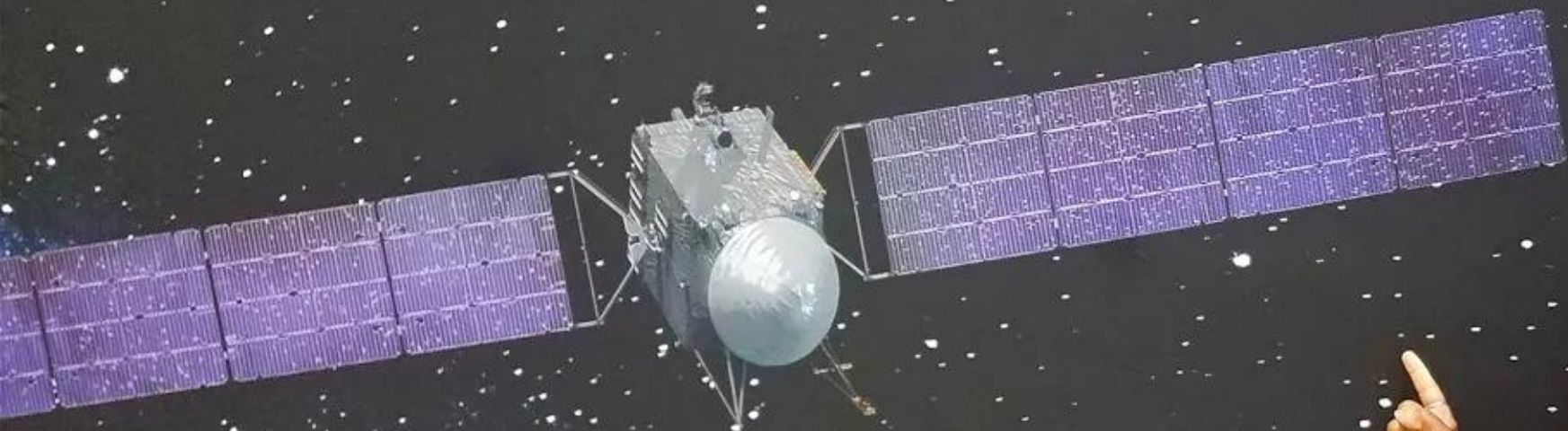


PSYCHE

JOURNEY TO A METAL WORLD

National Aeronautics and
Space Administration



1
00:00:00,050 --> 00:00:02,560

[Music]

2
00:00:08,750 --> 00:00:04,519

NASA's Jet Propulsion Laboratory

3
00:00:11,180 --> 00:00:08,760

presents the von Karman lecture a series

4
00:00:13,549 --> 00:00:11,190

of talks by scientists and engineers who

5
00:00:16,319 --> 00:00:13,559

are exploring our planet our solar

6
00:00:22,960 --> 00:00:16,329

system and all that lies beyond

7
00:00:25,820 --> 00:00:22,970

[Music]

