
PAO
NASA
www.earthkam.ucsd.edu

1
00:00:06,630 --> 00:00:04,630
earth cam is a nasa educational program

2
00:00:08,790 --> 00:00:06,640
in which middle school and college

3
00:00:11,110 --> 00:00:08,800
students don't just hear about a mission

4
00:00:13,350 --> 00:00:11,120
in space they participate in it by

5
00:00:15,910 --> 00:00:13,360
controlling a camera to photograph

6
00:00:18,230 --> 00:00:15,920
targets on earth the investigation is

7
00:00:21,510 --> 00:00:18,240
the brainchild of former astronaut sally

8
00:00:23,189 --> 00:00:21,520
ride and the payload developer brian awe

9
00:00:25,189 --> 00:00:23,199
is here this morning to talk about the

10
00:00:27,349 --> 00:00:25,199
project how did you get involved with

11
00:00:30,710 --> 00:00:27,359
with earthcam right

12
00:00:33,750 --> 00:00:30,720
i was working at an engineering firm and

13
00:00:35,670 --> 00:00:33,760

one of my supervisors approached me

14
00:00:38,630 --> 00:00:35,680
realizing that i had a background in

15
00:00:39,910 --> 00:00:38,640
camera and digital photography

16
00:00:42,630 --> 00:00:39,920
and asked if i would take over the

17
00:00:45,030 --> 00:00:42,640
project as a payload developer

18
00:00:47,110 --> 00:00:45,040
it was after a 24-year career in the air

19
00:00:48,389 --> 00:00:47,120
force and then they fortunately provided

20
00:00:51,270 --> 00:00:48,399
me with the school and the the

21
00:00:53,029 --> 00:00:51,280
engineering skills uh necessary to to

22
00:00:55,189 --> 00:00:53,039
take over as the the payload developer

23
00:00:58,630 --> 00:00:55,199
for earth cam so it's it's been a nice

24
00:01:00,470 --> 00:00:58,640
11 years it's been at for that long yes

25
00:01:03,270 --> 00:01:00,480
we have a lot of ways to take pictures

26
00:01:05,590 --> 00:01:03,280
of earth from the space station and

27
00:01:06,950 --> 00:01:05,600
from other things that are in orbit

28
00:01:09,590 --> 00:01:06,960
what is it about

29
00:01:12,550 --> 00:01:09,600
the earth cam that makes this so unique

30
00:01:14,870 --> 00:01:12,560
this is is a payload by students for

31
00:01:17,670 --> 00:01:14,880
students uh the the neatest thing about

32
00:01:19,990 --> 00:01:17,680
this is the students literally have

33
00:01:21,830 --> 00:01:20,000
direct control over the camera

34
00:01:23,190 --> 00:01:21,840
on board the iss

35
00:01:25,510 --> 00:01:23,200
it's not a

36
00:01:27,749 --> 00:01:25,520
the images are not a

37
00:01:29,590 --> 00:01:27,759
result of somebody else's research

38
00:01:31,590 --> 00:01:29,600

these are images that the students have

39
00:01:35,030 --> 00:01:31,600
actually targeted

40
00:01:35,990 --> 00:01:35,040
via web page tools that ucsd provides

41
00:01:38,310 --> 00:01:36,000
and

42
00:01:40,149 --> 00:01:38,320
they get these images down on the ground

43
00:01:42,310 --> 00:01:40,159
and then tear them apart and study them

44
00:01:45,109 --> 00:01:42,320
so that it's a really neat process you

45
00:01:47,749 --> 00:01:45,119
know by students for students ucsd is

46
00:01:49,190 --> 00:01:47,759
university of california and san diego

47
00:01:50,710 --> 00:01:49,200
um they're

48
00:01:52,630 --> 00:01:50,720
that's this is where that experiment

49
00:01:55,749 --> 00:01:52,640
this experiment comes from take us

50
00:01:58,230 --> 00:01:55,759
through it how do these students

51
00:01:59,350 --> 00:01:58,240
as you said do this study and tear it

52
00:02:01,030 --> 00:01:59,360
down just

53
00:02:03,429 --> 00:02:01,040
how how let's start with how those

54
00:02:05,270 --> 00:02:03,439
students are chosen to participate um

55
00:02:08,630 --> 00:02:05,280
it's they're really not chosen it's a

56
00:02:09,990 --> 00:02:08,640
teacher's election to utilize the the

57
00:02:13,510 --> 00:02:10,000
earthkam

58
00:02:15,589 --> 00:02:13,520
program as a as an aide to

59
00:02:17,510 --> 00:02:15,599
classroom studies we provide an

60
