1
00:00:01,786 --> 00:00:04,406
[Lynnette Madison] Lynnette Madison
here at NASA Johnson Space Center

2
00:00:04,406 --> 00:00:11,156
and I'm at a Wearable Technology Summit today,
or Wearable Technology Symposium where a group

3
00:00:11,156 --> 00:00:15,406
of University of Minnesota students
are here talking to NASA engineers

4
00:00:15,406 --> 00:00:19,856
and explaining how wearable technology or
e-textiles, I think it's what they told me,

5
00:00:20,416 --> 00:00:25,316
can actually help NASA engineers
create futuristic spacesuits.

6
00:00:25,666 --> 00:00:32,746
So with me today are Grace Loreg and
Mai Yang and also Jessica Loomis.

7
00:00:33,336 --> 00:00:35,946
So Grace, you're going to
be our spokesperson today.

8
00:00:36,256 --> 00:00:39,916
So tell me a little bit about
what your project was this,

9
00:00:40,196 --> 00:00:41,746
was it this semester, this past semester?

10
00:00:41,906 --> 00:00:45,716
[Grace Loreg] Yeah we've been working on
it the entire semester and our problem was

11

00:00:45,826 --> 00:00:52,486
to create a warning system for the astronauts to
wear in the space station that set off an alarm

12
00:00:52,696 --> 00:00:56,206
in all different levels of emergencies
with three different modalities.

13
00:00:56,206 --> 00:01:00,866
So we used visual, tactile
and audio alarm systems.

14
00:01:00,866 --> 00:01:05,966
[Lynnette] Okay, so this had to be
something that they could be lightweight

15
00:01:06,006 --> 00:01:07,916
so could fly it to the space station.

16
00:01:08,216 --> 00:01:09,566
It had to be wearable.

17
00:01:09,596 --> 00:01:11,526
Can you kind of tell me some of your challenges?

18
00:01:11,946 --> 00:01:17,046
[Grace] Well, a lot of the challenges came
in using fabrics that they could move well in

19
00:01:17,046 --> 00:01:21,476
but could also support the electronics
system that's wired throughout it.

20
00:01:21,476 --> 00:01:26,096
And then also being able to channel it
through and you can see on here how we,

21
00:01:26,536 --> 00:01:30,226
where the light's are located and the speakers
and the motors and how they have to go

22
00:01:30,326 --> 00:01:33,006
through the sleeves and all
the way back down into the pack

23
00:01:33,196 --> 00:01:35,776
that we have built into in
the back which is this.

24
00:01:36,206 --> 00:01:38,816
[Lynnette] So you're all fashion designers,

25
00:01:38,816 --> 00:01:42,246
or this class was an apparel design
class from what I understand.

26
00:01:42,676 --> 00:01:44,796
Had you ever worked with electronics before?

27
00:01:45,856 --> 00:01:46,156
[Grace] No.

28
00:01:46,776 --> 00:01:48,236
[Lynnette] Was this a challenge for you?

29
00:01:48,396 --> 00:01:48,556
[Grace] Yes.

30
00:01:48,906 --> 00:01:52,666
But our professor's really good at working
with all different kinds of e-textiles.

31
00:01:52,666 --> 00:01:53,366
She helped us a lot.

32
00:01:53,366 --> 00:01:54,826
[Lynnette] Was this a fun class?

33

00:01:55,316 --> 00:01:55,446
[Grace] Yeah.

34
00:01:55,886 --> 00:01:58,376
The beginning of the class is
a lot of learning about physics

35
00:01:58,376 --> 00:01:59,906
and human factors and stuff like that.

36
00:01:59,976 --> 00:02:01,706
So we had to integrate that into it.

37
00:02:01,706 --> 00:02:03,966
[Lynnette] And so that was not
something you had ever studied before.

38
00:02:04,376 --> 00:02:06,166
So physics is new to you.

39
00:02:06,166 --> 00:02:08,376
So tell me a little bit about
what you've created here.