8
00:00:27,920 --> 00:00:25,830

good evening folks wherever you may be I

9
00:00:30,170 --> 00:00:27,930

am Brian White from JPL's Office of

10
00:00:32,360 --> 00:00:30,180

Communications in education and welcome

11
00:00:34,790 --> 00:00:32,370

to a special remote edition of our von

12
00:00:37,430 --> 00:00:34,800

Karman series and normally greet you

13
00:00:40,310 --> 00:00:37,440

live from JPL von Karman auditorium

14
00:00:42,320 --> 00:00:40,320
hence the name the von Karman series but

15
00:00:45,430 --> 00:00:42,330
here we are reaching out to you from our

16
00:00:47,630 --> 00:00:45,440
respective homes the show must go on

17
00:00:49,880 --> 00:00:47,640
this evening we'll be speaking with the

18
00:00:53,119 --> 00:00:49,890
incomparable Tracy drain on how to

19
00:00:55,549 --> 00:00:53,129
become a NASA engineer what does an

20
00:00:57,890 --> 00:00:55,559
engineer do they create they build they

21
00:00:59,410 --> 00:00:57,900
test they solve problems they developed

22
00:01:02,930 --> 00:00:59,420
a plan they ask questions they

23
00:01:05,600 --> 00:01:02,940
collaborate and they dream I'd like to

24
00:01:08,120 --> 00:01:05,610
point out that Tracy's journey is not

25
00:01:10,940 --> 00:01:08,130
the only journey there is not one set

26

00:01:12,740 --> 00:01:10,950

path to get to NASA but she will be

27

00:01:14,870 --> 00:01:12,750

giving us some guideposts along the way

28

00:01:19,520 --> 00:01:14,880

some helpful tips that helped her out on

29

00:01:22,730 --> 00:01:19,530

her journey right now more than ever we

30

00:01:25,130 --> 00:01:22,740

believe in the power of connection if

31

00:01:27,200 --> 00:01:25,140

you are watching live on YouTube or

32

00:01:29,209 --> 00:01:27,210

Facebook we want you to be involved in

33

00:01:30,530 --> 00:01:29,219

this discussion ask questions in the

34

00:01:33,020 --> 00:01:30,540

chat and we will get to as many as we

35

00:01:35,510 --> 00:01:33,030

can during this show and if you're not

36

00:01:37,789 --> 00:01:35,520

seeing the chat right now refresh your

37

00:01:40,340 --> 00:01:37,799

browser and if we run into into any

38

00:01:40,670 --> 00:01:40,350

technical challenges now we'll roll with

39

00:01:44,749 --> 00:01:40,680

it

40

00:01:47,420 --> 00:01:44,759

and finally we ask that you stick around

41

00:01:48,800 --> 00:01:47,430

to the end we're gonna have a short

42

00:01:50,450 --> 00:01:48,810

little video about some of the other

43

00:01:52,969 --> 00:01:50,460

incredible things that our engineers are

44

00:01:56,240 --> 00:01:52,979

up to right now but without further ado

45

00:02:02,029 --> 00:01:56,250

let's meet our NASA engineer Tracy drain

46

00:02:04,249 --> 00:02:02,039

hi Tracy hey Brian thanks for joining us

47

00:02:06,020 --> 00:02:04,259

tonight let's just jump right into it

48

00:02:07,249 --> 00:02:06,030

don't necessarily need to give you an

49

00:02:08,779 --> 00:02:07,259

introduction because this is your path

50

00:02:11,060 --> 00:02:08,789

how did you become a NASA engineer I

51
00:02:12,350 --> 00:02:11,070
want to kind of check in with your early

52
00:02:15,260 --> 00:02:12,360
interest we I'm sure we have some

53
00:02:17,330 --> 00:02:15,270
students watching us here today yeah I

54
00:02:20,030 --> 00:02:17,340
hope that we do I had a lot of early

55
00:02:21,770 --> 00:02:20,040
interest growing up but um a lot of them

56
00:02:23,900 --> 00:02:21,780
were shaped by my mom who is very

57
00:02:26,570 --> 00:02:23,910
interested in science fiction we watched

58
00:02:28,899 --> 00:02:26,580
Star Trek and Star Wars Battlestar

59
00:02:31,009 --> 00:02:28,909
Galactica all of those cool things and

60
00:02:33,949 --> 00:02:31,019
that's part of the reason why I got

61
00:02:35,180 --> 00:02:33,959
interested in science fiction she also

62
00:02:35,640 --> 00:02:35,190
like every time it was a shuttle launch

63
00:02:36,929 --> 00:02:35,650

on

64

00:02:38,280 --> 00:02:36,939

she would pause and watch it we either

65

00:02:41,160 --> 00:02:38,290

sit there and watch it with her super

66

00:02:42,539 --> 00:02:41,170

exciting that's pretty cool actually if

67

00:02:44,130 --> 00:02:42,549

we could bring up image number two we

68

00:02:45,690 --> 00:02:44,140

got a great combination of that go to

69

00:02:47,940 --> 00:02:45,700

the NASA archives you'll find all sorts

70

00:02:51,479 --> 00:02:47,950

of wonderful things what do we have here

71

00:02:53,940 --> 00:02:51,489

Tracey I love this picture this is the

72

00:02:56,369 --> 00:02:53,950

cast of the original Star Trek standing

73

00:02:58,349 --> 00:02:56,379

next to the Space Shuttle enterprise so

74

00:03:01,039 --> 00:02:58,359

two of my very favorite things all mixed

75

00:03:06,119 --> 00:03:01,049

up together it's super cool

76
00:03:10,080 --> 00:03:06,129
quick question was this what you wanted

77
00:03:11,789 --> 00:03:10,090
to do when you were young when I was

78
00:03:13,860 --> 00:03:11,799
really little I was interested in a lot

79
00:03:16,020 --> 00:03:13,870
of things I loved arguing with my older

80
00:03:17,280 --> 00:03:16,030
brother if you're watching hi Tim and so

81
00:03:20,129 --> 00:03:17,290
I thought for a while that I wanted to

82
00:03:21,839 --> 00:03:20,139
be a liar I also love digging in my

83
00:03:23,160 --> 00:03:21,849
grandma's backyard and finding all sorts

84
00:03:25,020 --> 00:03:23,170
of weird things so I thought it might

85
00:03:27,059 --> 00:03:25,030
like to be an archaeologist I love

86
00:03:28,679 --> 00:03:27,069
flying maybe I want to be a pilot but it

87
00:03:30,390 --> 00:03:28,689
was sometime around my junior year of

88
00:03:31,920 --> 00:03:30,400

high school when I started to think

89

00:03:34,020 --> 00:03:31,930

about what am I gonna study in college

90

00:03:36,270 --> 00:03:34,030

but I won't want to do that I decided to

91

00:03:37,589 --> 00:03:36,280

go down a space track and I thought that

92

00:03:41,369 --> 00:03:37,599

that could keep me interested for my

93

00:03:43,520 --> 00:03:41,379

entire career so it was around high

94

00:03:46,830 --> 00:03:43,530

school that you you really started to

95

00:03:48,180 --> 00:03:46,840

lean into this was it something that you

96

00:03:49,349 --> 00:03:48,190

thought you could do was it something

97

00:03:52,770 --> 00:03:49,359

that you could thought you could get

98

00:03:54,509 --> 00:03:52,780

into right away I wasn't too sure about

99

00:03:57,030 --> 00:03:54,519

that actually I wanted to study

100

00:03:59,009 --> 00:03:57,040

astronomy but I'm old enough that there

101
00:04:01,020 --> 00:03:59,019
was like no real internet back then and

102
00:04:02,640 --> 00:04:01,030
I wasn't sure exactly what an astronomer

103
00:04:04,199 --> 00:04:02,650
would do and so I decided that

104
00:04:06,449 --> 00:04:04,209
engineering because I liked

105
00:04:09,210 --> 00:04:06,459
problem-solving and doing puzzles is

106
00:04:11,399 --> 00:04:09,220
something that I knew NASA would need

107
00:04:13,409 --> 00:04:11,409
and I chose mechanical engineering

108
00:04:15,719 --> 00:04:13,419
because just think if I didn't get hired

109
00:04:17,490 --> 00:04:15,729
by NASA or when the aerospace companies

110
00:04:20,149 --> 00:04:17,500
I could still do a lot of things with a

111
00:04:24,779 --> 00:04:20,159
nice broad mechanical engineering degree

112
00:04:25,890 --> 00:04:24,789
okay let's get some of the the public

113
00:04:28,140 --> 00:04:25,900

involved in this a little bit too we've

114

00:04:30,149 --> 00:04:28,150

got two questions one from Nathan on

115

00:04:32,279 --> 00:04:30,159

YouTube and one from Lexie Nathan's

116

00:04:34,620 --> 00:04:32,289

asking one of the best degrees and how

117

00:04:36,899 --> 00:04:34,630

high of a degree bachelor's master's PhD

118

00:04:38,580 --> 00:04:36,909

for an engineering job which I'm sure

119

00:04:41,969 --> 00:04:38,590

you can talk about but another question

120

00:04:43,320 --> 00:04:41,979

was is astrophysics also a good measure

121

00:04:46,950 --> 00:04:43,330

to pursue if you want to become a NASA

122

00:04:48,690 --> 00:04:46,960

engineer yes so there's a so many

123

00:04:49,629 --> 00:04:48,700

different degrees that you can choose if

124

00:04:51,399 --> 00:04:49,639

you want to be an asset

125

00:04:53,860 --> 00:04:51,409

there's the obvious ones mechanical

126

00:04:55,360 --> 00:04:53,870

aerospace electrical there's lots of

127

00:04:58,420 --> 00:04:55,370

Engineers that I knew who studied

128

00:04:59,860 --> 00:04:58,430

physics who studied astrophysics some of

129

00:05:02,050 --> 00:04:59,870

them later got degrees in engineering

130

00:05:05,070 --> 00:05:02,060

not all of them did because a lot of

131

00:05:07,390 --> 00:05:05,080

what you learn to do in school is

132

00:05:08,830 --> 00:05:07,400

problem-solving that the basic

133

00:05:10,570 --> 00:05:08,840

engineering courses are great for that

134

00:05:12,279 --> 00:05:10,580

and then when you get to work that's

135

00:05:14,260 --> 00:05:12,289

when you really learn how to do the

136

00:05:16,119 --> 00:05:14,270

specific things that you need to do to

137

00:05:20,649 --> 00:05:16,129

build spacecraft or cars or wherever you

138

00:05:23,800 --> 00:05:20,659

end up working okay where did you end up

139

00:05:26,050 --> 00:05:23,810

going to school I went to school at the

140

00:05:28,179 --> 00:05:26,060

University of Kentucky I chose it

141

00:05:29,769 --> 00:05:28,189

because well it was not too far from

142

00:05:32,379 --> 00:05:29,779

home I'm from Louisville Kentucky there

143

00:05:34,390 --> 00:05:32,389

was only about 70 miles away that made

144

00:05:36,010 --> 00:05:34,400

my mom really happy and it was a big

145

00:05:38,529 --> 00:05:36,020

enough school to have a lot of different

146

00:05:40,269 --> 00:05:38,539

majors so if I changed my mind I could

147

00:05:42,490 --> 00:05:40,279

do something else I was in the marching

148

00:05:44,619 --> 00:05:42,500

band and they had a huge like 20 piece

149

00:05:47,350 --> 00:05:44,629

marching band which was super exciting

150

00:05:49,809 --> 00:05:47,360

when I was that age and I chose

151
00:05:50,879 --> 00:05:49,819
mechanical engineering there to start my

152
00:05:53,350 --> 00:05:50,889
path

153
00:05:54,670 --> 00:05:53,360
can we bring up image five we've got a

154
00:05:56,260 --> 00:05:54,680
little bit of Tracy's path right here

155
00:05:58,510 --> 00:05:56,270
it's kind of a Cliff's Notes version of

156
00:06:00,010 --> 00:05:58,520
it but you went to grad school Kentucky

157
00:06:01,809 --> 00:06:00,020
and then there right there and then

158
00:06:02,890 --> 00:06:01,819
let's talk about grad and undergrad a

159
00:06:06,399 --> 00:06:02,900
little bit sorry not grad school

160
00:06:09,040 --> 00:06:06,409
undergrad a little bit were you

161
00:06:10,389 --> 00:06:09,050
successful right away I know it's a lot

162
00:06:12,100 --> 00:06:10,399
times people think that being a NASA

163
00:06:13,540 --> 00:06:12,110

engineer means you have to do this from

164

00:06:14,740 --> 00:06:13,550

when you're really young age you got to

165

00:06:16,480 --> 00:06:14,750

know it's the only thing you want and

166

00:06:19,480 --> 00:06:16,490

you got to be a straight-a student right

167

00:06:20,980 --> 00:06:19,490

away that's right I talk to lots of

168

00:06:22,329 --> 00:06:20,990

college students and the one thing that

169

00:06:24,399 --> 00:06:22,339

I want to make sure they take away is

170

00:06:26,529 --> 00:06:24,409

you don't have to be perfect the entire

171

00:06:29,110 --> 00:06:26,539

time undergrad is a great place to go

172

00:06:30,999 --> 00:06:29,120

learn some lessons and because this was

173

00:06:32,079 --> 00:06:31,009

my first time away from home there's

174

00:06:33,850 --> 00:06:32,089

lots of people there first time away

175

00:06:35,499 --> 00:06:33,860

from home and you're trying to learn all

176

00:06:38,019 --> 00:06:35,509

the stuff and figure out how to be

177

00:06:40,179 --> 00:06:38,029

independent and eat right and get sleep

178

00:06:41,619 --> 00:06:40,189

and not go to too many parties and when

179

00:06:43,899 --> 00:06:41,629

you're doing all of that at once it can

180

00:06:45,999 --> 00:06:43,909

be easy to make some mistakes and in my

181

00:06:49,300 --> 00:06:46,009

least favorite class that year was

182

00:06:51,100 --> 00:06:49,310

chemistry it was a huge class like one

183

00:06:52,929 --> 00:06:51,110

of those auditorium style classes with a

184

00:06:56,290 --> 00:06:52,939

professor way up front if you sit in the

185

00:06:57,999 --> 00:06:56,300

back like I did and I did all the things

186

00:06:59,619 --> 00:06:58,009

wrong it was a really early class I

187

00:07:02,170 --> 00:06:59,629

stayed up late I didn't read the

188

00:07:03,080 --> 00:07:02,180

material in advance all the time like so

189

00:07:05,270 --> 00:07:03,090

many bad things

190

00:07:08,240 --> 00:07:05,280

and as you would expect I did not do

191

00:07:10,340 --> 00:07:08,250

well as a matter of fact I got a D in

192

00:07:12,560 --> 00:07:10,350

that first chemistry class freshmen

193

00:07:14,689 --> 00:07:12,570

first semester I was really fortunate

194

00:07:17,390 --> 00:07:14,699

though because I got an A in everything

195

00:07:20,090 --> 00:07:17,400

else and so I hung on to my scholarship

196

00:07:22,870 --> 00:07:20,100

I like I'm at eyelash I had to keep it

197

00:07:25,850 --> 00:07:22,880

3.3 GPA and I think it was like 3.3 -

198

00:07:27,890 --> 00:07:25,860

Skeets by but then rather than like

199

00:07:29,450 --> 00:07:27,900

freaking out and deciding well

200

00:07:30,290 --> 00:07:29,460

engineering is not for me I totally

201

00:07:31,820 --> 00:07:30,300

messed that one up

202

00:07:34,730 --> 00:07:31,830

I learned that at my school you could

203

