

line #	Character/Actor	Dialogue	Elapsed time	Director's notes
1	Narrator / Katherine	Hello! We are Nx-treme, team 3691. This year we researched body repair and improvement in the form of prosthetic arms. We found that a major problem is this technology has not changed significantly since the hook and cable of World War II. In fact it has become such a large concern that DARPA developed the Revolutionizing Prosthetics Initiative giving grants to companies such as DEKA and Johns Hopkins' APL in order to advance prosthetics research. Without further delay we would like to present our research skit Arm Wars		
2	Narrator / Katherine	Our story begins as Luke Skycrawler battles his nemesis, the evil Darth Villain.		
3				Luke and Darth: <i>battle briefly</i>
4				Darth: <i>cuts off Luke's arm/hand</i> (exit)
6				Luke: <i>falls off stage screaming</i>
7	Narrator / Katherine	When Luke opens his eyes he finds himself in a primitive clinic, appearing to be like Earth 2010.		
8	Luke / Michael	My life is over, Han. I can't do anything without my arm. I can't balance right, or button my shirt, or use a lightsaber, or, or, or anything!		dramatically
9	Hun/ Jacob	I'm sure that it can't be that bad, after all there are over 100,000 people who have lost an arm in the United States alone, not to mention those who suffer from paralysis or Lou Gehrig's disease, and <i>they</i> survived. You just need the right prosthetic arm and you'll be fighting the empire again in no time.		
10	Primitive Dr. #1/ Austin	You're very lucky Mister. While you were unconscious we measured you for a new arm. <i>Gestures to pictures of arm being fitted and hands Luke a pamphlet</i>		
11	Primitive Dr. #2/ Nathan	We currently have two wonderful devices you can choose between. The Utah Arm uses myoelectric signals, generated from existing muscles, to give it precise movement.		
12	Primitive Dr. #1/ Austin	And the i-LIMB PULSE is a robust hand that can attach to it which offers the choice to grip things tighter and more securely using PULSE technology.		
13	Luke / Michael	But how do I tell if I'm gripping too hard, or what if I accidentally twitch my muscle and cause a myoelectric pulse to activate the arm?		
14	Primitive Dr. #1/ Austin	Umm... well... actually you know, I don't think you can afford that type of prosthetic. The arms in your price range are probably the hook and cable, which uses cables attached to your shoulder to close the hooks as you extend your arm or a cosmetic arm which, while not functional, looks just like a real arm.		
15	Luke / Michael	Wait, this is some sort of joke right? You're not really going to put that piece of junk on me?		
16	Primitive Dr. #2/ Nathan	This piece of <i>junk</i> is the most commonly used arm		

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17	Primitive Dr. #1/ Austin	Well we <i>do</i> have a specialist here working on a new cutting edge bionic arm, but it's still in research and development.		says doubtfully
18	Luke / Michael	Lets see it!		
19	Primitive Dr. #1/ Austin			<i>introduces source</i>
20	Source/ Lindsey	So I hear that you're interested in the Proto-2, I'm Dr. Arminger, one of the scientists working on it. The Proto-2 offers 22 degrees of freedom, including independent movement in every finger. This is 4 more degrees than offered by DEKA's Luke Arm. Using Targeted Nerve Re-Innervations the residual nerves from the missing limb will be remapped onto muscles in the chest. This causes the muscles to twitch when you think about moving your arm in a certain way, which activates the Injected Myoelectric Sensors telling the prosthetic to move in the manner you wish it to.		addressing Luke
21	Luke / Michael	How does the arm grab objects?		
22	Source/ Lindsey	The prosthetic is programmed with 8 different common grasps used in daily life, for example holding a briefcase or pencil. This manner of control is different than that used in the Luke Arm, which uses a pressure sensitive pad in the shoe controlled by the foot. Or that used in the Smart Hand which interfaces directly with the severed nerves.		
23	Luke / Michael	But how can I feel through a robotic hand?		
24	Source/ Lindsey	While we might not have 40 sensors like the Smart Hand, but there are four different sensors in each finger, including a temperature sensor, contact force sensor, and accelerometer which use reverse bio-feedback to transfer the sensations to your nerves.		
25	Luke / Michael	Can I control my X-Wing using motions that require multiple fingers to move differently?		
26	Source/ Lindsey	No. But you can do much more with it than with any other prosthetic arm currently available.		
27	Luke / Michael	This is a big problem isn't there anything you can do about it?		
28	Source/ Lindsey	No, we really can't.		
29	Luke / Michael	NOOOOOOOOOO!		
30	Narrator / Katherine	When Luke awakes from his worst nightmare he finds himself back home.		
31	Luke / Michael	Where am I?		<i>circumspectat</i>
32	Doctor #1/ Alex	You're in the X-treme Prosthetics Center. You got into a bit of a domestic dispute with your father and you've been unconscious since he severed your arm.		
33	Doctor #2/ Kaustubh	Don't worry too much though; our prosthetic solutions here are very innovative. You might not even realize that you're wearing a robotic arm.		
34	Doctor #1/ Alex	Previous arms were only able to use a set number of pre-programmed grips, but our arms use optical sensors in the palm to identify the shapes of common objects.		

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35	Doctor #2/ Kaustubh	By using this sensor glove on your good hand you can train the arm to “learn” what sort of grip or motion to use for the object.		
36	Doctor #1/ Alex	After a shape has been stored in the arm’s memory, and the sensor is within range of the object, the arm will send a signal to a wireless earpiece with the suggested set or “learned” motion and grip pattern for the object. The arm can also be controlled by preprogrammed voice commands		
37	Doctor #2/ Kaustubh	This allows for a faster reaction time and more dynamic grips patterns. Of course the suggestions could be turned off by voice over-ride.		
38	Doctor #1/ Alex	Another problem with older arms was their lack of tactile sensors, however we have solved this by using the highly flexible synthetic skin developed by Dr. Bao of the Bao Research Group. Which is sensitive enough to feel the weight of a butterfly landing on it.		
39	Doctor #2/ Kaustubh	Combined with thermally conductive carbon nanotubes that accurately transmit heat signals 20 times faster than conventional thermal sensors.		
40	Doctor #1/ Alex	The result of this combination is a highly temperature, contact, and force sensitive hand, with improved reflexes and grip dexterity.		
41	Darth Villain/ Kyle	Thank you for watching our presentation on innovative Prosthetic arm technologies. We would like to thank both the scientists from Johns Hopkins’ APL and the prostheticians from Virginia Prosthetics who meet with us and scientists from Oak Ridge National Laboratories and DARPA who sent us e-mail correspondents. We also shared our presentation during the national science and engineering expo on the Washington Mall, in a YouTube presentation, and with friends and family. If you want to find out more information on our topic you can look at the websites on our source list. Again thank-you, and have a good day.		