40
00:02:08,376 --> 00:02:09,726
You've got a jacket?

41
00:02:09,726 --> 00:02:09,936
[Grace] Yes.

42
00:02:10,306 --> 00:02:11,896
[Lynnette] And what does it do?

43
00:02:12,196 --> 00:02:14,716
[Grace] Well, it has three
different levels of warnings,

44
00:02:14,776 --> 00:02:18,686
so kind of just to get someone's

attention, and then a cautionary

45
00:02:18,686 --> 00:02:21,686
and then a high level of emergency warning.

46
00:02:22,196 --> 00:02:25,816
And there's also one system built in where

47
00:02:25,816 --> 00:02:28,696
if we could only use two
modalities, they would be used.

48
00:02:29,116 --> 00:02:34,326
It's a tactile and a visual
alert because visual is the sense

49
00:02:34,326 --> 00:02:37,856
that we use the most to get our attention.

50
00:02:37,856 --> 00:02:40,816
And then tactile is more like close to the body

51
00:02:40,816 --> 00:02:44,086
and you can capture attention maybe
quicker than if there was outside sound.

52
00:02:44,746 --> 00:02:50,736
And then there's also a button where
the user can alert other astronauts

53
00:02:50,836 --> 00:02:52,986
on the, in the space station.

54
00:02:52,986 --> 00:02:57,326
So it has a light and a vibrating
motor on the shoulder to tap them

55
00:02:57,326 --> 00:02:58,596
on the shoulder and get their attention.

56
00:02:58,596 --> 00:03:02,936
And then also this tab is an
emergency, high-level warning emergency

57
00:03:03,206 --> 00:03:05,856
that they can set off themselves.

58
00:03:05,856 --> 00:03:06,976
[Lynnette] So let's see a demonstration.

59
00:03:06,976 --> 00:03:07,276
[Grace] Okay.

60
00:03:08,216 --> 00:03:13,176
This is the lowest level and it's
just a yellow light that's on.

61
00:03:13,216 --> 00:03:16,356
So yellow is the most visually
stimulating color.

62
00:03:16,446 --> 00:03:19,846
They can see it but it also, we
intuitively read it as a caution

63
00:03:19,846 --> 00:03:21,506
so it's not as high-level warning.

64
00:03:22,046 --> 00:03:29,576
And then the medium level, the lights start
to blink and there's also, at the same time,

65
00:03:29,776 --> 00:03:32,566
there would be a beeping which
is not going off right now.

66
00:03:32,716 --> 00:03:36,146
And there's motors vibrating on the back in

the same kind of pattern with the lights.

67
00:03:36,706 --> 00:03:40,576
So the blinking moves it to a
second-level of warning because it,

68
00:03:41,246 --> 00:03:43,156
it reestablishes the warning
every time it goes off.

69
00:03:43,466 --> 00:03:46,476
[Lynnette] So they'll know that
it's a more serious warning

70
00:03:46,666 --> 00:03:49,426
because you're getting a
sound, you're hearing a sound.

71
00:03:49,426 --> 00:03:52,246
You're feeling something in your
back and you're also seeing a lot.

72
00:03:52,686 --> 00:03:55,306
So what happens when you get
the really serious warning?

73
00:03:55,356 --> 00:03:59,436
[Grace] The highest warning, a red light
comes on, the beat becomes more frequent

74
00:03:59,506 --> 00:04:03,376
and so does the vibrating pattern on the back.

75
00:04:03,946 --> 00:04:09,896
And also red is the color
that we read as a warning.

76
00:04:09,896 --> 00:04:12,096
So that's why we incorporated
that right into it.

77
00:04:12,096 --> 00:04:17,006
And then also this is the high-level
warning of just the two modalities.

78
00:04:17,006 --> 00:04:19,186
You can't tell that the motors are going off.

79
00:04:19,416 --> 00:04:24,686
But they're going off with the lights and
then, yeah, that's the button that she can push

80
00:04:24,756 --> 00:04:28,356
to get the attention of the other
astronauts in the space station.

