14:27,360
really can hear and see and we basically

349
00:14:30,870 --> 00:14:29,519
have one line of language in our mind we

350
00:14:33,509 --> 00:14:30,880
can't listen to six or seven

351
00:14:35,509 --> 00:14:33,519
conversations at once this machine would

352
00:14:38,069 --> 00:14:35,519
could and would handle just tons of

353
00:14:40,150 --> 00:14:38,079
input you will have a

354
00:14:42,550 --> 00:14:40,160
very capable companion

355
00:14:44,389 --> 00:14:42,560
not given certain sense but you'll have

356
00:14:46,310 --> 00:14:44,399
a much bigger memory if you ever have

357
00:14:49,110 --> 00:14:46,320
and recall

358
00:14:51,110 --> 00:14:49,120
we can be able to make decisions much

359
00:14:53,670 --> 00:14:51,120
faster than you can

360
00:14:55,509 --> 00:14:53,680
using millions of facts instead of four

361
00:14:58,230 --> 00:14:55,519
or five that you can juggle in your head

362
00:15:01,750 --> 00:14:58,240
they may way exceed our ability to

363
00:15:03,110 --> 00:15:01,760

assimilate and and digest facts

364
00:15:05,269 --> 00:15:03,120
but

365
00:15:06,949 --> 00:15:05,279
there is uh really uh

366
00:15:09,189 --> 00:15:06,959
not even a seed

367
00:15:11,189 --> 00:15:09,199
of creative intelligence in that

368
00:15:12,710 --> 00:15:11,199
different thinking machines will will

369
00:15:15,030 --> 00:15:12,720
actually have different personalities in

370
00:15:17,910 --> 00:15:15,040
a sense the idea that they're a servant

371
00:15:20,710 --> 00:15:17,920
that execute just what you've defined

372
00:15:22,710 --> 00:15:20,720
that era is is going to end and we're

373
00:15:24,389 --> 00:15:22,720
going to be in a whole different arena

374
00:15:51,910 --> 00:15:24,399
where they're going to be operating with

375
00:15:54,790 --> 00:15:53,509
i think some of the biggest problems in

376
00:15:55,829 --> 00:15:54,800
computing are going to be social and

377
00:15:58,310 --> 00:15:55,839
political

378
00:16:00,550 --> 00:15:58,320
uh rather than technical the more stuff

379
00:16:03,749 --> 00:16:00,560
about yourself that you put online

380
00:16:06,870 --> 00:16:05,430
the less control you have over it the

381
00:16:07,670 --> 00:16:06,880
more people are going to have access to

382
00:16:10,389 --> 00:16:07,680
it that

383
00:16:12,949 --> 00:16:10,399
maybe you don't want to have access to

384
00:16:15,030 --> 00:16:12,959
as fast as a society as we have today i

385
00:16:17,749 --> 00:16:15,040
think it's only going to get faster i

386
00:16:19,990 --> 00:16:17,759
think the biggest uh problem that

387
00:16:21,910 --> 00:16:20,000
computers can cause is the

388
00:16:24,230 --> 00:16:21,920

lack of personal contact in the human

389
00:16:26,550 --> 00:16:24,240
touch sometimes the fascination with the

390
00:16:28,230 --> 00:16:26,560
power of the tool steers you away from

391
00:16:30,870 --> 00:16:28,240
actually applying it to solve human

392
00:16:34,230 --> 00:16:30,880
problems i also have a fear of losing

393
00:16:35,110 --> 00:16:34,240
craftsmanship and skills i think that as

394
00:16:37,509 --> 00:16:35,120
we

395
00:16:39,509 --> 00:16:37,519
have a computer capability that is going

396
00:16:41,030 --> 00:16:39,519
to be able to handle more and more of

397
00:16:43,590 --> 00:16:41,040
our routine

398
00:16:45,509 --> 00:16:43,600
tasks that one of the incredible

399
00:16:47,030 --> 00:16:45,519
challenges we face

400
00:16:50,150 --> 00:16:47,040
is to

401
00:16:52,949 --> 00:16:50,160
educate kids how to solve problems how

402
00:16:54,710 --> 00:16:52,959
to be creative how to be innovative as

403
00:16:56,310 --> 00:16:54,720
opposed to regurgitating facts and

404
00:16:58,550 --> 00:16:56,320
figures because that's what computers

405
00:17:01,269 --> 00:16:58,560
are going to be able to do best for us

406
00:17:03,269 --> 00:17:01,279
we'll probably have social programs to

407