00:02:19,270 --> 00:02:17,520
opportunity by having the camera on

61
00:02:20,949 --> 00:02:19,280
board and available to the students for

62
00:02:22,710 --> 00:02:20,959
the week-long sessions

63
00:02:25,589 --> 00:02:22,720

we typically do this four times during

64
00:02:27,750 --> 00:02:25,599
the year and when the teacher elects to

65
00:02:29,270 --> 00:02:27,760
use earthkam to enhance the classroom

66
00:02:30,869 --> 00:02:29,280
activities

67
00:02:33,270 --> 00:02:30,879
some teachers actually have a

68
00:02:36,630 --> 00:02:33,280
competition to select the students

69
00:02:37,750 --> 00:02:36,640
others form the students into teams and

70
00:02:40,309 --> 00:02:37,760
have them

71
00:02:42,390 --> 00:02:40,319
work towards satisfying a research goal

72
00:02:43,270 --> 00:02:42,400
they give them a project that they have

73
00:02:45,830 --> 00:02:43,280
to go

74
00:02:47,910 --> 00:02:45,840
search out images that that they're able

75
00:02:50,470 --> 00:02:47,920
to capture during the mission

76
00:02:52,309 --> 00:02:50,480
and then use those images to

77
00:02:53,190 --> 00:02:52,319
back up

78
00:02:57,509 --> 00:02:53,200
a

79
00:02:59,910 --> 00:02:57,519
complete the project

80
00:03:01,670 --> 00:02:59,920
so it's and it's completely dependent

81
00:03:03,190 --> 00:03:01,680
upon the teacher

82
00:03:04,390 --> 00:03:03,200
we here at johnson

83
00:03:06,949 --> 00:03:04,400
and at

84
00:03:09,589 --> 00:03:06,959
ucsd california san diego provide the

85
00:03:10,630 --> 00:03:09,599
opportunity for the teachers to do this

86
00:03:12,470 --> 00:03:10,640
there must

87
00:03:14,949 --> 00:03:12,480
once the students are selected there is

88
00:03:17,430 --> 00:03:14,959

background work that they have to do

89
00:03:19,270 --> 00:03:17,440
to decide what they want to shoot if you

90
00:03:20,470 --> 00:03:19,280
will that's correct yeah

91
00:03:22,229 --> 00:03:20,480
based on the project that they're

92
00:03:24,149 --> 00:03:22,239
assigned

93
00:03:25,910 --> 00:03:24,159
the students can go to the web pages

94
00:03:29,190 --> 00:03:25,920
that we

95
00:03:31,190 --> 00:03:29,200
provide via the earth cam web page

96
00:03:32,949 --> 00:03:31,200
and determine where the iss is going to

97
00:03:34,070 --> 00:03:32,959
be flying overhead

98
00:03:35,830 --> 00:03:34,080
and

99
00:03:38,149 --> 00:03:35,840
search for targets that will satisfy

100
00:03:40,550 --> 00:03:38,159
their research requirement

101
00:03:42,390 --> 00:03:40,560
when they do that they then submit an

102
00:03:43,990 --> 00:03:42,400
image request

103
00:03:45,990 --> 00:03:44,000
to the university of california san

104
00:03:48,550 --> 00:03:46,000
diego in the the mock the mission

105
00:03:50,390 --> 00:03:48,560
operations center that they staff there

106
00:03:52,070 --> 00:03:50,400
we resolve the and that's staffed by

107
00:03:54,949 --> 00:03:52,080
college students correct undergrad

108
00:03:58,710 --> 00:03:54,959
students at the university

109
00:03:59,990 --> 00:03:58,720
they resolve any issues and with within

110
00:04:02,229 --> 00:04:00,000
literally all of the schools

111
00:04:03,509 --> 00:04:02,239
participating around the world

112
00:04:05,270 --> 00:04:03,519
and then they create what we call a

113
00:04:07,750 --> 00:04:05,280

camera control file

114
00:04:10,630 --> 00:04:07,760
that file then comes to us here at

115
00:04:12,869 --> 00:04:10,640
johnson space center by assets we have

116
00:04:15,429 --> 00:04:12,879
we uplink that to a

117
00:04:18,390 --> 00:04:15,439
laptop that is controlling the camera

118
00:04:20,310 --> 00:04:18,400
and it is a queue of times

119
00:04:22,790 --> 00:04:20,320
that tells the camera to take a picture

120
00:04:24,629 --> 00:04:22,800
as the space station passes over that

121
00:04:25,830 --> 00:04:24,639
point on the earth

122
00:04:27,749 --> 00:04:25,840
all of that

123
00:04:31,510 --> 00:04:27,759