00:07:36,770 --> 00:07:34,740

retake up to three classes repeat and

204

00:07:39,170 --> 00:07:36,780

and if you retake up in the three

205

00:07:41,360 --> 00:07:39,180

classes if you get a good grade you can

206

00:07:42,680 --> 00:07:41,370

drop the first one and it replaces it so

207

00:07:44,510 --> 00:07:42,690

when you look at my college transcript

208

00:07:45,650 --> 00:07:44,520

it looks like I got a 4.0 that first

209

00:07:47,480 --> 00:07:45,660

semester but it didn't actually happen

210

00:07:48,650 --> 00:07:47,490

that way so yeah you don't have to be

211

00:07:50,300 --> 00:07:48,660

perfect straight out of the gate you

212

00:07:52,190 --> 00:07:50,310

just got to figure out how to get back

213

00:07:54,940 --> 00:07:52,200

up and correct our mistakes learn from

214

00:07:57,409 --> 00:07:54,950

them and then don't do that again

215

00:07:59,990 --> 00:07:57,419

so you learn this lesson it sounds like

216

00:08:01,730 --> 00:08:00,000

pretty early on in college it took me a

217

00:08:03,830 --> 00:08:01,740

little longer to kind of learn some of

218

00:08:06,260 --> 00:08:03,840

those lessons you're going through

219

00:08:09,409 --> 00:08:06,270

Kentucky and then you had a pretty

220

00:08:12,920 --> 00:08:09,419

middle little part of that slide there

221

00:08:15,770 --> 00:08:12,930

is NASA Langley Research Center and how

222

00:08:17,840 --> 00:08:15,780

did that come about one of the things I

223

00:08:20,000 --> 00:08:17,850

loved yeah right one of the things I

224

00:08:21,140 --> 00:08:20,010

loved about undergrad at UK and I think

225

00:08:23,060 --> 00:08:21,150

this is true in lots of schools right

226

00:08:24,469 --> 00:08:23,070

they encourage engineering students

227

00:08:26,930 --> 00:08:24,479

science students lots of different

228

00:08:29,029 --> 00:08:26,940

students to do internships coops while

229

00:08:30,890 --> 00:08:29,039

you're in school so that you can get a

230

00:08:31,550 --> 00:08:30,900

chance to see what the job is like if

231

00:08:34,130 --> 00:08:31,560

you're gonna like it

232

00:08:35,329 --> 00:08:34,140

and I wandered into the coop office the

233

00:08:37,610 --> 00:08:35,339

beginning at the end of my sophomore

234

00:08:39,920 --> 00:08:37,620

year I guess like you do at UK back then

235

00:08:41,570 --> 00:08:39,930

and I thought they would just hand me a

236

00:08:43,250 --> 00:08:41,580

list of options and say here are the

237

00:08:44,660 --> 00:08:43,260

things right here in Kentucky you're

238

00:08:46,250 --> 00:08:44,670

gonna build construction equipment or

239

00:08:48,920 --> 00:08:46,260

build printers or you know the things

240

00:08:50,960 --> 00:08:48,930

that I saw around me all the time but

241

00:08:53,000 --> 00:08:50,970

they asked me so hey what do you want to

242

00:08:55,790 --> 00:08:53,010

do and I'm like well I want to work for

243

00:08:57,890 --> 00:08:55,800

NASA haha what do you actually have but

244

00:08:59,210 --> 00:08:57,900

they had a contact that NASA Langley and

245

00:09:01,310 --> 00:08:59,220

she called me we did a phone interview

246

00:09:02,780 --> 00:09:01,320

and at the end of the interview she's

247

00:09:07,850 --> 00:09:02,790

like yeah sounds great just show up on

248

00:09:10,340 --> 00:09:07,860

me whatever I'm like and so that was my

249

00:09:13,400 --> 00:09:10,350

really first foot in the door working

250

00:09:15,360 --> 00:09:13,410

for NASA and it was amazing as you could

251

00:09:16,980 --> 00:09:15,370

imagine just walking on

252

00:09:18,590 --> 00:09:16,990

Center and like seeing the NASA signs

253

00:09:21,030 --> 00:09:18,600

are aware knowing they were working on

254

00:09:23,240 --> 00:09:21,040

Windtunnel testing in koulev it's just

255

00:09:25,650 --> 00:09:23,250

great

256

00:09:27,930 --> 00:09:25,660

sir you've going to Langley you're

257

00:09:30,630 --> 00:09:27,940

getting this hands-on thing because you

258

00:09:31,890 --> 00:09:30,640

asked you took the initiative and you

259

00:09:33,450 --> 00:09:31,900

said this is what I want to do you were

260

00:09:36,660 --> 00:09:33,460

kind of joking but it never hurts to ask

261

00:09:38,460 --> 00:09:36,670

right and you you've got to move forward

262

00:09:41,220 --> 00:09:38,470

with it are there any advice that you

263

00:09:42,930 --> 00:09:41,230

would give to people wanting a NASA

264

00:09:45,690 --> 00:09:42,940

internship people who are going to be

265

00:09:47,030 --> 00:09:45,700

going on to a NASA internship some fun

266

00:09:50,250 --> 00:09:47,040

lessons that you learned with that

267

00:09:52,829 --> 00:09:50,260

absolutely exactly what she said like no

268

00:09:54,540 --> 00:09:52,839

one's no one's gonna just randomly drop

269

00:09:56,010 --> 00:09:54,550

opportunities in your lap if you don't

270

00:09:58,140 --> 00:09:56,020

ask for them or at least it'll happen

271

00:10:00,120 --> 00:09:58,150

far less often so even if you feel like

272

00:10:02,430 --> 00:10:00,130

a crazy person saying what you want just

273

00:10:04,290 --> 00:10:02,440

go for it all they can say is no but I

274

00:10:06,030 --> 00:10:04,300

might say no but do this and this and

275

00:10:07,320 --> 00:10:06,040

then or they might say let me introduce

276

00:10:09,210 --> 00:10:07,330

you to someone else who could get you

277

00:10:11,010 --> 00:10:09,220

there so definitely ask for the things

278

00:10:12,390 --> 00:10:11,020

that you're interested in and I think

279

00:10:14,460 --> 00:10:12,400

while you're interning some of the

280

00:10:16,710 --> 00:10:14,470

obvious things are you know do a good

281

00:10:18,720 --> 00:10:16,720

job learn a lot while you're there but

282

00:10:20,820 --> 00:10:18,730

also keep your head up and look around

283

00:10:23,160 --> 00:10:20,830

for the cool opportunities that you

284

00:10:26,400 --> 00:10:23,170

might find because one of my favorite

285

00:10:28,440 --> 00:10:26,410

things about that whole NASA internship

286

00:10:30,840 --> 00:10:28,450

experience what didn't even happen on

287

00:10:33,510 --> 00:10:30,850

Langley right I was staying with some

288

00:10:35,400 --> 00:10:33,520

other interns and one of them walked

289

00:10:37,500 --> 00:10:35,410

into the living room and said hey I just

290

00:10:41,160 --> 00:10:37,510

found out that the Space Shuttle is

291

00:10:43,530 --> 00:10:41,170

launching in 18 hours and if we pack up

292

00:10:50,430 --> 00:10:43,540

and leave like in an hour we could make

293

00:10:51,900 --> 00:10:50,440

it so what we call a image number for me

294

00:10:57,329 --> 00:10:51,910

image number

295

00:10:58,890 --> 00:10:57,339

neat and a couple of the interns that I

296

00:11:00,780 --> 00:10:58,900

went to NASA Langley with and you can

297

00:11:02,310 --> 00:11:00,790

see way in the background that little

298

00:11:03,870 --> 00:11:02,320

building looks small there but that's

299

00:11:06,360 --> 00:11:03,880

actually the Vehicle Assembly Building

300

00:11:08,600 --> 00:11:06,370

on the day that we were gonna be

301
00:11:10,590 --> 00:11:08,610
watching a shuttle watch and it was just

302
00:11:12,900 --> 00:11:10,600
magnificent that we got to go down there

303
00:11:14,250 --> 00:11:12,910
and it was only because we seized that

304
00:11:15,720 --> 00:11:14,260
opportunity in hopped in a car and drove

305
00:11:18,810 --> 00:11:15,730
I thought we were safe some of us stayed

306
00:11:21,060 --> 00:11:18,820
up all night and took turns but it was

307
00:11:22,410 --> 00:11:21,070
it was just experience and then when the

308
00:11:23,699 --> 00:11:22,420
shuttle actually launched I don't know

309
00:11:26,730 --> 00:11:23,709
how many of the people watching have

310
00:11:29,220 --> 00:11:26,740
ever seen a shuttle watch but it is

311
00:11:32,850 --> 00:11:29,230
crazy you're not even that close to it

312
00:11:36,720 --> 00:11:32,860
but just the that overwhelming base

313
00:11:38,130 --> 00:11:36,730

sound of the engines going just watch

314

00:11:40,590 --> 00:11:38,140

through your whole body

315

00:11:42,180 --> 00:11:40,600

it feels like it's launching right on

316

00:11:45,630 --> 00:11:42,190

top of you it's pretty cool I think that

317

00:11:49,490 --> 00:11:45,640

might be image number four where oh my

318

00:11:53,850 --> 00:11:49,500

gosh image for immature yes and four

319

00:11:55,769 --> 00:11:53,860

yeah just amazing and for me to have

320

00:11:57,090 --> 00:11:55,779

been a little girl sitting with my mom

321

00:12:00,150 --> 00:11:57,100

in the living room watching the shuttle

322

00:12:03,840 --> 00:12:00,160

launches on TV and then to be a NASA

323

00:12:05,610 --> 00:12:03,850

intern down at KSC watching one live was

324

00:12:08,100 --> 00:12:05,620

just such an incredible dream come true

325

00:12:13,949 --> 00:12:08,110

at such a young age so it was phenomenal

326

00:12:15,690 --> 00:12:13,959

I love that idea we're getting a

327

00:12:18,420 --> 00:12:15,700

question right now from Olivia who's

328

00:12:20,160 --> 00:12:18,430

asking and we can always refer her back

329

00:12:21,840 --> 00:12:20,170

to NASA's website but any internships

330

00:12:27,570 --> 00:12:21,850

are camps available for fifteen-year-old

331

00:12:30,120 --> 00:12:27,580

aspiring engineers available I know

332

00:12:31,769 --> 00:12:30,130

about Space Camp which I never got to go

333

00:12:33,870 --> 00:12:31,779

to so jealous of my friends that I never

334

00:12:35,430 --> 00:12:33,880

did but there's Space Camp which is for

335

00:12:38,579 --> 00:12:35,440

kids of all ages up to teens I think

336

00:12:40,650 --> 00:12:38,589

they do it for adults also I know that I

337

00:12:42,120 --> 00:12:40,660

used to see high school interns around

338

00:12:43,650 --> 00:12:42,130

the lab but I'm not really sure we do

339

00:12:46,230 --> 00:12:43,660

that much anymore I think it's mainly

340

00:12:48,350 --> 00:12:46,240

for students who are in college but you

341

00:12:52,260 --> 00:12:48,360

guys might know more about that right

342

00:12:54,120 --> 00:12:52,270

well yeah go to NASA or get NASA JPL's

343

00:12:55,920 --> 00:12:54,130

website you can go to educational

344

00:12:57,870 --> 00:12:55,930

opportunities go to employment

345

00:12:59,970 --> 00:12:57,880

opportunities and you can find those and

346

00:13:03,180 --> 00:12:59,980

ask questions and emails all the time on

347

00:13:05,850 --> 00:13:03,190

those so you get this great internship

348

00:13:07,230 --> 00:13:05,860

you're working at NASA Langley but you

349

00:13:08,910 --> 00:13:07,240

decide to go to grad school if we could

350

00:13:12,810 --> 00:13:08,920

pull up image five again back there on

351

00:13:15,420 --> 00:13:12,820

the end you've got Georgia Tech that's

352

00:13:16,889 --> 00:13:15,430

right I personally just did not feel

353

00:13:18,690 --> 00:13:16,899

ready to be unleashed on the world as a

354

00:13:20,579 --> 00:13:18,700

little baby engineer by the time I

355

00:13:22,530 --> 00:13:20,589

finished my undergrad degree and I had

356

00:13:25,440 --> 00:13:22,540

perfect I didn't know how many things I

357

00:13:27,090 --> 00:13:25,450

would break but I had heard that you got

358

00:13:28,560 --> 00:13:27,100

a chance if you do grad school and

359

00:13:30,960 --> 00:13:28,570

especially if you do a thesis based

360

00:13:32,850 --> 00:13:30,970

graduate degree you get a chance to do a

361

00:13:35,100 --> 00:13:32,860

lot of independent work you can choose

362

00:13:36,390 --> 00:13:35,110

what item you're gonna research you can

363

00:13:38,069 --> 00:13:36,400

work with your advisors and order to

364

00:13:39,689 --> 00:13:38,079

figure out how to do it and it really

365

00:13:41,849 --> 00:13:39,699

for me anyway

366

00:13:43,349 --> 00:13:41,859

shaped my ability to just go out on the

367

00:13:45,449 --> 00:13:43,359

world into the world and really be able

368

00:13:47,460 --> 00:13:45,459

to do all the things I wanted to do so I

369

00:13:49,049 --> 00:13:47,470

chose Georgia Tech to do my master's

370

00:13:52,650 --> 00:13:49,059

degree in mechanical engineering and

371

00:13:54,179 --> 00:13:52,660

spent two years there doing that but

372

00:13:55,769 --> 00:13:54,189

that was something that you knew you

373

00:13:57,659 --> 00:13:55,779

needed to do that wasn't a choice that

374

00:14:00,539 --> 00:13:57,669

was forced upon you wasn't something

375

00:14:02,159 --> 00:14:00,549

that NASA was like hey you gotta come

376

00:14:04,199 --> 00:14:02,169

and get a graduate degree to work here

377

00:14:05,849 --> 00:14:04,209

right that's exactly right

378

00:14:07,499 --> 00:14:05,859

I know that even as a group supervisor

379

00:14:10,079 --> 00:14:07,509

we've hired people with bachelor's

380

00:14:12,030 --> 00:14:10,089

degree master's degree PhDs in the

381

00:14:13,769 --> 00:14:12,040

engineering realm you can kind of be all

382

00:14:16,169 --> 00:14:13,779

over that map I know that if you want to

383

00:14:18,269 --> 00:14:16,179

be a scientist at NASA you certainly

384

00:14:20,099 --> 00:14:18,279

need your PhD to do that it doesn't mean

385

00:14:22,799 --> 00:14:20,109

you can't be an intern as a scientist

386

00:14:27,119 --> 00:14:22,809

but we typically hire scientists who

387

00:14:30,030 --> 00:14:27,129

have their PhD should go to grad school

388

00:14:31,949 --> 00:14:30,040

and if we can bring up image six this is

389

00:14:33,809 --> 00:14:31,959

where you there was a question asked

390

00:14:36,359 --> 00:14:33,819

about what was your first job out of

391

00:14:40,439 --> 00:14:36,369

college uncertain Gaspar Lopez on

392

00:14:43,829 --> 00:14:40,449

Facebook is this it right here where you

393

00:14:45,119 --> 00:14:43,839

are now today this is it so after the

394

00:14:47,009 --> 00:14:45,129

