

#AskNASA



WHAT DO BECK,

NASA AND ARTIFICIAL INTELLIGENCE

HAVE IN COMMON?

1
00:00:09,750 --> 00:00:07,909
hey everybody this is beck and i'm a

2
00:00:12,870 --> 00:00:09,760
maker of music

3
00:00:14,470 --> 00:00:12,880
and like the great sun raw said space is

4
00:00:16,710 --> 00:00:14,480
the place

5
00:00:19,990 --> 00:00:16,720
and i'm farah i work at nasa and i use

6
00:00:21,590 --> 00:00:20,000
ai to explore mars and i brought a few

7
00:00:23,590 --> 00:00:21,600
friends along who knows something about

8
00:00:24,870 --> 00:00:23,600
artificial intelligence

9
00:00:26,550 --> 00:00:24,880
hi i'm joan

10
00:00:28,470 --> 00:00:26,560
hi i'm isabel

11
00:00:31,349 --> 00:00:28,480
we are both artists working with nasa

12
00:00:33,750 --> 00:00:31,359
using artificial intelligence

13
00:00:35,610 --> 00:00:33,760

this is

14

00:00:56,150 --> 00:00:35,620

ask nasa

15

00:01:00,790 --> 00:00:57,990

yeah so back you just released a set of

16

00:01:02,950 --> 00:01:00,800

new music videos uh using a lot of nasa

17

00:01:04,549 --> 00:01:02,960

imagery and i grew up living space and

18

00:01:07,429 --> 00:01:04,559

obviously those images are used by

19

00:01:09,990 --> 00:01:07,439

scientists what inspires you about space

20

00:01:12,070 --> 00:01:10,000

and how you came up with this idea well

21

00:01:14,149 --> 00:01:12,080

the title of the record came from a

22

00:01:16,550 --> 00:01:14,159

video game a really primitive video game

23

00:01:18,149 --> 00:01:16,560

from the 80s called asteroids

24

00:01:20,070 --> 00:01:18,159

when the asteroids were going to kill

25

00:01:21,350 --> 00:01:20,080

you and they would

26

00:01:23,030 --> 00:01:21,360

they were just about to collide with

27

00:01:25,749 --> 00:01:23,040

your spaceship that you would hit this

28

00:01:28,390 --> 00:01:25,759

button and it would make you disappear

29

00:01:30,630 --> 00:01:28,400

and reappear somewhere else in in the

30

00:01:32,069 --> 00:01:30,640

galaxy

31

00:01:33,510 --> 00:01:32,079

and i always wondered what that button

32

00:01:35,350 --> 00:01:33,520

was called and i looked it up one day

33

00:01:37,270 --> 00:01:35,360

and it was called hyperspace

34

00:01:40,230 --> 00:01:37,280

so i i sort of

35

00:01:42,149 --> 00:01:40,240

got my mind thinking into music and song

36

00:01:44,710 --> 00:01:42,159

ideas because i think in some way i

37

00:01:45,910 --> 00:01:44,720

think of music as sort of a hyper space

38

00:01:47,990 --> 00:01:45,920

button

39

00:01:49,990 --> 00:01:48,000

you know it's something that we

40

00:01:51,830 --> 00:01:50,000

you know we press play on a piece of

41

00:01:54,230 --> 00:01:51,840

music and it takes us somewhere out of

42

00:01:55,270 --> 00:01:54,240

our lives out of our circumstances but i

43

00:01:57,749 --> 00:01:55,280

did like

44

00:02:00,950 --> 00:01:57,759

the feeling of the music

45

00:02:03,990 --> 00:02:00,960

that there was this sort of thread of

46

00:02:04,950 --> 00:02:04,000

outer space kind of um

47

00:02:07,510 --> 00:02:04,960

wide

48

00:02:10,070 --> 00:02:07,520

vista of space and time you know

49

00:02:12,790 --> 00:02:10,080

existing in the songs

50

00:02:14,470 --> 00:02:12,800

artificial intelligence is the ability

51
00:02:17,350 --> 00:02:14,480
for machines or computers to make

52
00:02:19,589 --> 00:02:17,360
autonomous and intelligent decisions

53
00:02:22,550 --> 00:02:19,599
that can look like recognizing patterns

54
00:02:25,030 --> 00:02:22,560
or analyzing images or learning certain