work is accomplished at

124
00:04:33,749 --> 00:04:31,520
ucsd and in return the software that's

125
00:04:36,230 --> 00:04:33,759
operating on that laptop that quote

126
00:04:37,510 --> 00:04:36,240
makes earth camp will pull that image

127
00:04:39,350 --> 00:04:37,520
from

128
00:04:41,990 --> 00:04:39,360
the camera puts it in the folder we

129
00:04:45,270 --> 00:04:42,000
downlink that it gets post-processed a

130
00:04:47,110 --> 00:04:45,280
bit out at jpl we've got an individual

131
00:04:50,790 --> 00:04:47,120
out there who handles

132
00:04:52,390 --> 00:04:50,800
the imagery we contrast enhance it

133
00:04:53,749 --> 00:04:52,400
and then we post it to the website so

134
00:04:54,950 --> 00:04:53,759
the students can get access to their

135
00:04:56,790 --> 00:04:54,960
picture and then it's open to the

136
00:04:58,870 --> 00:04:56,800
general public also

137
00:05:00,950 --> 00:04:58,880
the students the middle school students

138
00:05:02,790 --> 00:05:00,960

are the ones who come up with the time

139
00:05:04,550 --> 00:05:02,800
that gets sent to the camera to say when

140
00:05:05,830 --> 00:05:04,560
to take the picture

141
00:05:07,990 --> 00:05:05,840
they have to do

142
00:05:10,390 --> 00:05:08,000
a lawful lot of different kinds of study

143
00:05:11,189 --> 00:05:10,400
to know what's the right time yes they

144
00:05:13,110 --> 00:05:11,199
do

145
00:05:16,310 --> 00:05:13,120
it starts off with a basic understanding

146
00:05:18,390 --> 00:05:16,320
of the globe latitude longitude

147
00:05:20,710 --> 00:05:18,400
and then they have to

148
00:05:22,870 --> 00:05:20,720
reduce the project that the teacher has

149
00:05:25,430 --> 00:05:22,880
assigned them into to

150
00:05:27,590 --> 00:05:25,440
latitude longitudes of potential targets

151
00:05:30,469 --> 00:05:27,600
then they go investigate where the space

152
00:05:33,189 --> 00:05:30,479
station is flying see if they can't

153
00:05:35,510 --> 00:05:33,199
image or target

154
00:05:37,189 --> 00:05:35,520
specific shots along the orbit track of

155
00:05:38,870 --> 00:05:37,199
the iss

156
00:05:41,670 --> 00:05:38,880
and then they they have to understand a

157
00:05:43,029 --> 00:05:41,680
little bit about trigonometry uh in

158
00:05:44,629 --> 00:05:43,039
geography

159
00:05:47,909 --> 00:05:44,639
in order to pull the whole package

160
00:05:50,390 --> 00:05:47,919
together so yeah it's it's a driver for

161
00:05:52,150 --> 00:05:50,400
showing real-time involvement into many

162
00:05:54,790 --> 00:05:52,160
different disciplines of science and

163
00:05:56,950 --> 00:05:54,800

math it's one thing to do a lot of study

164
00:05:58,870 --> 00:05:56,960
ahead of time to be able to predict the

165
00:05:59,990 --> 00:05:58,880
right time where the station's going to

166
00:06:02,629 --> 00:06:00,000
be

167
00:06:04,790 --> 00:06:02,639
after they send in that request how real

168
00:06:07,430 --> 00:06:04,800
time are the operations do things change

169
00:06:08,870 --> 00:06:07,440
on them oh yes oh yes we're in a real

170
00:06:10,710 --> 00:06:08,880
world

171
00:06:12,790 --> 00:06:10,720
we we have a camry that's operating on

172
00:06:14,870 --> 00:06:12,800
batteries

173
00:06:17,430 --> 00:06:14,880
occasionally toward the end of a battery

174
00:06:19,590 --> 00:06:17,440
or if it's it's been used a lot

175
00:06:21,670 --> 00:06:19,600
unfortunately we may miss a shot or two

176
00:06:23,909 --> 00:06:21,680
because the battery's gone dead and the

177
00:06:25,990 --> 00:06:23,919
crew hasn't had the chance to

178
00:06:29,029 --> 00:06:26,000
change the battery out yet

179
00:06:30,950 --> 00:06:29,039
later this week we also have a russian

180
00:06:32,629 --> 00:06:30,960
thruster firing test

181
00:06:34,309 --> 00:06:32,639
as a part of that we have to protect the

182
00:06:36,950 --> 00:06:34,319
window that we're looking out of the lab

183