end of my undergrad at University of

395

00:14:48,900 --> 00:14:47,019

Kentucky I spent a summer in Louisville

396

00:14:50,309 --> 00:14:48,910

my hometown working at GE appliances but

397

00:14:52,400 --> 00:14:50,319

I knew I was going to grad school and

398

00:14:53,639 --> 00:14:52,410

then near the end of my grad school

399

00:14:56,309 --> 00:14:53,649

degree

400

00:14:59,309 --> 00:14:56,319

JPL came to a career fair and I was

401
00:15:01,139 --> 00:14:59,319
actually because of things that I had

402
00:15:04,439 --> 00:15:01,149
learned and read I was actually looking

403
00:15:06,419 --> 00:15:04,449
for like the private industry booths and

404
00:15:07,139 --> 00:15:06,429
I was about to walk right past and she

405
00:15:08,519 --> 00:15:07,149
gets the old booth

406
00:15:09,629 --> 00:15:08,529
but the recruiter like reach that and

407
00:15:12,119 --> 00:15:09,639
poked me it was like hey aren't you

408
00:15:14,519 --> 00:15:12,129
gonna stop but I'm like what JPL was

409
00:15:16,949 --> 00:15:14,529
it's so embarrassing and even having

410
00:15:19,109 --> 00:15:16,959
worked at Langley for for internship

411
00:15:20,729 --> 00:15:19,119
rotations I had not heard of the Jet

412
00:15:23,099 --> 00:15:20,739
Propulsion Laboratory you know we tend

413
00:15:24,960 --> 00:15:23,109

to sometimes think of JPL as NASA at

414

00:15:26,009 --> 00:15:24,970

this monolithic thing and I realize

415

00:15:27,479 --> 00:15:26,019

there are all these different centers

416

00:15:29,400 --> 00:15:27,489

all across the country that all had

417

00:15:31,470 --> 00:15:29,410

their own little personalities and so

418

00:15:33,150 --> 00:15:31,480

once the recruiter let me know that JPL

419

00:15:35,279 --> 00:15:33,160

was a center that's a pathfinder on Mars

420

00:15:37,439 --> 00:15:35,289

was like okay little antennae go up oh

421

00:15:39,389 --> 00:15:37,449

is that okay can we talk and after

422

00:15:41,519 --> 00:15:39,399

talking with them for a while leaving my

423

00:15:43,229 --> 00:15:41,529

resume I was very fortunate they forgave

424

00:15:45,449 --> 00:15:43,239

me for not knowing about JPL and I got

425

00:15:47,460 --> 00:15:45,459

to come out to interview really fell in

426

00:15:49,079 --> 00:15:47,470

love with the campus it's just beautiful

427

00:15:50,850 --> 00:15:49,089

here it feels like a college campus I

428

00:15:52,830 --> 00:15:50,860

pretty much had ruled all over every

429

00:15:55,170 --> 00:15:52,840

body they would let me talk

430

00:15:56,820 --> 00:15:55,180

like please give me a job and I was very

431

00:16:00,000 --> 00:15:56,830

fortunate that they made me a job offer

432

00:16:03,870 --> 00:16:00,010

and I took it so I've been here since

433

00:16:05,580 --> 00:16:03,880

2000 and a great question that we're

434

00:16:07,170 --> 00:16:05,590

getting we got online from Diana Castro

435

00:16:09,030 --> 00:16:07,180

on YouTube she asked if you've always

436

00:16:12,270 --> 00:16:09,040

been a systems engineer or did you start

437

00:16:13,290 --> 00:16:12,280

with a different engineering group is a

438

00:16:15,360 --> 00:16:13,300

great question

439

00:16:17,580 --> 00:16:15,370

I was hired directly into the systems

440

00:16:18,960 --> 00:16:17,590

engineering division at the lab which

441

00:16:20,750 --> 00:16:18,970

was interesting because I had never

442

00:16:23,220 --> 00:16:20,760

heard systems engineering together

443

00:16:25,230 --> 00:16:23,230

instance before I was interviewing here

444

00:16:28,380 --> 00:16:25,240

yeah this is a long time ago back in

445

00:16:30,540 --> 00:16:28,390

2000 and it was during my internship I

446

00:16:32,850 --> 00:16:30,550

interviews on lab that what was then

447

00:16:35,520 --> 00:16:32,860

going to be my supervisor explained what

448

00:16:36,780 --> 00:16:35,530

the job was the fact that a systems

449

00:16:38,640 --> 00:16:36,790

engineer needs to know a little bit

450

00:16:40,980 --> 00:16:38,650

about all these different areas and work

451
00:16:43,140 --> 00:16:40,990
with experts in order to figure out how

452
00:16:45,840 --> 00:16:43,150
a design is gonna come together and then

453
00:16:47,280 --> 00:16:45,850
solve problems along the way and it

454
00:16:49,590 --> 00:16:47,290
entails working with lots and lots of

455
00:16:51,900 --> 00:16:49,600
people which I found very exciting I'm

456
00:16:54,240 --> 00:16:51,910
such a people person I love that systems

457
00:16:56,550 --> 00:16:54,250
engineering is a role that plays a lot

458
00:16:57,660 --> 00:16:56,560
in that arena instead of just being like

459
00:17:01,890 --> 00:16:57,670
locked in a room somewhere with a

460
00:17:03,060 --> 00:17:01,900
computer and signing a component I also

461
00:17:07,320 --> 00:17:03,070
want to make sure we get this out there

462
00:17:09,180 --> 00:17:07,330
H JPL dot jobs is a good place to go and

463
00:17:11,400 --> 00:17:09,190

look for internships and look for jobs

464

00:17:12,600 --> 00:17:11,410

particularly with jpo work where Tracy's

465

00:17:15,600 --> 00:17:12,610

talking about cut pork with Tracy

466

00:17:18,330 --> 00:17:15,610

someday you started as a system engineer

467

00:17:20,520 --> 00:17:18,340

but how did you I love where you where

468

00:17:24,390 --> 00:17:20,530

exactly you've got started though the

469

00:17:26,220 --> 00:17:24,400

the kind of sandbox aspect of it right

470

00:17:27,690 --> 00:17:26,230

it took me a long time actually to

471

00:17:30,060 --> 00:17:27,700

understand why they let me do this as a

472

00:17:32,220 --> 00:17:30,070

brand-new person when I first got

473

00:17:34,560 --> 00:17:32,230

started they paired me and a couple of

474

00:17:36,780 --> 00:17:34,570

other brand-new engineers just out of

475

00:17:38,730 --> 00:17:36,790

college with a much more senior engineer

476

00:17:41,370 --> 00:17:38,740

and how does doing this thing called

477

00:17:43,620 --> 00:17:41,380

advanced studies and the particular one

478

00:17:45,780 --> 00:17:43,630

we were working on was okay so pretend

479

00:17:48,180 --> 00:17:45,790

you want to have an all robotic outpost

480

00:17:49,830 --> 00:17:48,190

on Mars like what would you do and if

481

00:17:51,510 --> 00:17:49,840

money was no object and you could darken

482

00:17:52,590 --> 00:17:51,520

the skies with Delft two floor heavies

483

00:17:55,290 --> 00:17:52,600

and land all the stuff on what would you

484

00:17:57,090 --> 00:17:55,300

do and well maybe we can have these huge

485

00:17:59,460 --> 00:17:57,100

Rovers that would build roads than these

486

00:18:01,770 --> 00:17:59,470

giant nuclear power plants that would

487

00:18:05,340 --> 00:18:01,780

beam power wirelessly around all the

488

00:18:07,169 --> 00:18:05,350

other components and telecom antennas of

489

00:18:09,510 --> 00:18:07,179

the mortgage gate it was just it was

490

00:18:11,490 --> 00:18:09,520

hilarious and we had such a great time

491

00:18:12,840 --> 00:18:11,500

doing it and I'm like you know like I

492

00:18:15,510 --> 00:18:12,850

don't know what I'm doing yeah just

493

00:18:18,810 --> 00:18:15,520

going to kill engineering but I now

494

00:18:21,270 --> 00:18:18,820

understand why they encourage very young

495

00:18:23,490 --> 00:18:21,280

people to do this kind of creative

496

00:18:25,500 --> 00:18:23,500

out-of-the-box brainstorming thing

497

00:18:27,450 --> 00:18:25,510

because even if those things weren't

498

00:18:29,580 --> 00:18:27,460

going to become real five years ten

499

00:18:31,080 --> 00:18:29,590

years twenty years some of the things

500

00:18:33,539 --> 00:18:31,090

that we were playing with could

501
00:18:35,340 --> 00:18:33,549
eventually become the kernel of studies

502
00:18:37,440 --> 00:18:35,350
that are done down the road and because

503
00:18:39,690 --> 00:18:37,450
we were too young to kind of know what

504
00:18:42,149 --> 00:18:39,700
the limits were we pressed a little

505
00:18:43,590 --> 00:18:42,159
farther than you might normally do and

506
00:18:45,149 --> 00:18:43,600
they paired us with a much more senior

507
00:18:47,070 --> 00:18:45,159
engineer so that we didn't get too crazy

508
00:18:48,539 --> 00:18:47,080
but that was a lot of fun they can

509
00:18:49,620 --> 00:18:48,549
almost have just not paid me and I would

510
00:18:56,850 --> 00:18:49,630
have just come to work every day because

511
00:18:58,740 --> 00:18:56,860
it was a blast don't tell anything can

512
00:19:00,960 --> 00:18:58,750
we bring up image seven I want to look

513
00:19:02,940 --> 00:19:00,970

at your your path here Tracy because you

514

00:19:07,460 --> 00:19:02,950

you've not you didn't just stay in the

515

00:19:11,370 --> 00:19:07,470

sandbox you really got to go all over

516

00:19:13,110 --> 00:19:11,380

that's right I did one of the things one

517

00:19:15,810 --> 00:19:13,120

of the things that's cool about being at

518

00:19:18,270 --> 00:19:15,820

the lab is that your next job can kind

519

00:19:20,610 --> 00:19:18,280

of come up in a variety of ways and I

520

00:19:22,500 --> 00:19:20,620

was happily in the sandbox doing

521

00:19:24,360 --> 00:19:22,510

advanced studies and I got a call from a

522

00:19:25,649 --> 00:19:24,370

gentleman who was about to start

523

00:19:27,060 --> 00:19:25,659

building up his project system

524

00:19:29,190 --> 00:19:27,070

engineering team on the Mars

525

00:19:30,450 --> 00:19:29,200

Reconnaissance Orbiter and he says Tracy

526
00:19:31,649 --> 00:19:30,460
you know I bumped into you a while ago

527
00:19:33,600 --> 00:19:31,659
you're asking you some questions about

528
00:19:35,220 --> 00:19:33,610
things and you seem like a go-getter I'm

529
00:19:36,659 --> 00:19:35,230
trying to get a couple of more junior

530
00:19:38,520 --> 00:19:36,669
engineers to pair with so my senior

531
00:19:39,810 --> 00:19:38,530
engineers to round out my team do you

532
00:19:43,649 --> 00:19:39,820
want to come work on Mars Reconnaissance

533
00:19:44,789 --> 00:19:43,659
Orbiter I was too young even then to

534
00:19:46,560 --> 00:19:44,799
know you're not supposed to say yes

535
00:19:48,000 --> 00:19:46,570
until you talk to your supervisor but

536
00:19:50,520 --> 00:19:48,010
I'm sure you talked about a fingernail

537
00:19:52,680 --> 00:19:50,530
and so I got to join the Mars

538
00:19:54,930 --> 00:19:52,690

Reconnaissance Orbiter team about four

539

00:19:57,029 --> 00:19:54,940

years before watch half time on the

540

00:19:58,770 --> 00:19:57,039

project system engineering team and half

541

00:20:00,419 --> 00:19:58,780

time on the flight system engineering

542

00:20:02,310 --> 00:20:00,429

team and maybe this is a good time to

543

00:20:03,630 --> 00:20:02,320

say a little more about what systems

544

00:20:06,000 --> 00:20:03,640

engineering is and the different

545

00:20:08,460 --> 00:20:06,010

decisions great time because we're

546

00:20:11,010 --> 00:20:08,470

getting questions from people online in

547

00:20:13,169 --> 00:20:11,020

particular from Lexi Torres on YouTube

548

00:20:17,720 --> 00:20:13,179

asks what is a systems engineer so what

549

00:20:19,289 --> 00:20:17,730

exactly is a systems engineer eight

550

00:20:20,519 --> 00:20:19,299

images

551

00:20:23,070 --> 00:20:20,529

we kind of take a look at that a little

552

00:20:25,139 --> 00:20:23,080

bit yes perfect yeah so we'll talk a

553

00:20:27,359 --> 00:20:25,149

little bit about how we design space

554

00:20:28,950 --> 00:20:27,369

missions here at the lab and then on top

555

00:20:30,600 --> 00:20:28,960

of that I'll layer and what is it that a

556

00:20:32,460 --> 00:20:30,610

systems engineer does and I'll try not

557

00:20:34,619 --> 00:20:32,470

to spend like a whole hour on this life

558

00:20:36,210 --> 00:20:34,629

as we could totally do that so when

559

00:20:38,789 --> 00:20:36,220

you're trying to develop a mission you

560

00:20:40,379 --> 00:20:38,799

start with scientists who are trying to

561

00:20:42,840 --> 00:20:40,389

decide what questions we want to answer

562

00:20:45,180 --> 00:20:42,850

and then they have to decide well what

563

00:20:47,220 --> 00:20:45,190

data do I need to get those answers can

564

00:20:49,049 --> 00:20:47,230

I use an instrument from the earth and

565

00:20:52,289 --> 00:20:49,059

pointed at that thing can I do a flyby

566

00:20:53,729 --> 00:20:52,299

do I have to go in orbit a target and so

567

00:20:56,099 --> 00:20:53,739

they work with mission designers to kind

568

00:20:58,049 --> 00:20:56,109

of work out a top-level idea and then we

569

00:20:59,909 --> 00:20:58,059

start to put together a concept for a

570

00:21:01,049 --> 00:20:59,919

spacecraft that would support the

571

00:21:03,960 --> 00:21:01,059

instruments and get them where they need

572

00:21:05,430 --> 00:21:03,970

to go and then we have to test and test

573

00:21:06,989 --> 00:21:05,440

test and do a bunch of analysis to make

574

00:21:08,340 --> 00:21:06,999

sure it's all going to work and we strap

575

00:21:10,470 --> 00:21:08,350

it on the top of a rocket cross our

576
00:21:12,330 --> 00:21:10,480
fingers poke the heart and then launch

577
00:21:14,340 --> 00:21:12,340
it and off it goes and then engineers

578
00:21:15,690 --> 00:21:14,350
and scientists monitor the data and make

579
00:21:17,070 --> 00:21:15,700
sure the state of fact is okay until it

580
00:21:18,960 --> 00:21:17,080
gets where it's going gets all the

581
00:21:21,539 --> 00:21:18,970
science or the data sends it back to the

582
00:21:24,269 --> 00:21:21,549
scientist can analyze it and make

583
00:21:29,119 --> 00:21:24,279
awesome discoveries and and advance the

584
00:21:35,099 --> 00:21:32,909
okay so so systems engineers at the

585
00:21:36,090 --> 00:21:35,109
spacecraft level are trying to think

586
00:21:37,919 --> 00:21:36,100
about all the things that need to work

587
00:21:40,200 --> 00:21:37,929