55
00:02:26,550 --> 00:02:25,040
behaviors and then mimicking them

56
00:02:28,949 --> 00:02:26,560
i mean right away when we heard

57
00:02:31,430 --> 00:02:28,959
hyperspace we thought we have to use ai

58
00:02:33,509 --> 00:02:31,440
for this vec was already creating a

59
00:02:36,070 --> 00:02:33,519
sonic environment that went to like the

60
00:02:37,830 --> 00:02:36,080
edges of our our understanding and the

61
00:02:39,509 --> 00:02:37,840
way that we see and that's something

62
00:02:41,030 --> 00:02:39,519
that we're most excited about working

63
00:02:43,750 --> 00:02:41,040

with ai with but it

64

00:02:46,309 --> 00:02:43,760

expands our our modes of thinking and

65

00:02:49,110 --> 00:02:46,319

then just the title hyperspace literally

66

00:02:50,790 --> 00:02:49,120

means to go beyond three dimensions the

67

00:02:52,790 --> 00:02:50,800

one that we use for this particular

68

00:02:56,309 --> 00:02:52,800

project it literally

69

00:02:58,390 --> 00:02:56,319

works in a 512 dimensional space

70

00:03:00,550 --> 00:02:58,400

in order the the process begins with the

71

00:03:02,550 --> 00:03:00,560

ai training on the images so if we

72

00:03:04,550 --> 00:03:02,560

showed it just a few hundred it wouldn't

73

00:03:07,750 --> 00:03:04,560

know that much but what was so great

74

00:03:10,390 --> 00:03:07,760

about working with nasa's decade deep

75

00:03:12,949 --> 00:03:10,400

you know archive of knowledge is that it

76

00:03:15,830 --> 00:03:12,959

could really learn so for weeks and

77

00:03:17,589 --> 00:03:15,840

weeks the ai trained on as many images

78

00:03:20,309 --> 00:03:17,599

as we could show it i think in the end

79

00:03:22,149 --> 00:03:20,319

it looked at over 25 million images

80

00:03:23,910 --> 00:03:22,159

sometimes that was multiple times

81

00:03:25,670 --> 00:03:23,920

looking at the same images to try and

82

00:03:28,149 --> 00:03:25,680

understand these images

83

00:03:30,309 --> 00:03:28,159

yeah basically imagery of anything in

84

00:03:33,030 --> 00:03:30,319

our solar system is how we get started

85

00:03:35,030 --> 00:03:33,040

in the process of exploration right and

86

00:03:37,350 --> 00:03:35,040

so when we first went to mars or when we

87

00:03:39,270 --> 00:03:37,360

sent cassini to saturn

88

00:03:40,949 --> 00:03:39,280

we had some thoughts about what we might

89

00:03:43,670 --> 00:03:40,959

find based on that imagery and that's

90

00:03:45,670 --> 00:03:43,680

what allows us to really focus down on

91

00:03:47,830 --> 00:03:45,680

the type of science we're going to do i

92

00:03:49,910 --> 00:03:47,840

worked a lot on the database creation

93

00:03:51,430 --> 00:03:49,920

and i feel almost like i could draw a

94

00:03:54,070 --> 00:03:51,440

picture of

95

00:03:55,910 --> 00:03:54,080

the galaxy now just from going like

96

00:03:56,869 --> 00:03:55,920

anyone can do just by working with the

97

00:03:58,630 --> 00:03:56,879

nasa

98

00:04:00,949 --> 00:03:58,640

websites and going through the archives

99

00:04:02,550 --> 00:04:00,959

like the ai was then able to take that

100

00:04:05,350 --> 00:04:02,560

and

101
00:04:06,630 --> 00:04:05,360
recognize uh colors that were happening

102
00:04:08,630 --> 00:04:06,640
a lot recognize shapes that were

103
00:04:10,149 --> 00:04:08,640
happening a lot i remember when it first

104
00:04:10,949 --> 00:04:10,159
showed us what it thought saturn looked

105
00:04:12,470 --> 00:04:10,959
like

106
00:04:14,949 --> 00:04:12,480
i was blown away

107