00:06:39,749 --> 00:06:36,960
window is a very high quality scientific

184
00:06:42,150 --> 00:06:39,759
instrument if literally it's just a flat

185
00:06:43,749 --> 00:06:42,160
lens system so in order to protect it

186
00:06:45,990 --> 00:06:43,759
from getting

187
00:06:48,390 --> 00:06:46,000
obscured by the propellants we have to

188
00:06:50,550 --> 00:06:48,400

close the window shutter so again

189
00:06:52,309 --> 00:06:50,560
we have to black out no pictures during

190
00:06:54,150 --> 00:06:52,319
that time correct so yeah we play in the

191
00:06:55,830 --> 00:06:54,160
real world uh

192
00:06:57,110 --> 00:06:55,840
in making this payload work for the

193
00:06:58,950 --> 00:06:57,120
students

194
00:07:00,629 --> 00:06:58,960
the pictures you said there they come

195
00:07:02,870 --> 00:07:00,639
down they're processed and then they're

196
00:07:04,629 --> 00:07:02,880
made available on the internet for

197
00:07:07,749 --> 00:07:04,639
everyone correct yes

198
00:07:10,070 --> 00:07:07,759
since it's a a

199
00:07:13,350 --> 00:07:10,080
when pally and when sally thought this

200
00:07:16,230 --> 00:07:13,360
payload up uh she did a tremendous job

201
00:07:18,629 --> 00:07:16,240
in making sure that the resource wasn't

202
00:07:20,870 --> 00:07:18,639
just confined to a small group it's it's

203
00:07:22,710 --> 00:07:20,880
available to the general public

204
00:07:25,830 --> 00:07:22,720
and even several researchers actually

205
00:07:28,390 --> 00:07:25,840
use earthkam images as context photos

206
00:07:30,790 --> 00:07:28,400
for uh more in-depth knowledge in in

207
00:07:32,950 --> 00:07:30,800
their actual research

208
00:07:36,390 --> 00:07:32,960
how many students have been involved in

209
00:07:40,790 --> 00:07:36,400
this for more than 11 years over 11

210
00:07:43,430 --> 00:07:40,800
years uh we're over 190 000 students

211
00:07:45,830 --> 00:07:43,440
we we started keeping track of this

212
00:07:48,150 --> 00:07:45,840
as time went on and

213
00:07:50,950 --> 00:07:48,160

some of the earlier missions we had

214
00:07:53,589 --> 00:07:50,960
basically two or three hundred

215
00:07:56,390 --> 00:07:53,599
now we're averaging over three to four

216
00:07:58,790 --> 00:07:56,400
thousand per week long mission so it's

217
00:08:01,189 --> 00:07:58,800
grown quite a bit we still have the

218
00:08:03,029 --> 00:08:01,199
capability to handle more students

219
00:08:06,070 --> 00:08:03,039
uh the resources on board are not

220
00:08:08,390 --> 00:08:06,080
stretched uh so that you know we we can

221
00:08:10,150 --> 00:08:08,400
accommodate taking more pictures but you

222
00:08:12,150 --> 00:08:10,160
said you're doing it four times a year

223
00:08:14,629 --> 00:08:12,160
for a week at a time a week at a time

224
00:08:16,869 --> 00:08:14,639
yes that leaves a lot more weeks

225
00:08:18,070 --> 00:08:16,879
well we also have undergrad students out

226
00:08:19,909 --> 00:08:18,080
at the university that have to

227
00:08:21,830 --> 00:08:19,919
concentrate on their classes also they

228
00:08:24,469 --> 00:08:21,840
volunteer for scholarship money when

229
00:08:26,869 --> 00:08:24,479
they work at the the earth camp mission

230
00:08:28,390 --> 00:08:26,879
operations center so it's not a direct

231
00:08:30,869 --> 00:08:28,400
payment but they can offset their

232
00:08:32,550 --> 00:08:30,879
tuition costs somewhat by by working the

233
00:08:34,550 --> 00:08:32,560
mission for the middle school students

234
00:08:36,389 --> 00:08:34,560
we're not these students who have

235
00:08:39,509 --> 00:08:36,399
participated are from schools all over

236
00:08:41,990 --> 00:08:39,519
the world right yes uh we've had over 43

237
00:08:43,589 --> 00:08:42,000
countries involved with earth camp

238
00:08:45,110 --> 00:08:43,599

several of them have operated for

239
00:08:47,269 --> 00:08:45,120
multiple times

240
00:08:48,949 --> 00:08:47,279