together you have to have a thermal

588
00:21:41,879 --> 00:21:40,210

system you need telecom you need

589

00:21:44,489 --> 00:21:41,889

attitude control and power all these

590

00:21:46,139 --> 00:21:44,499

things and there will be subject matter

591

00:21:48,389 --> 00:21:46,149

experts in each of those areas who will

592

00:21:50,220 --> 00:21:48,399

know way more than you do about all of

593

00:21:52,080 --> 00:21:50,230

those things but a systems engineer

594

00:21:53,249 --> 00:21:52,090

tries to look at it from the top level

595

00:21:54,960 --> 00:21:53,259

how do we make sure things are working

596

00:21:57,090 --> 00:21:54,970

we don't change something over here that

597

00:21:58,619 --> 00:21:57,100

has a bad impact over here or we come up

598

00:22:01,049 --> 00:21:58,629

with a problem and you have all these

599

00:22:02,460 --> 00:22:01,059

different ways of solving it but but you

600

00:22:04,769 --> 00:22:02,470

can pick the way that's the best across

601
00:22:06,509 --> 00:22:04,779
the whole area so that's the spacecraft

602
00:22:08,940 --> 00:22:06,519
or flight system engineering and then a

603
00:22:10,470 --> 00:22:08,950
project engineering job is making sure

604
00:22:12,389 --> 00:22:10,480
that the spacecraft and the instrument

605
00:22:14,340 --> 00:22:12,399
and the ground data system and the

606
00:22:16,289 --> 00:22:14,350
mission design and navigation and launch

607
00:22:18,180 --> 00:22:16,299
vehicle are all know are together and

608
00:22:20,129 --> 00:22:18,190
it's that same kind of thing you're

609
00:22:22,109 --> 00:22:20,139
looking for decisions that you have to

610
00:22:23,669 --> 00:22:22,119
make so that it all works together and

611
00:22:26,129 --> 00:22:23,679
because even though we're super smart

612
00:22:27,269 --> 00:22:26,139
here at NASA sometimes we miss things

613
00:22:29,190 --> 00:22:27,279

because the things that we do are very

614

00:22:31,080 --> 00:22:29,200

complicated and so problems crop up

615

00:22:32,790 --> 00:22:31,090

along the way and you need systems

616

00:22:34,110 --> 00:22:32,800

engineers to pull in the right subject

617

00:22:35,640 --> 00:22:34,120

our experts to talk over all the

618

00:22:37,620 --> 00:22:35,650

technical details and figure out how to

619

00:22:39,660 --> 00:22:37,630

solve them and the same thing when you

620

00:22:42,210 --> 00:22:39,670

have a spacecraft in operations because

621

00:22:44,340 --> 00:22:42,220

even though it's 300 million miles away

622

00:22:46,290 --> 00:22:44,350

still sometimes things don't work quite

623

00:22:48,210 --> 00:22:46,300

right and you have to figure out what to

624

00:22:49,800 --> 00:22:48,220

do you have to get your data back and do

625

00:22:51,360 --> 00:22:49,810

a little mystery search to find what the

626

00:22:53,010 --> 00:22:51,370

problem is and then you either change

627

00:22:54,870 --> 00:22:53,020

the software or change the way you're

628

00:22:57,030 --> 00:22:54,880

commanding it so that it will still work

629

00:22:59,370 --> 00:22:57,040

so systems engineering and the way we

630

00:23:03,930 --> 00:22:59,380

design a mission now you can all go do

631

00:23:05,490 --> 00:23:03,940

it I there's a lot of stuff I think we

632

00:23:06,750 --> 00:23:05,500

can definitely unpack with what your

633

00:23:09,480 --> 00:23:06,760

answer with that you're right you could

634

00:23:10,980 --> 00:23:09,490

talk about that cycle over and over

635

00:23:13,830 --> 00:23:10,990

again but two things I want to bring up

636

00:23:15,660 --> 00:23:13,840

that you pull up is number one you just

637

00:23:19,950 --> 00:23:15,670

admitted to everybody all over the world

638

00:23:22,980 --> 00:23:19,960

that you don't know everything from what

639

00:23:27,450 --> 00:23:22,990

you've told me that's a great trait to

640

00:23:28,470 --> 00:23:27,460

have as a NASA engineer yes it is and

641

00:23:30,300 --> 00:23:28,480

one of the things that I like to tell

642

00:23:31,950 --> 00:23:30,310

college students is sometimes when when

643

00:23:33,060 --> 00:23:31,960

you're in class and you have a project

644

00:23:35,160 --> 00:23:33,070

and your professors asking you questions

645

00:23:36,570 --> 00:23:35,170

you feel this pressure you have to have

646

00:23:38,460 --> 00:23:36,580

an answer and if you don't have an

647

00:23:39,690 --> 00:23:38,470

answer like like shouldn't make

648

00:23:41,760 --> 00:23:39,700

something up like I gotta look like I

649

00:23:43,260 --> 00:23:41,770

know what I'm talkin but that so does

650

00:23:45,150 --> 00:23:43,270

not work when you're trying to build

651
00:23:46,980 --> 00:23:45,160
spacecraft and they have to work if you

652
00:23:50,220 --> 00:23:46,990
don't know something you really need to

653
00:23:53,370 --> 00:23:50,230
say I don't know and the rest of the

654
00:23:56,220 --> 00:23:53,380
engineers will say yay it will go figure

655
00:23:57,930 --> 00:23:56,230
it out because if you just there's

656
00:23:58,410 --> 00:23:57,940
there's there's this line fake it to you

657
00:24:00,270 --> 00:23:58,420
naked

658
00:24:01,710 --> 00:24:00,280
I really just know you fake it till you

659
00:24:03,630 --> 00:24:01,720
break it is what happens when you're

660
00:24:06,060 --> 00:24:03,640
trying to build spacecraft and so it's

661
00:24:07,560 --> 00:24:06,070
really important to do things that you

662
00:24:08,940 --> 00:24:07,570
know and be aware of where the

663
00:24:10,110 --> 00:24:08,950

boundaries of your knowledge are and

664

00:24:12,510 --> 00:24:10,120

tell people when you don't know

665

00:24:14,850 --> 00:24:12,520

something and then use that as a lever

666

00:24:18,750 --> 00:24:14,860

to go learn and figure out how things

667

00:24:20,100 --> 00:24:18,760

can move on from there let's go back to

668

00:24:23,130 --> 00:24:20,110

some of the missions you worked on if we

669

00:24:24,480 --> 00:24:23,140

can go to image 9 first could you talked

670

00:24:27,060 --> 00:24:24,490

about a little bit before we got into

671

00:24:28,950 --> 00:24:27,070

the details of what is a systems

672

00:24:32,670 --> 00:24:28,960

engineer but you went to Mars

673

00:24:34,530 --> 00:24:32,680

Reconnaissance Orbiter what were some of

674

00:24:36,350 --> 00:24:34,540

the challenges that you've learned on

675

00:24:38,910 --> 00:24:36,360

your many and your different missions

676
00:24:40,170 --> 00:24:38,920
throughout working at JPL well we keep

677
00:24:41,700 --> 00:24:40,180
we're getting that question a lot right

678
00:24:42,210 --> 00:24:41,710
now so I figured let's aspect of that

679
00:24:44,760 --> 00:24:42,220
right away

680
00:24:45,450 --> 00:24:44,770
well pretty obvious challenge the way

681
00:24:46,950 --> 00:24:45,460
that I described

682
00:24:48,360 --> 00:24:46,960
engineering it's about knowing enough

683
00:24:50,669 --> 00:24:48,370
about all the things so that you can

684
00:24:52,680 --> 00:24:50,679
resolve issues working with people who

685
00:24:55,110 --> 00:24:52,690
are experts right well as a baby systems

686
00:24:57,210 --> 00:24:55,120
engineer you feel like such a

687
00:24:59,370 --> 00:24:57,220
twitchbucks it's a number of things you

688
00:25:01,380 --> 00:24:59,380

do not know feels literally infinite and

689

00:25:04,200 --> 00:25:01,390

when you're when you're responsible for

690

00:25:07,019 --> 00:25:04,210

something and a team of experienced

691

00:25:09,299 --> 00:25:07,029

engineers then you just you have to ask

692

00:25:10,919 --> 00:25:09,309

so many questions and questions after

693

00:25:13,380 --> 00:25:10,929

question and that's my number one lesson

694

00:25:15,990 --> 00:25:13,390

from when I first started on MRO when

695

00:25:17,220 --> 00:25:16,000

you're new in any job really you feel

696

00:25:19,620 --> 00:25:17,230

like you shouldn't ask questions because

697

00:25:21,659 --> 00:25:19,630

it's gonna waste the time of the experts

698

00:25:23,880 --> 00:25:21,669

but what I found was especially working

699

00:25:25,080 --> 00:25:23,890

on a very complicated spacecraft and

700

00:25:27,360 --> 00:25:25,090

you're trying to resolve a specific

701
00:25:29,370 --> 00:25:27,370
issue there will be experts in that area

702
00:25:31,080 --> 00:25:29,380
but also people who aren't experts in

703
00:25:33,060 --> 00:25:31,090
that area and so when you're in a

704
00:25:35,070 --> 00:25:33,070
meeting and you ask your question and

705
00:25:36,450 --> 00:25:35,080
the expert explains the other people

706
00:25:38,340 --> 00:25:36,460
around the room are learning things too

707
00:25:39,750 --> 00:25:38,350
and even the people who know what the

708
00:25:41,399 --> 00:25:39,760
experts gonna say there might be some

709
00:25:42,990 --> 00:25:41,409
nuance that comes out that is a little

710
00:25:44,580 --> 00:25:43,000
bit surprising and then that leads you

711
00:25:46,019 --> 00:25:44,590
down a conversation path that might take

712
00:25:47,940 --> 00:25:46,029
you to a solution that might not

713
00:25:50,399 --> 00:25:47,950

otherwise have come up so I learned that

714

00:25:52,620 --> 00:25:50,409

as a young systems engineer that

715

00:25:54,899 --> 00:25:52,630

actually was a good thing to be always

716

00:25:56,519 --> 00:25:54,909

asking questions what did what is this

717

00:25:57,899 --> 00:25:56,529

do why does it work that way why are we

718

00:25:59,220 --> 00:25:57,909

doing it this way and said it that way I

719

00:26:01,200 --> 00:25:59,230

mean you have to ask the questions in a

720

00:26:06,120 --> 00:26:01,210

respectful way you can't say I'm doing

721

00:26:08,070 --> 00:26:06,130

it like that understand why this instead

722

00:26:09,960 --> 00:26:08,080

of that because clearly you're still

723

00:26:12,060 --> 00:26:09,970

learning while you're also trying to

724

00:26:14,279 --> 00:26:12,070

move things along so that was a major

725

00:26:17,610 --> 00:26:14,289

lesson that I learned I also learned

726

00:26:20,639 --> 00:26:17,620

that as a young systems engineer

727

00:26:22,500 --> 00:26:20,649

focusing on specific areas sometimes you

728

00:26:23,909 --> 00:26:22,510

just don't have enough bandwidth I'll

729

00:26:26,250 --> 00:26:23,919

say to pay attention to a whole bunch of

730

00:26:29,010 --> 00:26:26,260

things that are going on and I wound up

731

00:26:30,930 --> 00:26:29,020

doing a very similar job on missions

732

00:26:32,220 --> 00:26:30,940

downstream and some people might think

733

00:26:33,480 --> 00:26:32,230

we'll why would you do the same kind of

734

00:26:35,519 --> 00:26:33,490

job on another mission would that be

735

00:26:37,440 --> 00:26:35,529

boring but the systems engineering job

736

00:26:38,700 --> 00:26:37,450

is so much about troubleshooting all

737

00:26:40,769 --> 00:26:38,710

these little issues that is very

738

00:26:42,779 --> 00:26:40,779

different on the next project and you

739

00:26:44,700 --> 00:26:42,789

can use some of your knowledge from the

740

00:26:47,190 --> 00:26:44,710

past project on the next one and then

741

00:26:48,510 --> 00:26:47,200

you have a little more bandwidth to pay

742

00:26:50,159 --> 00:26:48,520

more attention to other things that are

743

00:26:52,529 --> 00:26:50,169

going on and learn and contribute in

744

00:26:54,840 --> 00:26:52,539

more areas I felt like by the way that's

745

00:26:56,610 --> 00:26:54,850

spending six years on MRO from four

746

00:26:57,990 --> 00:26:56,620

years before launch to two years in

747

00:26:59,520 --> 00:26:58,000

operations was

748

00:27:01,620 --> 00:26:59,530

getting my master's degree in systems

749

00:27:06,210 --> 00:27:01,630

engineering because I learned how do the

750

00:27:07,650 --> 00:27:06,220

job here at JPL very cool I want to jump

751
00:27:08,820 --> 00:27:07,660
to image 10 now and talk about a

752
00:27:11,700 --> 00:27:08,830
different mission that you worked on

753
00:27:13,710 --> 00:27:11,710
because a question that really does keep

754
00:27:17,220 --> 00:27:13,720
coming up and I you've talked to me

755
00:27:18,420 --> 00:27:17,230
before about challenges because every

756
00:27:21,210 --> 00:27:18,430
mission has a challenge that's part of

757
00:27:22,440 --> 00:27:21,220
what makes I hate to say it your words

758
00:27:26,810 --> 00:27:22,450
not mine that's part of what makes

759
00:27:31,050 --> 00:27:28,680
you don't you don't want it to be

760
00:27:35,400 --> 00:27:31,060
fraught with challenges but can you tell

761
00:27:37,530 --> 00:27:35,410
us one or two stories about time on juno

762
00:27:39,510 --> 00:27:37,540
and maybe a couple things that you as a

763
00:27:39,960 --> 00:27:39,520

system engineer and the team had to

764

00:27:43,980 --> 00:27:39,970

overcome

765

00:27:45,360 --> 00:27:43,990

I can't so one of the things that makes

766

00:27:46,560 --> 00:27:45,370

me laugh when people ask me about my

767

00:27:48,870 --> 00:27:46,570

time on do you know I spent two years

768

00:27:51,330 --> 00:27:48,880

before launch and in five years in

769

00:27:53,850 --> 00:27:51,340

operations just jetting to Jupiter and

770

00:27:55,770 --> 00:27:53,860

then another year and a half or so once

771

00:27:57,060 --> 00:27:55,780

we got there and people say wow five

772

00:27:58,500 --> 00:27:57,070

years and cruise well you people just

773

00:27:59,730 --> 00:27:58,510

twiddling your thumbs and like sitting

774

00:28:02,550 --> 00:27:59,740

around like playing car what were you

775

00:28:04,380 --> 00:28:02,560

okay and there's so many things that the

776

00:28:06,720 --> 00:28:04,390

spacecraft had to do in order to make it

777

00:28:08,700 --> 00:28:06,730

all the way to Jupiter and so many

778

00:28:10,680 --> 00:28:08,710

things went slightly differently than we

779

00:28:12,750 --> 00:28:10,690

expected that it was just exciting to be

780

00:28:14,940 --> 00:28:12,760