81
00:04:28,466 --> 00:04:31,926
And then if you were to pull
the tab this would happen.

82
00:04:32,056 --> 00:04:32,716
[Lynnette] Very good.

83
00:04:32,966 --> 00:04:35,146
So did you sew this yourselves?

84
00:04:35,196 --> 00:04:36,696
Did your, you all worked on this?

85
00:04:36,746 --> 00:04:40,386
And you all, you cut, did you design
the pattern, you cut it all out?

86
00:04:40,606 --> 00:04:41,656
How did you decide that?

87
00:04:42,706 --> 00:04:49,136
How did you put all of these electronics
into this very nice little jacket?

88
00:04:49,216 --> 00:04:53,246
[Grace] It was kind of a "learn
as we went" kind of a thing.

89
00:04:53,246 --> 00:04:56,696
We, first we had to plan out
kind of the wiring system.

90
00:04:56,776 --> 00:05:01,626
So initially we did testing to figure out the
placement of things and where they were best,

91
00:05:01,816 --> 00:05:04,116
where they best caught the
attention of the user.

92
00:05:04,636 --> 00:05:07,106
And then we patterned out wiring.

93
00:05:07,186 --> 00:05:12,766
So this is its own channel through
the arm to let the wiring go through.

94
00:05:12,766 --> 00:05:16,846
This yoke right here has wiring
that comes back through here.

95
00:05:16,846 --> 00:05:22,446
And then the back on both sides this channel
leads down into the pack in the back.

96
00:05:22,696 --> 00:05:24,596
So that was something we patterned right away.

97
00:05:25,066 --> 00:05:31,436
And then the gray fabric is stretch fabrics and
this had to be a woven so it couldn't stretch.

98

00:05:31,756 --> 00:05:34,686
We wanted the user to be able to move
around a lot 'cause that's how they get

99
00:05:34,686 --> 00:05:36,396
around space station is with their arms.

100
00:05:36,996 --> 00:05:39,026
So that's why we incorporated
stretch fabric into there.

101
00:05:39,026 --> 00:05:45,826
And then also where the, where the
woven fabric is you put a lining inside

102
00:05:45,826 --> 00:05:48,336
and it also supports the wires
that go through the garment.

103
00:05:48,806 --> 00:05:53,126
[Lynnette] So you learned a lot about
electricity and a lot about making fashion.

104
00:05:53,306 --> 00:05:53,536
[Grace] Yes.

105
00:05:53,826 --> 00:05:58,886
Yeah and of course also along with that
we wanted to be aesthetically pleasing.

106
00:05:58,886 --> 00:06:00,836
So it kind of ended up being cool looking.

107
00:06:01,306 --> 00:06:03,196
[Lynnette] I think it is very cool looking.

108
00:06:03,196 --> 00:06:06,316
Well that sort of leads me to your
consumer product because you had

109
00:06:06,316 --> 00:06:08,126
to do something for NASA in your class.

110
00:06:08,536 --> 00:06:11,116
But you also had to make a consumer product.

111
00:06:11,396 --> 00:06:14,036
So this is very nice looking and what is that?

112
00:06:14,036 --> 00:06:18,806
[Grace] This is a biking jacket and
we tried to figure out some activity

113
00:06:18,806 --> 00:06:21,716
that someone would be doing where
they would want all three modalities,

114
00:06:22,506 --> 00:06:24,016
or where they would be useful.

115
00:06:24,446 --> 00:06:27,956
And so we either, the first thing that
came to my mind was biking because I feel

116
00:06:27,956 --> 00:06:32,836
that there's a lot of miscommunication
between bikers and people on the road.

117
00:06:33,536 --> 00:06:34,936
So we put the lights in.

118
00:06:34,936 --> 00:06:40,326
This is on the right arm so it would be a
constant yellow light that would be on so

119
00:06:40,326 --> 00:06:44,826
that people in cars and other
bikers could see you,

120
00:06:44,826 --> 00:06:48,056
their arm when it was raised
signaling right or left.