00:04:17,509 --> 00:04:14,959
yeah and even then seeing these images

108
00:04:19,430 --> 00:04:17,519
and getting all the info it's it's it is

109
00:04:21,189 --> 00:04:19,440
overwhelming isn't it i mean we're

110
00:04:23,189 --> 00:04:21,199
talking about other worlds we're talking

111
00:04:24,710 --> 00:04:23,199
about other realities we probably won't

112
00:04:26,870 --> 00:04:24,720
ever get to

113
00:04:28,629 --> 00:04:26,880

experience in our lifetimes this is the

114

00:04:31,909 --> 00:04:28,639

closest we'll come

115

00:04:33,350 --> 00:04:31,919

to uh touching the unknown this project

116

00:04:36,070 --> 00:04:33,360

is so

117

00:04:38,310 --> 00:04:36,080

interesting because it really came out

118

00:04:40,390 --> 00:04:38,320

of the theme of the record

119

00:04:42,950 --> 00:04:40,400

i would have loved the idea of taking

120

00:04:45,110 --> 00:04:42,960

sounds from these missions in space and

121

00:04:47,590 --> 00:04:45,120

putting them into the music itself the

122

00:04:48,950 --> 00:04:47,600

coolest thing that we have coming up um

123

00:04:50,950 --> 00:04:48,960

you know which we can point you to when

124

00:04:52,710 --> 00:04:50,960

it comes out is that perseverance

125

00:04:54,790 --> 00:04:52,720

actually has two microphones on board

126
00:04:57,350 --> 00:04:54,800
it's the first time we'll have real

127
00:04:59,430 --> 00:04:57,360
audio from mars so we'll have audio as

128
00:05:01,430 --> 00:04:59,440
well landing on the planet so that

129
00:05:03,590 --> 00:05:01,440
during entry descent and landing and

130
00:05:05,749 --> 00:05:03,600
then we'll have audio when we're driving

131
00:05:07,270 --> 00:05:05,759
or um the rover has a laser and so

132
00:05:09,590 --> 00:05:07,280
you'll be able to actually hear that

133
00:05:11,510 --> 00:05:09,600
laser zap on another planet which is

134
00:05:13,350 --> 00:05:11,520
kind of something that's kind of hard to

135
00:05:15,430 --> 00:05:13,360
even wrap your mind around

136
00:05:17,430 --> 00:05:15,440
and that hasn't been recorded before no

137
00:05:18,870 --> 00:05:17,440
not with the microphone not this way

138
00:05:21,590 --> 00:05:18,880

we've never had a microphone on the

139

00:05:23,350 --> 00:05:21,600

rover okay well

140

00:05:25,990 --> 00:05:23,360

send those audio files my way when you

141

00:05:28,390 --> 00:05:26,000

get them absolutely

142

00:05:30,310 --> 00:05:28,400

so on perseverance we actually have an

143

00:05:32,469 --> 00:05:30,320

extra computer and so that extra

144

00:05:35,270 --> 00:05:32,479

computer allows us to make the rover

145

00:05:39,590 --> 00:05:35,280

smarter and we actually self-drive on

146

00:05:41,909 --> 00:05:39,600

mars so the rover has to take imagery of

147

00:05:44,629 --> 00:05:41,919

the area in front of it literally build

148

00:05:47,350 --> 00:05:44,639

its own map it can then identify

149

00:05:49,590 --> 00:05:47,360

different types of obstacles and slopes

150

00:05:52,070 --> 00:05:49,600

and based on that and its knowledge of

151

00:05:55,110 --> 00:05:52,080

where it's able to drive it decides on

152

00:05:59,909 --> 00:05:57,749

the mars database was in one of the

153

00:06:02,309 --> 00:05:59,919

easiest ones because it's where we have

154

00:06:04,629 --> 00:06:02,319

the most high resolution imagery it's

155

00:06:06,710 --> 00:06:04,639

been so well captured from so many

156

00:06:09,350 --> 00:06:06,720

different points of view we've seen the

157

00:06:11,510 --> 00:06:09,360

soil on a terrestrial level and then we