able to you troubleshoot them and one

781

00:28:17,070 --> 00:28:14,950

that I will remember is we only talked

782

00:28:20,490 --> 00:28:17,080

to the spacecraft once a week during one

783

00:28:22,260 --> 00:28:20,500

part of cruise that we no I won't tell

784

00:28:24,960 --> 00:28:22,270

you what we used to call it during one

785

00:28:26,730 --> 00:28:24,970

primaries and on one Wednesday we talked

786

00:28:28,290 --> 00:28:26,740

to the spacecraft and it was fine and

787

00:28:30,630 --> 00:28:28,300

then we ended the session the next

788

00:28:32,280 --> 00:28:30,640

Wednesday we try to talk to the spare

789

00:28:33,810 --> 00:28:32,290

shaft and it wasn't there they had to

790

00:28:36,870 --> 00:28:33,820

look for it on the emergency frequency

791

00:28:39,810 --> 00:28:36,880

and they found it and had rebooted and

792

00:28:42,780 --> 00:28:39,820

booted again and swamped to the backup

793

00:28:45,020 --> 00:28:42,790

computer like oh why does have it well

794

00:28:47,370 --> 00:28:45,030

then we had to go start our little

795

00:28:48,090 --> 00:28:47,380

investigative search to figure out why

796

00:28:50,040 --> 00:28:48,100

did that happen

797

00:28:52,950 --> 00:28:50,050

and what can we do about it and is it a

798

00:28:54,780 --> 00:28:52,960

problem and that led down some really

799

00:28:56,280 --> 00:28:54,790

interesting paths because we had SWAT

800

00:28:58,170 --> 00:28:56,290

sides we didn't have all the information

801
00:28:59,850 --> 00:28:58,180
from the primary side to figure out

802
00:29:01,020 --> 00:28:59,860
exactly what happened but we could

803
00:29:02,280 --> 00:29:01,030
figure out what happened in the second

804
00:29:04,080 --> 00:29:02,290
boot and fix that so it wouldn't happen

805
00:29:06,360 --> 00:29:04,090
again and then you would think well okay

806
00:29:08,160 --> 00:29:06,370
so you figured you feed it out mostly

807
00:29:11,240 --> 00:29:08,170
and the stagecraft is safe so you're

808
00:29:12,710 --> 00:29:11,250
done with that right that was in 24

809
00:29:15,020 --> 00:29:12,720
you know want to say and it was like

810
00:29:17,090 --> 00:29:15,030
2015 before he finally put the boson

811
00:29:19,340 --> 00:29:17,100
that investigation and then we had to

812
00:29:21,500 --> 00:29:19,350
decide so you're a year out from orbit

813
00:29:24,260 --> 00:29:21,510

insertion are you gonna stay on the

814

00:29:26,540 --> 00:29:24,270

backup computer or are you gonna like

815

00:29:28,220 --> 00:29:26,550

tell the spacecraft to swap back and we

816

00:29:30,920 --> 00:29:28,230

had some really fun philosophical

817

00:29:32,690 --> 00:29:30,930

conversations about that deciding do you

818

00:29:33,920 --> 00:29:32,700

swap away from working hardware because

819

00:29:35,870 --> 00:29:33,930

you want to be on the side that you did

820

00:29:38,060 --> 00:29:35,880

out most of your ground testing on do

821

00:29:41,000 --> 00:29:38,070

you stay on side B and you're pretty

822

00:29:47,540 --> 00:29:41,010

sure side a is okay and so that was

823

00:29:49,220 --> 00:29:47,550

exciting and challenging and fun I want

824

00:29:53,380 --> 00:29:49,230

to lean into that what you're talking

825

00:29:55,790 --> 00:29:53,390

about with working in teams lots of I

826

00:29:57,140 --> 00:29:55,800

mean how much of the job is sitting in

827

00:29:59,890 --> 00:29:57,150

meetings with other people who are very

828

00:30:03,980 --> 00:30:02,030

something that you you've told me about

829

00:30:06,710 --> 00:30:03,990

and I think is good because I've started

830

00:30:12,770 --> 00:30:06,720

doing it is is about taking notes in

831

00:30:14,030 --> 00:30:12,780

these meetings yeah I got a story but I

832

00:30:17,020 --> 00:30:14,040

like it I think it's better when you

833

00:30:20,210 --> 00:30:17,030

tell the story you NASA and I'm sure

834

00:30:22,040 --> 00:30:20,220

some ginormous descendant of my job a

835

00:30:23,210 --> 00:30:22,050

spend and meeting after meeting after

836

00:30:24,560 --> 00:30:23,220

meeting after meeting and it's kind of

837

00:30:26,630 --> 00:30:24,570

hilarious because we're all working from

838

00:30:27,980 --> 00:30:26,640

home right now and my husband works at

839

00:30:29,300 --> 00:30:27,990

the lab too but he has a very different

840

00:30:30,980 --> 00:30:29,310

job for mine he's like are you in

841

00:30:32,600 --> 00:30:30,990

another meeting yes and when this one in

842

00:30:34,550 --> 00:30:32,610

to have another one actually today I

843

00:30:36,620 --> 00:30:34,560

have meetings at 8 and 9 and 10 have a

844

00:30:38,090 --> 00:30:36,630

break at 11 and 12 and then one and two

845

00:30:41,540 --> 00:30:38,100

and three and a very short one at far

846

00:30:44,150 --> 00:30:41,550

right so it's a lot and I know that some

847

00:30:46,190 --> 00:30:44,160

meetings can be there's a procession

848

00:30:47,240 --> 00:30:46,200

that some meetings can be non-productive

849

00:30:48,980 --> 00:30:47,250

that you're just sitting there and

850

00:30:49,970 --> 00:30:48,990

someone's presenting and half of the

851

00:30:51,680 --> 00:30:49,980

people are following asleep but the

852

00:30:55,190 --> 00:30:51,690

meetings a time and are not like that at

853

00:30:56,360 --> 00:30:55,200

all we have very specific working issues

854

00:30:58,400 --> 00:30:56,370

we're trying to resolve and they can be

855

00:31:00,590 --> 00:30:58,410

very interactive some of them are about

856

00:31:02,420 --> 00:31:00,600

status and sometimes that status is

857

00:31:04,640 --> 00:31:02,430

surprising so that can be very

858

00:31:06,830 --> 00:31:04,650

interactive so there really it's it's

859

00:31:10,100 --> 00:31:06,840

energizing meetings working with a lot

860

00:31:12,500 --> 00:31:10,110

of people and then the note-taking thing

861

00:31:15,170 --> 00:31:12,510

is kind of funny I've started taking a

862

00:31:16,640 --> 00:31:15,180

lot of notes when I was much more junior

863

00:31:17,960 --> 00:31:16,650

engineer just because there are so many

864

00:31:19,490 --> 00:31:17,970

things being said that I had no idea

865

00:31:21,380 --> 00:31:19,500

what they were so I would write them

866

00:31:23,000 --> 00:31:21,390

down so I could go find out later and

867

00:31:23,660 --> 00:31:23,010

then be more informed the next thing

868

00:31:25,670 --> 00:31:23,670

that I had

869

00:31:27,200 --> 00:31:25,680

and then later I determined I was

870

00:31:28,850 --> 00:31:27,210

ticking notes just so that I could had

871

00:31:31,280 --> 00:31:28,860

something to refer back to we have so

872

00:31:32,750 --> 00:31:31,290

much information in our jobs and I would

873

00:31:34,940 --> 00:31:32,760

sometimes share those with other people

874

00:31:38,480 --> 00:31:34,950

and at one point in my career a very

875

00:31:40,280 --> 00:31:38,490

well-meaning person gave me a tip that I

876
00:31:42,410 --> 00:31:40,290
never would have thought on thought of

877
00:31:44,990 --> 00:31:42,420
on my own he was like Tracy so I know

878
00:31:46,580 --> 00:31:45,000
that you enjoy taking notion you just do

879
00:31:47,720 --> 00:31:46,590
that for yourself it's really kind of

880
00:31:49,520 --> 00:31:47,730
you to share them with other people but

881
00:31:51,650 --> 00:31:49,530
just keep in mind like this is very

882
00:31:53,870 --> 00:31:51,660
male-dominated industry and some things

883
00:31:56,240 --> 00:31:53,880
you can do or just make you seem more

884
00:31:57,620 --> 00:31:56,250
like you're just working on the

885
00:31:59,240 --> 00:31:57,630
administrative things and not like doing

886
00:32:01,580 --> 00:31:59,250
engineering things so just keep that in

887
00:32:02,780 --> 00:32:01,590
mind and be careful I'm like wow I thank

888
00:32:04,670 --> 00:32:02,790

you so much I never thought about that

889

00:32:07,670 --> 00:32:04,680

okay let me I'll go on I think about

890

00:32:09,110 --> 00:32:07,680

that and then I realized the flip side

891

00:32:11,330 --> 00:32:09,120

of that is that when I'm in a meeting

892

00:32:12,980 --> 00:32:11,340

with people working on a technical issue

893

00:32:14,900 --> 00:32:12,990

we go through a whole bunch of stuff we

894

00:32:17,540 --> 00:32:14,910

make decisions and then we do actions

895

00:32:19,400 --> 00:32:17,550

and then if no one seems out the notes

896

00:32:20,300 --> 00:32:19,410

of what happened every single person

897

00:32:22,190 --> 00:32:20,310

that meeting will have a slightly

898

00:32:23,480 --> 00:32:22,200

different understanding of what was done

899

00:32:25,370 --> 00:32:23,490

and what decisions were made and then

900

00:32:27,200 --> 00:32:25,380

what should be done next and I realized

901
00:32:29,330 --> 00:32:27,210
that when I take the notes and take very

902
00:32:31,490 --> 00:32:29,340
good notes and when I send them out they

903
00:32:33,110 --> 00:32:31,500
have here the key highlights right

904
00:32:34,630 --> 00:32:33,120
here's what we decided here are the

905
00:32:37,310 --> 00:32:34,640
actions and here's who has to do it and

906
00:32:38,750 --> 00:32:37,320
here's really critical things and I send

907
00:32:40,790 --> 00:32:38,760
those out to people like I am

908
00:32:43,130 --> 00:32:40,800
controlling the history of what happened

909
00:32:44,690 --> 00:32:43,140
and setting the tone for the rest of the

910
00:32:46,610 --> 00:32:44,700
team especially as I got into one

911
00:32:48,320 --> 00:32:46,620
leadership position and so I decided

912
00:32:51,530 --> 00:32:48,330
while that was a very well-meaning tip

913
00:32:52,730 --> 00:32:51,540

I'm glad I thought about it but now I'm

914

00:32:54,740 --> 00:32:52,740

gonna keep up my whole third fitting

915

00:32:56,000 --> 00:32:54,750

thing because it's my way of making sure

916

00:32:58,520 --> 00:32:56,010

that things are getting done the way I

917

00:32:59,810 --> 00:32:58,530

think that should be done or at least if

918

00:33:01,190 --> 00:32:59,820

I send them out and someone says that's

919

00:33:04,580 --> 00:33:01,200

not how I remember that at all if you

920

00:33:06,920 --> 00:33:04,590

can get that disconnect out into the

921

00:33:14,840 --> 00:33:06,930

open and figure it out so that it isn't

922

00:33:16,670 --> 00:33:14,850

a problem downstream that's yeah I love

923

00:33:18,260 --> 00:33:16,680

that story and I've started taking so

924

00:33:19,550 --> 00:33:18,270

many notes in my life now because I'm

925

00:33:23,570 --> 00:33:19,560

like yeah I want to make sure I have the

926

00:33:26,360 --> 00:33:23,580

history I want to I want to move on to

927

00:33:29,540 --> 00:33:26,370

kind of where somebody people have been

928

00:33:32,690 --> 00:33:29,550

asking online what you what you're

929

00:33:33,830 --> 00:33:32,700

working on now and then any challenges

930

00:33:35,500 --> 00:33:33,840

that might come with that and then I've

931

00:33:37,250 --> 00:33:35,510

got a question for you about that

932

00:33:38,630 --> 00:33:37,260

afterwards of maybe

933

00:33:41,330 --> 00:33:38,640

it's next but let's focus on what you're

934

00:33:43,820 --> 00:33:41,340

working on right now right now I am the

935

00:33:47,690 --> 00:33:43,830

deputy project system engineer for the

936

00:33:49,850 --> 00:33:47,700

psyche mission and it's one of I had a

937

00:33:52,070 --> 00:33:49,860

lot of fun jobs but is one of the more

938

00:33:53,540 --> 00:33:52,080

fun jobs that I have had because this

939

00:33:55,490 --> 00:33:53,550

mission is so different from the ones

940

00:33:57,830 --> 00:33:55,500

that I've done before I've done missions

941

00:34:00,800 --> 00:33:57,840

that what we consider more traditional

942

00:34:03,380 --> 00:34:00,810

chemical propulsion missions where you

943

00:34:04,550 --> 00:34:03,390

launch a spacecraft it does a burn so

944

00:34:06,050 --> 00:34:04,560

that it's on right trajectory to go

945

00:34:08,690 --> 00:34:06,060

somewhere downstream it does another one

946

00:34:10,790 --> 00:34:08,700

right the psyche is a mission that's

947

00:34:12,950 --> 00:34:10,800

launching in 2022 it's going to go visit

948

00:34:15,230 --> 00:34:12,960

an asteroid the scientists think has a

949

00:34:16,730 --> 00:34:15,240

lot of metal in it one of the hypotheses

950

00:34:18,710 --> 00:34:16,740

is maybe it used to be a little baby

951
00:34:19,879 --> 00:34:18,720
planet core we're not sure so we're

952
00:34:22,250 --> 00:34:19,889
taking some instruments to go and

953
00:34:24,800 --> 00:34:22,260
investigate and find out and it uses

954
00:34:27,800 --> 00:34:24,810
solar electric propulsion it's a low

955
00:34:30,290 --> 00:34:27,810
thrust mission if you took like your

956
00:34:32,180 --> 00:34:30,300
hand and put a slice of bread on it like

957
00:34:35,060 --> 00:34:32,190
the weight of that here on earth and 1g

958
00:34:37,190 --> 00:34:35,070
is the amount of force that the engines

959
00:34:39,260 --> 00:34:37,200
produce it's very very tiny but they are

960
00:34:41,450 --> 00:34:39,270
on and on and on and on you just have to

961
00:34:43,310 --> 00:34:41,460
burn really long time to get where you

962
00:34:46,639 --> 00:34:43,320
build up you know enough acceleration

963
00:34:47,869 --> 00:34:46,649

and get to where you're going and the

964

00:34:51,710 --> 00:34:47,879

thing that's interesting about it is

965

00:34:54,680 --> 00:34:51,720

there's such a connection between that

966

00:34:56,419 --> 00:34:54,690

on time thrusting and how much mass you

967

00:34:58,100 --> 00:34:56,429

take because you need the masses Zenon

968

00:35:00,350 --> 00:34:58,110

but you have to push it all as you're

969

00:35:03,980 --> 00:35:00,360

going and the power that you have in

970

00:35:06,410 --> 00:35:03,990

order to to have higher thrust coming

971

00:35:08,810 --> 00:35:06,420

out of your engine and so those things

972