121
00:06:48,056 --> 00:06:52,276
And then on the back there is,
this would be a constant red light.

122
00:06:52,276 --> 00:06:55,166
So kind of like the light that they put on
their bikes but it's also on the garment.

123
00:06:55,166 --> 00:06:58,896
And then over right and left shoulder
lights so that they could push,

124
00:06:59,316 --> 00:07:03,386
there's button on the left arm that they can use
to signal whether they're going right or left.

125
00:07:03,486 --> 00:07:04,266
So it would flash.

126
00:07:04,746 --> 00:07:10,026
And then there's also a motor built on
each shoulder so that they can either,

127
00:07:10,026 --> 00:07:12,946
if there biking with someone, whether
they're in front or behind them,

128
00:07:12,946 --> 00:07:16,996
they can get their attention by just tapping one
and tapping their shoulder or one or the other

129
00:07:16,996 --> 00:07:18,886
to tell them that they're turning right or left.

130
00:07:19,836 --> 00:07:21,936

There's also a speaker built in.

131
00:07:21,936 --> 00:07:26,766
And the idea behind that would be, like
when you're backing up your car and it beeps

132
00:07:26,766 --> 00:07:30,026
when you're getting close to something
behind you, so the hopes would be

133
00:07:30,226 --> 00:07:35,056
that the speaker would be turned
on when there was a car approaching

134
00:07:35,056 --> 00:07:37,176
or something close behind
you and it would alert you.

135
00:07:37,826 --> 00:07:40,006
[Lynnette] So this is your consumer product.

136
00:07:40,596 --> 00:07:43,396
What is your next step?

137
00:07:43,586 --> 00:07:47,186
[Grace] Well from here and we can take
some classes, other classes offered

138
00:07:47,186 --> 00:07:53,186
by your professor, also offers the Human
Factors course so we could learn more

139
00:07:53,186 --> 00:07:55,226
of those things to incorporate into garments.

140
00:07:55,226 --> 00:07:58,946
And I also think there's a Technical
Design class she's teaching.

141

00:07:59,556 --> 00:08:03,306
And we're working on our senior line
next year for our final project.

142
00:08:03,306 --> 00:08:06,846
And some students might incorporate some
of the things we learned here into that,

143
00:08:06,966 --> 00:08:11,526
like other active wear, other
functional design and stuff like that.

144
00:08:11,936 --> 00:08:13,166
[Lynnette] How many students are in your class?

145
00:08:13,606 --> 00:08:15,036
[Grace] There's 16 I think.

146
00:08:15,256 --> 00:08:18,376
[Lynnette] Have you always worked on NASA
projects or have you done other things?

147
00:08:18,736 --> 00:08:21,276
[Grace] This is the first
year we worked with NASA.

148
00:08:21,366 --> 00:08:24,576
But previously they worked with
companies like Nike and 3M.

149
00:08:25,926 --> 00:08:29,026
[Lynnette] So when you work
with companies like 3M

150
00:08:29,026 --> 00:08:31,806
and Nike do you take those
products onto their company?

151
00:08:32,286 --> 00:08:38,736
Will this possibly be a NASA spacesuit

item or NASA, something that we would use

152
00:08:38,736 --> 00:08:39,836
on the International Space Station?

153
00:08:39,976 --> 00:08:43,056
[Grace] Well they're prototypes
for them to work from.

154
00:08:43,056 --> 00:08:44,896
I don't know if they'll use the exact thing.

155
00:08:44,896 --> 00:08:48,356
But I know that there are certain
things that, maybe the placement

156
00:08:48,356 --> 00:08:53,236
or some of the intuitive things that
we built into it that they might add

157
00:08:53,286 --> 00:08:54,666
into things that they're already working on.

158
00:08:55,126 --> 00:08:58,596
[Lynnette] Is it exciting to do something
like this, to work on actual project?

159
00:08:59,586 --> 00:08:59,716
[Grace] Yes.

160
00:09:00,126 --> 00:09:01,736
It was scary at first.