00:17:05,350 --> 00:17:03,279
make sure that we get

408
00:17:06,789 --> 00:17:05,360
cellular computers to

409
00:17:08,230 --> 00:17:06,799
everyone

410
00:17:10,230 --> 00:17:08,240
so they can have a say in the way the

411
00:17:11,669 --> 00:17:10,240
world operates you know we talked today

412
00:17:13,829 --> 00:17:11,679
about the

413
00:17:15,510 --> 00:17:13,839

potential rift between the

414
00:17:17,429 --> 00:17:15,520
calves and haves not

415
00:17:20,870 --> 00:17:17,439
growing wider

416
00:17:23,829 --> 00:17:20,880
i kind of turned that into the future

417
00:17:25,590 --> 00:17:23,839
concern for the nose and the nose knots

418
00:17:27,510 --> 00:17:25,600
it's one of those equalizer tools i

419
00:17:29,029 --> 00:17:27,520
think that can be useful to a lot of

420
00:17:30,789 --> 00:17:29,039
people to help them

421
00:17:32,870 --> 00:17:30,799
overcome some of the disadvantages they

422
00:17:34,950 --> 00:17:32,880
might have as an individual or a small

423
00:17:36,710 --> 00:17:34,960
group i'm interested mostly in adaptive

424
00:17:39,110 --> 00:17:36,720
technology since it applies to me both

425
00:17:40,310 --> 00:17:39,120
in my professional and personal life my

426
00:17:42,630 --> 00:17:40,320
hopes maybe

427
00:17:44,230 --> 00:17:42,640
like i said in my professional life is

428
00:17:46,390 --> 00:17:44,240
to have things that i can use in the

429
00:17:48,310 --> 00:17:46,400
office so that i can identify

430
00:17:50,390 --> 00:17:48,320
much more than i do now as far as

431
00:17:53,110 --> 00:17:50,400
documents and things like that

432
00:17:54,789 --> 00:17:53,120
and some added additions hopefully being

433
00:17:56,549 --> 00:17:54,799
able to

434
00:17:58,710 --> 00:17:56,559
be compatible with graphical user

435
00:18:01,190 --> 00:17:58,720
interface using speech or maybe even

436
00:18:02,710 --> 00:18:01,200
using voice recognition systems

437
00:18:05,029 --> 00:18:02,720
and for my personal life maybe a

438
00:18:07,510 --> 00:18:05,039

computerized car have a lot more

439
00:18:09,029 --> 00:18:07,520
dynamism a lot more mobility a lot more

440
00:18:10,870 --> 00:18:09,039
adaptability

441
00:18:12,950 --> 00:18:10,880
a lot more independence a lot more

442
00:18:15,990 --> 00:18:12,960
requirement for responsibility for

443
00:18:17,350 --> 00:18:16,000
education for initiative while we have

444
00:18:19,909 --> 00:18:17,360
all of these things they have not

445
00:18:21,270 --> 00:18:19,919
brought brought the world happiness it's

446
00:18:22,789 --> 00:18:21,280
brought it closer together made a

447
00:18:24,870 --> 00:18:22,799
smaller world

448
00:18:27,270 --> 00:18:24,880
we seem not to understand one another

449
00:18:29,110 --> 00:18:27,280
that seems to be quite uh prevalent

450
00:18:30,390 --> 00:18:29,120
computing can only be a tool that's

451
00:18:33,350 --> 00:18:30,400
going to help

452
00:18:35,510 --> 00:18:33,360
bringing information to us i think that

453
00:18:37,190 --> 00:18:35,520
uh

454
00:18:38,870 --> 00:18:37,200
the thing that

455
00:18:39,990 --> 00:18:38,880
humans are

456
00:18:42,950 --> 00:18:40,000
probably

457
00:18:45,750 --> 00:18:42,960
for the next 20 or 30 years i'm going to

458
00:18:48,470 --> 00:18:45,760
always be uh more capable in computers

459
00:18:50,630 --> 00:18:48,480
is of imagination

460
00:18:52,870 --> 00:18:50,640
of conceptualizing and visualizing

461
00:18:54,870 --> 00:18:52,880
things and and

462
00:18:56,789 --> 00:18:54,880
asking the question of

463
00:18:57,909 --> 00:18:56,799

how could this be different or why is

464
00:18:59,430 --> 00:18:57,919
this

465
00:19:01,750 --> 00:18:59,440
and then posing that question the

466
00:19:03,990 --> 00:19:01,760
computer and maybe finding an answer

467
00:19:05,909 --> 00:19:04,000
more and more i think what i see

468
00:19:08,470 --> 00:19:05,919
is that what knowledgeable people are