00:35:10,070 --> 00:35:08,820

play together in a way that's just super

973

00:35:11,720 --> 00:35:10,080

different from missions that I've been

974

00:35:13,520 --> 00:35:11,730

on before and have given us some

975

00:35:15,320 --> 00:35:13,530

interesting challenges to try to work

976
00:35:17,060 --> 00:35:15,330
out at that project system-level working

977
00:35:18,500 --> 00:35:17,070
with Mission system and the propulsion

978
00:35:22,010 --> 00:35:18,510
folks and guidance navigation and

979
00:35:23,920 --> 00:35:22,020
control has been super educational it

980
00:35:28,460 --> 00:35:23,930
sounds like you've had your dream job

981
00:35:31,310 --> 00:35:28,470
multiple times yeah oh yeah what do you

982
00:35:33,410 --> 00:35:31,320
want to be when you grow up you know

983
00:35:35,020 --> 00:35:33,420
what's funny every time my supervisor

984
00:35:37,460 --> 00:35:35,030
asked me this and like I don't know

985
00:35:40,430 --> 00:35:37,470
you're supposed to have a five-year plan

986
00:35:43,160 --> 00:35:40,440
a ten-year plan I just don't know and so

987
00:35:45,800 --> 00:35:43,170
for me I've just been having a great

988
00:35:47,240 --> 00:35:45,810

time in my career I was on tomorrow

989

00:35:49,430 --> 00:35:47,250

I left MRO and spent a couple of years

990

00:35:49,910 --> 00:35:49,440

working on the Kepler mission I left

991

00:35:51,710 --> 00:35:49,920

Kepler

992

00:35:53,510 --> 00:35:51,720

spent nine years of my life on Juno

993

00:35:56,900 --> 00:35:53,520

mission doing project system in flight

994

00:35:59,120 --> 00:35:56,910

system engineering again and because the

995

00:36:00,559 --> 00:35:59,130

missions are so different and the number

996

00:36:01,789 --> 00:36:00,569

of the things that I focus on are so

997

00:36:04,039 --> 00:36:01,799

different from requirements development

998

00:36:06,349 --> 00:36:04,049

to running tests analyzing data to

999

00:36:09,380 --> 00:36:06,359

troubleshooting anomalies it's just it's

1000

00:36:13,069 --> 00:36:09,390

crazy amounts of fun I just really enjoy

1001

00:36:14,839 --> 00:36:13,079

it and so I've never been able to think

1002

00:36:18,049 --> 00:36:14,849

well someday I want to be the lab

1003

00:36:21,020 --> 00:36:18,059

director I might or someday I want to be

1004

00:36:23,390 --> 00:36:21,030

a project manager or those things I'm

1005

00:36:25,789 --> 00:36:23,400

just super happy enjoying what I'm doing

1006

00:36:28,250 --> 00:36:25,799

and it's interesting because my plan

1007

00:36:30,380 --> 00:36:28,260

when I joined psyche for years before

1008

00:36:32,660 --> 00:36:30,390

launch was to see that whole development

1009

00:36:33,829 --> 00:36:32,670

cycle stick around for operations it's

1010

00:36:35,180 --> 00:36:33,839

gonna take about three and a half years

1011

00:36:37,190 --> 00:36:35,190

for the spacecraft to get to the

1012

00:36:38,839 --> 00:36:37,200

asteroid and a couple of years to do the

1013

00:36:40,460 --> 00:36:38,849

mission I just wanted to do that whole

1014

00:36:42,710 --> 00:36:40,470

cradle to grave thing it's a really cool

1015

00:36:45,049 --> 00:36:42,720

mission but the opportunity has come up

1016

00:36:46,970 --> 00:36:45,059

for me to go and now be the lead fly

1017

00:36:50,089 --> 00:36:46,980

system engineer on the Europa clipper

1018

00:36:51,950 --> 00:36:50,099

mission and I really can't couldn't I

1019

00:36:55,069 --> 00:36:51,960

just couldn't turn away from path and so

1020

00:36:57,349 --> 00:36:55,079

I'm super excited for that it's a brand

1021

00:36:59,270 --> 00:36:57,359

new mission for me though Tina's been

1022

00:37:01,670 --> 00:36:59,280

working on it for a long time now but

1023

00:37:04,760 --> 00:37:01,680

now I get to help see that mission to

1024

00:37:07,849 --> 00:37:04,770

the launch pad get back near Jupiter but

1025

00:37:10,039 --> 00:37:07,859

to go study Europa which is fascinating

1026
00:37:12,530 --> 00:37:10,049
place to learn more of that because the

1027
00:37:15,559 --> 00:37:12,540
scientists are pretty sure that there is

1028
00:37:18,890 --> 00:37:15,569
a lot of liquid water beneath the thick

1029
00:37:21,049 --> 00:37:18,900
shell of ice on that moon and maybe all

1030
00:37:24,410 --> 00:37:21,059
the ingredients where life could arise

1031
00:37:28,520 --> 00:37:24,420
so I'm super super excited to get to be

1032
00:37:31,190 --> 00:37:28,530
a part of that whole mission one of the

1033
00:37:34,400 --> 00:37:31,200
things I appreciate just talking with

1034
00:37:38,020 --> 00:37:34,410
you is how much joy and vibrancy you

1035
00:37:40,220 --> 00:37:38,030
bring to well you bring to everything I

1036
00:37:42,260 --> 00:37:40,230
want to if we can bring up image of

1037
00:37:44,030 --> 00:37:42,270
eleven this is something that I've

1038
00:37:47,180 --> 00:37:44,040

always noticed about you is that you

1039

00:37:51,680 --> 00:37:47,190

still are

1040

00:37:55,490 --> 00:37:51,690

kid at heart and I've seen anything both

1041

00:37:57,620 --> 00:37:55,500

of those faces before that kind of that

1042

00:38:00,250 --> 00:37:57,630

passion and joy that you bring into it

1043

00:38:03,190 --> 00:38:00,260

this is you seem excited to go to work

1044

00:38:05,180 --> 00:38:03,200

every day

1045

00:38:07,190 --> 00:38:05,190

absolutely one of the other things that

1046

00:38:08,480 --> 00:38:07,200

I like to tell students is just because

1047

00:38:10,220 --> 00:38:08,490

you grow up to be an engineer or a

1048

00:38:11,570 --> 00:38:10,230

scientist doesn't mean you have to be

1049

00:38:14,120 --> 00:38:11,580

like this super serious stick into my

1050

00:38:16,160 --> 00:38:14,130

personal time and I love the fact that

1051

00:38:18,170 --> 00:38:16,170

most of the people that I work with on

1052

00:38:20,420 --> 00:38:18,180

lab also really enjoy what they're doing

1053

00:38:22,250 --> 00:38:20,430

and so before a meeting start were

1054

00:38:23,300 --> 00:38:22,260

joking around with each other talking

1055

00:38:25,940 --> 00:38:23,310

about the things that we've done what

1056

00:38:28,490 --> 00:38:25,950

our hobbies are like it's it just makes

1057

00:38:31,070 --> 00:38:28,500

your life much more worth living if you

1058

00:38:32,570 --> 00:38:31,080

can enjoy it as you go and I do enjoy

1059

00:38:35,240 --> 00:38:32,580

going to work every day I mean not every

1060

00:38:38,480 --> 00:38:35,250

day there are those days but most of the

1061

00:38:40,460 --> 00:38:38,490

day and as a whole super excited about

1062

00:38:43,670 --> 00:38:40,470

the kind of work that we're doing and

1063

00:38:44,870 --> 00:38:43,680

how many people get to go help develop

1064

00:38:46,730 --> 00:38:44,880

things that are gonna get launched off

1065

00:38:48,110 --> 00:38:46,740

this planet to go learn other things

1066

00:38:50,480 --> 00:38:48,120

about our solar system it's kind of

1067

00:38:52,220 --> 00:38:50,490

amazing that I got to grow up and have

1068

00:38:53,570 --> 00:38:52,230

this hasn't been done maybe I dunno why

1069

00:38:55,610 --> 00:38:53,580

do I do you want to grow up this this is

1070

00:38:56,780 --> 00:38:55,620

it right this is it you're doing it

1071

00:38:58,640 --> 00:38:56,790

right now

1072

00:39:00,470 --> 00:38:58,650

and I love the bookend of your career

1073

00:39:02,180 --> 00:39:00,480

not that there's an end to your career

1074

00:39:05,480 --> 00:39:02,190

right now but if we bring up image 12

1075

00:39:09,920 --> 00:39:05,490

how you got started and really where you

1076

00:39:11,660 --> 00:39:09,930

can be today I mean that's that's O'Hara

1077

00:39:13,730 --> 00:39:11,670

right there that's you and O'Hara

1078

00:39:15,350 --> 00:39:13,740

it is for those of you who don't

1079

00:39:18,050 --> 00:39:15,360

recognize her that is in the shell

1080

00:39:20,750 --> 00:39:18,060

Nichols who was the original O'Hara on

1081

00:39:23,240 --> 00:39:20,760

Star Trek and she came to visit the lab

1082

00:39:24,980 --> 00:39:23,250

a few years ago and fortunately for me I

1083

00:39:27,380 --> 00:39:24,990

was one of the people who got to go and

1084

00:39:30,200 --> 00:39:27,390

meet her and tell her how important she

1085

00:39:31,880 --> 00:39:30,210

was to help set me on the trajectory

1086

00:39:33,620 --> 00:39:31,890

that I'm on now because one of the

1087

00:39:36,290 --> 00:39:33,630

reasons that my mom a lot of Star Trek

1088

00:39:38,270 --> 00:39:36,300

is that Laura looks like my mom's older

1089

00:39:40,340 --> 00:39:38,280

sister and so they would rush home from

1090

00:39:42,230 --> 00:39:40,350

school to watch the show and that's how

1091

00:39:44,450 --> 00:39:42,240

she got hooked on science fiction and

1092

00:39:46,160 --> 00:39:44,460

why she dragged me along with her so I

1093

00:39:48,380 --> 00:39:46,170

don't know my life would have turned out

1094

00:39:50,750 --> 00:39:48,390

like if mom wasn't watching that show

1095

00:39:53,330 --> 00:39:50,760

and wasn't such a sci-fi buff so it was

1096

00:39:55,370 --> 00:39:53,340

my very great pleasure to meet her and

1097

00:39:58,850 --> 00:39:55,380

tell her thanks and hello from my little

1098

00:40:00,560 --> 00:39:58,860

MoMA I want to open it up to some

1099

00:40:05,450 --> 00:40:00,570

questions online that we're getting

1100

00:40:07,400 --> 00:40:05,460

right now Brandon Lee on YouTube asks

1101

00:40:10,270 --> 00:40:07,410

what extracurricular activities should

1102

00:40:12,410 --> 00:40:10,280

you do to prepare to be a NASA engineer

1103

00:40:13,610 --> 00:40:12,420

that's a great question there are a lot

1104

00:40:14,930 --> 00:40:13,620

of things that you could do to help

1105

00:40:16,320 --> 00:40:14,940

prepare to be a NASA engineer while

1106

00:40:18,030 --> 00:40:16,330

you're in school

1107

00:40:20,690 --> 00:40:18,040

it's so great right now that they have

1108

00:40:22,620 --> 00:40:20,700

it's really inexpensive to get those

1109

00:40:24,240 --> 00:40:22,630

computer parts you could build your own

1110

00:40:26,220 --> 00:40:24,250

little Rovers have you heard of Arduino

1111

00:40:27,630 --> 00:40:26,230

is right you have an opportunity to go

1112

00:40:29,760 --> 00:40:27,640

and explore some of those things and

1113

00:40:31,620 --> 00:40:29,770

learn those problem-solving skills on

1114

00:40:34,050 --> 00:40:31,630

your own when you're in high school now

1115

00:40:36,780 --> 00:40:34,060

or college you can join robotics groups

1116

00:40:39,270 --> 00:40:36,790

there are colleges now that build nano

1117

00:40:41,160 --> 00:40:39,280

satellites and sounding rockets and the

1118

00:40:45,030 --> 00:40:41,170

experience that you can get doing those

1119

00:40:47,400 --> 00:40:45,040

things directly applies to what you need

1120

00:40:49,020 --> 00:40:47,410

as an engineer working at NASA it's also

1121

00:40:51,510 --> 00:40:49,030

great if you want to go do internships

1122

00:40:52,650 --> 00:40:51,520

like I was able to do and if you try to

1123

00:40:54,360 --> 00:40:52,660

get involved in those things and you

1124

00:40:56,310 --> 00:40:54,370

can't like don't yeah there's plenty of

1125

00:40:58,110 --> 00:40:56,320

other things you can do that aren't also

1126
00:41:00,030 --> 00:40:58,120
applicable to being an engineer one of

1127
00:41:02,840 --> 00:41:00,040
the things that we like for systems

1128
00:41:05,550 --> 00:41:02,850
engineers to show is a diversity of

1129
00:41:06,840 --> 00:41:05,560
interest not someone who's just doing

1130
00:41:08,580 --> 00:41:06,850
engineering engineering engineering

1131
00:41:12,150 --> 00:41:08,590
engineering but people who aren't sports

1132
00:41:14,640 --> 00:41:12,160
teams learn a lot about teamwork people

1133
00:41:16,710 --> 00:41:14,650
who are musicians lots about team work

1134
00:41:18,390 --> 00:41:16,720
people who do art a lot about creativity

1135
00:41:19,800 --> 00:41:18,400
and thinking outside the box so you

1136
00:41:21,570 --> 00:41:19,810
don't have to think that you must stick

1137
00:41:23,040 --> 00:41:21,580
to engineering science activities do

1138
00:41:24,990 --> 00:41:23,050

some of those other things too so that

1139

00:41:26,220 --> 00:41:25,000

you can be a well-rounded person don't

1140

00:41:28,520 --> 00:41:26,230

kill yourself don't get them sleep like

1141

00:41:30,690 --> 00:41:28,530

we try to do too many things at once

1142

00:41:32,150 --> 00:41:30,700

well that's a good segue question to

1143

00:41:34,890 --> 00:41:32,160

James T on YouTube kind of

1144

00:41:36,060 --> 00:41:34,900

extracurriculars but then and I imagine

1145

00:41:37,740 --> 00:41:36,070

this is just your opinion there's not

1146

00:41:40,080 --> 00:41:37,750

the official opinion of NASA but is

1147

00:41:42,780 --> 00:41:40,090

there more pressure to graduate from a

1148

00:41:45,210 --> 00:41:42,790

traditional engineering powerhouse MIT

1149

00:41:48,080 --> 00:41:45,220

Caltech Georgia Tech than it is to have

1150

00:41:50,970 --> 00:41:48,090

research experience and the high GPA

1151
00:41:53,580 --> 00:41:50,980
thanks for the question yeah definitely

1152
00:41:56,610 --> 00:41:53,590
my opinion and not the opinion of NASA

1153
00:41:58,170 --> 00:41:56,620
but I do think that there is pressure

1154
00:42:01,170 --> 00:41:58,180
there and whether that's pressure that's

1155
00:42:02,790 --> 00:42:01,180
coming from the internet from the

1156
00:42:05,460 --> 00:42:02,800
culture from what you hear from other

1157
00:42:07,020 --> 00:42:05,470
people whether it's you know where

1158
00:42:09,060 --> 00:42:07,030
companies go and do their recruiting

1159
00:42:12,060 --> 00:42:09,070
right if you go to Georgia Tech you'll

1160
00:42:14,280 --> 00:42:12,070
see ginormous recruiting from all sorts

1161
00:42:16,470 --> 00:42:14,290
of places around industry if you go to a

1162
00:42:18,570 --> 00:42:16,480