i think the total

241
00:08:51,590 --> 00:08:48,959
by the time you add them up we're well

242
00:08:54,070 --> 00:08:51,600
over 240 some countries that have

243
00:08:56,870 --> 00:08:54,080
participated either once or multiple

244
00:08:58,949 --> 00:08:56,880
times yes how do you gauge the success

245
00:09:00,310 --> 00:08:58,959
is it it's not just that the picture's

246
00:09:02,470 --> 00:09:00,320
in focus is it

247
00:09:04,230 --> 00:09:02,480
um that's that's my job

248
00:09:06,310 --> 00:09:04,240
yeah i make sure that all the technical

249
00:09:08,710 --> 00:09:06,320
aspects are taken care of

250
00:09:11,269 --> 00:09:08,720
it's really nice i've gone to a few of

251
00:09:12,630 --> 00:09:11,279
the schools around here in the area

252
00:09:14,150 --> 00:09:12,640
after a mission actually during a

253
00:09:16,630 --> 00:09:14,160
mission i was able to sneak out for a

254
00:09:19,190 --> 00:09:16,640
few hours and when you see the students

255
00:09:21,110 --> 00:09:19,200
sitting down engaged in a mission it's

256
00:09:22,630 --> 00:09:21,120
like sitting here in mission control

257
00:09:25,110 --> 00:09:22,640
they are into

258
00:09:27,190 --> 00:09:25,120
their task at hand making sure that that

259
00:09:28,710 --> 00:09:27,200
image that they're about to request is a

260
00:09:31,590 --> 00:09:28,720
valid one

261
00:09:33,430 --> 00:09:31,600
and it's going to provide them a return

262
00:09:35,509 --> 00:09:33,440
so that they can benefit through their

263
00:09:36,790 --> 00:09:35,519

studies yeah it's it's neat to see the

264
00:09:39,269 --> 00:09:36,800
kids just

265
00:09:41,190 --> 00:09:39,279
engaged and when they do get a picture

266
00:09:43,190 --> 00:09:41,200
back they're very proud of it they can

267
00:09:45,750 --> 00:09:43,200
tell you what each pixel in that picture

268
00:09:48,070 --> 00:09:45,760
means and what it's representing so yes

269
00:09:50,710 --> 00:09:48,080
it's the the ownership

270
00:09:53,509 --> 00:09:50,720
of the images is probably the the

271
00:09:55,430 --> 00:09:53,519
incalculable benefit from it all the

272
00:09:57,990 --> 00:09:55,440
students can actually say i took that

273
00:10:00,070 --> 00:09:58,000
picture it wasn't a the result of

274
00:10:02,630 --> 00:10:00,080
somebody else's research it was their

275
00:10:04,870 --> 00:10:02,640
target their image that they targeted

276
00:10:07,110 --> 00:10:04,880
that's what sally wright had in mind yes

277
00:10:09,590 --> 00:10:07,120
yes she wanted to engage the students

278
00:10:11,829 --> 00:10:09,600
and she wanted to make it available for

279
00:10:13,750 --> 00:10:11,839
almost anybody all you have to do is

280
00:10:16,069 --> 00:10:13,760
have internet access

281
00:10:18,389 --> 00:10:16,079
we've got schools that are participating

282
00:10:21,030 --> 00:10:18,399
we call them education groups we've got

283
00:10:22,949 --> 00:10:21,040
schools we have scouting groups we have

284
00:10:24,790 --> 00:10:22,959
home school children that actually

285
00:10:27,030 --> 00:10:24,800
participate

286
00:10:29,269 --> 00:10:27,040
so the outreach

287
00:10:32,150 --> 00:10:29,279
for using earth cam

288
00:10:34,389 --> 00:10:32,160

is is growing and we see nothing but

289
00:10:36,389 --> 00:10:34,399
getting bigger and better as as time

290
00:10:38,710 --> 00:10:36,399
goes on and as you said anybody can look

291
00:10:40,710 --> 00:10:38,720
at the pictures what's the the internet

292
00:10:42,190 --> 00:10:40,720
address there's uh the internet address

293
00:10:49,430 --> 00:10:42,200
is

294
00:10:53,110 --> 00:10:51,269
it's an education website okay now

295
00:10:55,590 --> 00:10:53,120
that's on the screen there for everyone

296
00:10:57,190 --> 00:10:55,600
to see brian thanks very much enjoy it

297
00:10:59,350 --> 00:10:57,200
thank you very much brian awe is the

298
00:11:01,509 --> 00:10:59,360
payload developer for the earth cam