158

00:06:12,390 --> 00:06:11,520

also have imaging of mars firms from

159

00:06:14,790 --> 00:06:12,400

above

160

00:06:15,590 --> 00:06:14,800

and looking through this this data set

161

00:06:21,110 --> 00:06:15,600

of

162

00:06:23,909 --> 00:06:21,120

once we train the ai on that it was able

163

00:06:26,309 --> 00:06:23,919

to kind of produce such

164

00:06:29,029 --> 00:06:26,319

vivid strange

165

00:06:32,710 --> 00:06:29,039

imagery because mars itself i think is

166

00:06:36,540 --> 00:06:32,720

so much more complex and so much more

167

00:06:38,230 --> 00:06:36,550

deep and varied than we imagined it is

168

00:06:40,790 --> 00:06:38,240

[Music]

169

00:06:42,870 --> 00:06:40,800

okay so one more cool feature about the

170

00:06:44,870 --> 00:06:42,880

perseverance rover is that it can also

171

00:06:46,629 --> 00:06:44,880

act as a scientist

172

00:06:48,710 --> 00:06:46,639

the rover can look at the environment

173

00:06:50,550 --> 00:06:48,720

around it look at all the rocks and say

174

00:06:51,430 --> 00:06:50,560

hey this rock over there looks really

175

00:06:54,150 --> 00:06:51,440

cool

176

00:06:56,070 --> 00:06:54,160

let me image it use my laser to zap it

177

00:06:57,589 --> 00:06:56,080

and figure out what's under that surface

178

00:06:59,670 --> 00:06:57,599

send all of that data back to the

179

00:07:01,110 --> 00:06:59,680

scientists so it allows us to

180

00:07:03,510 --> 00:07:01,120

essentially have

181

00:07:05,189 --> 00:07:03,520

scientists on mars making decisions

182

00:07:06,790 --> 00:07:05,199

without having humans in the loop here

183

00:07:09,189 --> 00:07:06,800

on the ground

184

00:07:11,110 --> 00:07:09,199

i think to me the idea of space is a bit

185

00:07:13,990 --> 00:07:11,120

overwhelming and

186

00:07:15,909 --> 00:07:14,000

awe inspiring just the idea of listening

187

00:07:17,990 --> 00:07:15,919

to a piece of music and we go somewhere

188

00:07:20,950 --> 00:07:18,000

else our lives change you know it's a

189

00:07:23,830 --> 00:07:20,960

mirror to this other idea of space and

190

00:07:25,830 --> 00:07:23,840

space exploration and letting the

191

00:07:28,700 --> 00:07:25,840

imagery of these other worlds these

192

00:07:36,550 --> 00:07:28,710

unknown places with this music i think

193

00:07:43,350 --> 00:07:39,990

you know i feel uh really fortunate to

194

00:07:45,270 --> 00:07:43,360

to have you all open your doors to to me

195

00:07:47,270 --> 00:07:45,280

and my music and

196

00:07:51,990 --> 00:07:47,280

for us to go somewhere with it that was

197

00:07:52,000 --> 00:07:56,390

here let me get my video up

198

00:07:56,400 --> 00:08:00,700

we'll get it

199

00:08:00,710 --> 00:08:10,950

[Music]

200

00:08:15,189 --> 00:08:13,749

this is ask nasa

201
00:08:18,150 --> 00:08:15,199
i mean that would be the show turned

202
00:08:20,309 --> 00:08:18,160
away there's all kinds of guitars um

203
00:08:22,469 --> 00:08:20,319
this guitar is actually

204
00:08:25,430 --> 00:08:22,479
from 1901

205
00:08:27,909 --> 00:08:25,440
and it has these ivory pegs all right so

206
00:08:30,230 --> 00:08:27,919
these are some vintage keyboards and

207
00:08:34,310 --> 00:08:30,240
this is the 808 which is responsible for

208
00:08:36,790 --> 00:08:34,320
the sound of all trap music is the moog

209
00:08:38,550 --> 00:08:36,800
and uh this is responsible for most of

210
00:08:41,110 --> 00:08:38,560
the music of the 80s there's a couple of

211
00:08:45,269 --> 00:08:41,120
pedals that i use