very small college that might not have

1163
00:42:20,910 --> 00:42:18,580

as high of a profile maybe they don't

1164

00:42:22,830 --> 00:42:20,920

have a career fair that's that big but

1165

00:42:25,770 --> 00:42:22,840

one of the things that I think is great

1166

00:42:27,720 --> 00:42:25,780

about the world today is the Internet it

1167

00:42:29,339 --> 00:42:27,730

gives people much more access to

1168

00:42:31,380 --> 00:42:29,349

information my

1169

00:42:32,670 --> 00:42:31,390

more ability to get your resume and the

1170

00:42:34,440 --> 00:42:32,680

things that you're doing out in front of

1171

00:42:36,960 --> 00:42:34,450

people one of the things that you always

1172

00:42:39,120 --> 00:42:36,970

always always want to do is network you

1173

00:42:41,940 --> 00:42:39,130

might feel like you can't hear in some

1174

00:42:44,279 --> 00:42:41,950

small college town but if you can just

1175

00:42:46,859 --> 00:42:44,289

get online search for some people to

1176
00:42:48,120 --> 00:42:46,869
people a cold you know hey I'm a student

1177
00:42:49,380 --> 00:42:48,130
studying blah blah blah can you just

1178
00:42:51,059 --> 00:42:49,390
talk to me for half an hour and give me

1179
00:42:53,249 --> 00:42:51,069
some career advice you'd be surprised

1180
00:42:55,109 --> 00:42:53,259
the number of people who will say yes to

1181
00:42:57,239 --> 00:42:55,119
that I talked to students frequently

1182
00:42:59,579 --> 00:42:57,249
just to give them some tips and tricks

1183
00:43:01,229 --> 00:42:59,589
that might seem obvious to people who

1184
00:43:03,029 --> 00:43:01,239
have been around the block for 20 years

1185
00:43:04,589 --> 00:43:03,039
but certainly isn't obvious to someone

1186
00:43:08,400 --> 00:43:04,599
who's just starting out like don't

1187
00:43:10,469 --> 00:43:08,410
everybody call me because I do like to

1188
00:43:12,120 --> 00:43:10,479

do that and once a month or so to try to

1189

00:43:13,529 --> 00:43:12,130

help our students and what I can't then

1190

00:43:15,539 --> 00:43:13,539

I might try to hook them up with other

1191

00:43:17,759 --> 00:43:15,549

people that I know just to give them

1192

00:43:20,819 --> 00:43:17,769

some insight yeah lots of things you can

1193

00:43:22,769 --> 00:43:20,829

do when I was a great addition to Becca

1194

00:43:24,569 --> 00:43:22,779

H asked is how do you find time for

1195

00:43:27,690 --> 00:43:24,579

mentoring while doing all this systems

1196

00:43:29,519 --> 00:43:27,700

engineering mmm another key you guys are

1197

00:43:32,009 --> 00:43:29,529

great with the questions today for me

1198

00:43:34,349 --> 00:43:32,019

that one is tough because especially

1199

00:43:36,539 --> 00:43:34,359

when we're in times where we have like

1200

00:43:38,339 --> 00:43:36,549

major reviews coming up our major launch

1201
00:43:39,900 --> 00:43:38,349
is coming up you have to figure out how

1202
00:43:41,160 --> 00:43:39,910
to compress some of the other things in

1203
00:43:43,950 --> 00:43:41,170
your life so you can get all the work

1204
00:43:46,049 --> 00:43:43,960
done and not like be up for 24 hours a

1205
00:43:48,150 --> 00:43:46,059
day every day and so I might do a little

1206
00:43:52,650 --> 00:43:48,160
less mentoring during those times but

1207
00:43:55,049 --> 00:43:52,660
for me I I just really enjoy seeing

1208
00:43:57,209 --> 00:43:55,059
people succeed and I had so many people

1209
00:43:58,950 --> 00:43:57,219
helped me in my career that I just like

1210
00:44:01,319 --> 00:43:58,960
to give back and to sort of pay that

1211
00:44:02,640 --> 00:44:01,329
forward and so if it means that I will

1212
00:44:04,829 --> 00:44:02,650
have a mentoring conversation during a

1213
00:44:06,660 --> 00:44:04,839

lunch time I've done that you know quite

1214

00:44:09,779 --> 00:44:06,670

a bit with people that I'm mentoring

1215

00:44:11,880 --> 00:44:09,789

right now hi Kristina and if I have to

1216

00:44:14,549 --> 00:44:11,890

do it like at 5 p.m. or on a Saturday

1217

00:44:16,229 --> 00:44:14,559

like I will try to get in an hour here

1218

00:44:19,709 --> 00:44:16,239

and there on a regular basis to try to

1219

00:44:21,509 --> 00:44:19,719

help out people like that so we'll do

1220

00:44:23,099 --> 00:44:21,519

one last question and then we'll move on

1221

00:44:24,269 --> 00:44:23,109

we've got there a lot of questions

1222

00:44:26,880 --> 00:44:24,279

coming through and they've been amazing

1223

00:44:30,509 --> 00:44:26,890

questions but one that we are getting a

1224

00:44:32,099 --> 00:44:30,519

lot it's kind of broader than but I

1225

00:44:35,459 --> 00:44:32,109

think knowing you you'll be very

1226

00:44:38,249 --> 00:44:35,469

specific about it what do you think is

1227

00:44:40,229 --> 00:44:38,259

the best way to inspire the next

1228

00:44:42,719 --> 00:44:40,239

generation and is there any advice that

1229

00:44:42,940 --> 00:44:42,729

you would the one piece of advice from

1230

00:44:49,870 --> 00:44:42,950

this

1231

00:44:54,940 --> 00:44:49,880

works for you it works and if it doesn't

1232

00:44:57,430 --> 00:44:54,950

I'm sorry I think the best thing that

1233

00:44:59,410 --> 00:44:57,440

the thing that I like to do let's say it

1234

00:45:04,060 --> 00:44:59,420

that way to inspire the next generation

1235

00:45:05,470 --> 00:45:04,070

is to just a do what I enjoy so that

1236

00:45:06,760 --> 00:45:05,480

when I'm talking about it like you said

1237

00:45:08,770 --> 00:45:06,770

you can tell that it's something that

1238

00:45:10,960 --> 00:45:08,780

I'm excited about and I love doing

1239

00:45:12,099 --> 00:45:10,970

instead of saying engineering is really

1240

00:45:13,450 --> 00:45:12,109

important and you should do it because

1241

00:45:15,880 --> 00:45:13,460

we really have to have figure Raiders

1242

00:45:18,670 --> 00:45:15,890

and selfishly those things are great but

1243

00:45:20,200 --> 00:45:18,680

it's lovely when you can feel fired up

1244

00:45:21,670 --> 00:45:20,210

about the thing that you're doing the

1245

00:45:23,740 --> 00:45:21,680

second thing I will say which is gonna

1246

00:45:26,380 --> 00:45:23,750

sound super contradictory to that third

1247

00:45:28,089 --> 00:45:26,390

thing is I know that students here

1248

00:45:29,200 --> 00:45:28,099

coming at them all the time like find

1249

00:45:31,120 --> 00:45:29,210

your passion and do what you're

1250

00:45:34,180 --> 00:45:31,130

passionate about but the next thought is

1251

00:45:35,829 --> 00:45:34,190

okay how do I do that like how do how do

1252

00:45:39,490 --> 00:45:35,839

I know what I'm passionate about and how

1253

00:45:41,650 --> 00:45:39,500

do I go about doing it there's um I wish

1254

00:45:44,170 --> 00:45:41,660

that someone had told me this which is

1255

00:45:44,680 --> 00:45:44,180

you don't have to get it right the first

1256

00:45:46,089 --> 00:45:44,690

time

1257

00:45:48,280 --> 00:45:46,099

you really don't there's so much

1258

00:45:49,390 --> 00:45:48,290

pressure on students to pick a career

1259

00:45:52,210 --> 00:45:49,400

that they're going to be satisfied with

1260

00:45:54,040 --> 00:45:52,220

forever because if they don't they will

1261

00:45:56,050 --> 00:45:54,050

have wasted X number of years and X

1262

00:45:57,819 --> 00:45:56,060

number of dollars and loans and you know

1263

00:45:59,680 --> 00:45:57,829

into the world kind of situation right

1264

00:46:02,050 --> 00:45:59,690

but there are people that I know who

1265

00:46:04,690 --> 00:46:02,060

chose a career path started down a

1266

00:46:05,500 --> 00:46:04,700

career path ten years into it said this

1267

00:46:07,960 --> 00:46:05,510

isn't working for me

1268

00:46:09,190 --> 00:46:07,970

I'm on to something else and figured out

1269

00:46:11,230 --> 00:46:09,200

how to go back to school while working

1270

00:46:13,089 --> 00:46:11,240

and try something else and now they are

1271

00:46:14,950 --> 00:46:13,099

satisfied with what they're doing so I

1272

00:46:17,200 --> 00:46:14,960

think you just have to like just don't

1273

00:46:19,780 --> 00:46:17,210

stress yes you have to pick something

1274

00:46:21,819 --> 00:46:19,790

but try it and see how it goes and if

1275

00:46:23,530 --> 00:46:21,829

it's not great two months in it's only

1276

00:46:26,650 --> 00:46:23,540

been two months like keep going for a

1277

00:46:28,930 --> 00:46:26,660

while and know that you can change your

1278

00:46:30,790 --> 00:46:28,940

mind even though it might feel like the

1279

00:46:33,609 --> 00:46:30,800

walls are closing in when you want to

1280

00:46:35,920 --> 00:46:33,619

choose to do that what I like talking

1281

00:46:37,480 --> 00:46:35,930

about you is I'm not an engineer but I

1282

00:46:39,250 --> 00:46:37,490

feel like a lot of the advice that you

1283

00:46:42,460 --> 00:46:39,260

give is good for no matter what you're

1284

00:46:44,109 --> 00:46:42,470

doing and stick around with us for a

1285

00:46:46,089 --> 00:46:44,119

second but we want to just let everybody

1286

00:46:48,069 --> 00:46:46,099

know before we leave you tonight we're

1287

00:46:50,700 --> 00:46:48,079

gonna step in on John Krasinski's

1288

00:46:53,020 --> 00:46:50,710

territory and talk about some good news

1289

00:46:55,599 --> 00:46:53,030

on April 1st NASA launched an

1290

00:46:56,710 --> 00:46:55,609

agency-wide call for ideas or how the

1291

00:46:58,870 --> 00:46:56,720

agency can lever

1292

00:46:59,920 --> 00:46:58,880

his expertise and capabilities to help

1293

00:47:04,030 --> 00:46:59,930

the nation with this unprecedented

1294

00:47:07,240 --> 00:47:04,040

crisis in just two weeks 250 ideas from

1295

00:47:11,020 --> 00:47:07,250

NASA scientists engineers everybody were

1296

00:47:13,570 --> 00:47:11,030

submitted into this now here's what some

1297

00:47:17,350 --> 00:47:13,580

JPL engineers decided to do and we're

1298

00:47:17,360 --> 00:47:25,190

[Music]

1299

00:47:31,890 --> 00:47:29,160

we are designing a easy and rapidly

1300

00:47:41,040 --> 00:47:31,900

mapped manufacturable ventilator device

1301

00:47:43,760 --> 00:47:41,050

and it is a easy project this crisis is

1302

00:47:47,670 --> 00:47:43,770

unprecedented in our lives and and

1303

00:47:52,809 --> 00:47:47,680

requires fascinating action

1304

00:47:55,849 --> 00:47:52,819

[Music]

1305

00:47:58,190 --> 00:47:55,859

I'm so amped up I mean it really the

1306

00:48:00,470 --> 00:47:58,200

adrenaline rush it's exciting but it's

1307

00:48:08,630 --> 00:48:00,480

exhausting it I think we all just want

1308

00:48:08,640 --> 00:48:13,720

[Music]

1309

00:48:20,650 --> 00:48:16,120

I would say the biggest personal

1310

00:48:28,540 --> 00:48:20,660

challenges that I have myself is I don't

1311

00:48:30,370 --> 00:48:28,550

have time to sleep I think that what JPL

1312

00:48:32,609 --> 00:48:30,380

brings to the table is extraordinary

1313

00:48:35,740 --> 00:48:32,619

talent it also brings to the table

1314

00:48:38,490 --> 00:48:35,750

tremendous innovation the third thing it

1315

00:48:42,040 --> 00:48:38,500

brings to the table is tremendous focus

1316

00:48:45,580 --> 00:48:42,050

the other thing that I felt I see it in

1317

00:48:48,760 --> 00:48:45,590

our team and that is a call to duty I

1318

00:48:53,730 --> 00:48:48,770

have this talent I'm an engineer or a

1319

00:48:58,990 --> 00:48:57,339

we have the potential to save human

1320

00:49:01,800 --> 00:48:59,000

lives people that we might know our

1321

00:49:08,950 --> 00:49:01,810

neighbors our families and that

1322

00:49:10,839 --> 00:49:08,960

intensity amazing it's amazing and it's

1323

00:49:14,890 --> 00:49:10,849

stressful as hasn't been for everybody

1324

00:49:16,530 --> 00:49:14,900

in the last a ballute week not one of us

1325

00:49:30,000 --> 00:49:16,540

can stop

1326

00:49:30,010 --> 00:49:42,250

[Music]

1327

00:49:47,690 --> 00:49:45,430

Fido was recently authorized by the FDA

1328

00:49:50,360 --> 00:49:47,700

it is designed to treat patients with

1329

00:49:52,310 --> 00:49:50,370

milder symptoms thereby keeping the

1330

00:49:54,020 --> 00:49:52,320

nation's limited supply of traditional

1331

00:49:55,580 --> 00:49:54,030

ventilators available for patients with

1332

00:49:57,710 --> 00:49:55,590

more severe Kovach symptoms

1333

00:50:00,230 --> 00:49:57,720

the Weisse can be built faster

1334

00:50:01,550 --> 00:50:00,240

maintained more easily and with far

1335

00:50:03,950 --> 00:50:01,560

fewer parts than a traditional

1336

00:50:06,800 --> 00:50:03,960

ventilator thus making it more

1337

00:50:08,240 --> 00:50:06,810

economical to produce the designs for

1338

00:50:10,580 --> 00:50:08,250

licensing through the licensing

1339

00:50:14,140 --> 00:50:10,590

licensing these are royalty-free during

1340

00:50:18,350 --> 00:50:14,150

this time this is just one of the few

1341

00:50:21,250 --> 00:50:18,360

NASA responses to our current world so

1342

00:50:26,420 --> 00:50:21,260

what do engineers do they solve problems

1343

00:50:28,070 --> 00:50:26,430

they collaborate they help I want to

1344

00:50:30,200 --> 00:50:28,080

thank Tracy drain for sharing her time

1345

00:50:32,210 --> 00:50:30,210

with us this evening thank you so much

1346

00:50:35,960 --> 00:50:32,220

Tracy I learned a lot I hope everybody

1347

00:50:39,890 --> 00:50:35,970

watching really learned something too my

1348

00:50:41,600 --> 00:50:39,900

pleasure Bane I want I hope everybody

1349

00:50:43,670 --> 00:50:41,610

joins us next month when my colleague

1350

00:50:46,280 --> 00:50:43,680

Preston dikes will be hosting making a

1351

00:50:48,950 --> 00:50:46,290

Mars rover thank you for joining us this

1352

00:50:51,470 --> 00:50:48,960

evening thank you to tracy drain please

1353

00:50:57,920 --> 00:50:51,480

stay safe stay kind and we'll see you