

Bionic Arm

1. Adjective
2. Noun
3. Noun
4. Adjective
5. Noun
6. Past Tense Verb
7. Noun
8. Noun
9. Adjective
10. Past Tense Verb
11. Noun
12. Noun
13. Past Tense Verb
14. Noun
15. Verb
16. Verb
17. Noun
18. Noun
19. Past Tense Verb
20. Adjective
21. Noun
22. Verb
23. Noun

24. Noun _____

25. Verb _____

26. Verb Ending In Ing _____

27. Past Tense Verb _____

28. Verb _____

29. Noun _____

30. Noun _____

31. Past Tense Verb _____

32. Noun _____

33. Past Tense Verb _____

34. Noun _____

35. Noun _____

36. Noun _____

37. Noun _____

38. Noun _____

39. Noun _____

40. Noun _____

41. Verb _____

42. Noun _____

43. Noun _____

44. Adjective _____

45. Noun _____

46. Past Tense Verb _____

47. Past Tense Verb _____

48. Adjective _____

49. Noun

50. Verb Ending In Ing

51. Location

52. Adjective

53. Noun

54. Noun

55. Noun

56. Verb Ending In Ing

57. Past Tense Verb

58. Adjective

59. Past Tense Verb

60. Past Tense Verb

Bionic Arm

As the first Adjective Noun injured in Noun to use a new Adjective

Noun Cpl Andrew Garthwaite's story has already been remarkable.

But this week he Past tense verb six hours of surgery at a hospital in Austria at the start of a process to

make it even more so - to prepare him to be fitted with an Noun he will be able to control with his
Noun.

The 24-year-old, from South Tyneside, was Adjective Past tense verb in Helmand, Afghanistan, in

September 2010 when a Taliban rocket-propelled Noun took off his right Noun and
Past tense verb one of his Noun.

He first had to learn how to Verb Verb everyday Noun with one Noun but was
Past tense verb to

learn he would have one of the latest models of _____ Adjective _____ Noun _____ fitted.

He could _____ Verb _____ a _____ Noun _____ and do basic _____ Noun _____. He could also _____ Verb _____ his party trick
- _____ Verb ending in ing _____ his hand 360 degrees.

A technician then _____ Past tense verb _____ a new arm so he could ride his motorbike.

_____ Verb _____ Noun _____ Noun _____

He _____ Past tense verb _____ it all with a positive attitude and said his _____ Noun _____ was _____ Past tense verb _____ by the
support he had from his _____ Noun _____ his _____ Noun _____ and _____ Noun _____ who saved his _____ Noun _____.
This

_____ Noun _____ Noun _____ though, has its _____ Noun _____ and Cpl Garthwaite needs to _____ Verb _____ his

_____ Noun _____ or _____ Noun _____ muscle to achieve a single, _____ Adjective _____ Noun _____.

Cpl Garthwaite was badly _____ Past tense verb _____ in September 2010

He was then _____ Past tense verb _____ eligible for some _____ Adjective _____ Noun _____. It involved _____ Verb _____

ending in ing _____ to _____ Location _____ to have what the medics there called _____ Adjective _____ Noun _____

Reinnervation (TMR), the first step on the process to receiving the _____ Noun _____ he will control with his
_____ Noun _____.

Verb ending in ing _____ before he _____ Past tense verb _____ he said: "I'm really excited at going over. A little bit
_____ Adjective _____ but I think the outcome is going to be great.";

The surgeons at the hospital in the Medical University of Vienna have rewired his nervous system.

He is _____ Past tense verb to be the first person from the UK to undergo this cutting-edge technique in the field of bionics.

Cpl Garthwaite said he had been "lost for words"; when he learnt that and was "honoured"; to have been chosen.

'Difficult surgery';

Surgeons at the hospital are working closely with bionics company Otto Bock, in Vienna, to create one of the most intelligent bionic systems in the world.

In an operation lasting six hours on Tuesday surgeon Prof Oskar Aszmann and his team _____ Past tense verb _____ out which of the mass of tiny nerves from his shoulder joint operated his arm and hand. Once they isolated those, they rewired them into his chest.

After the surgery, Prof Aszmann said: "It all went extremely well.

"It was a surprise to me because he had a shrapnel injury, there was a rocket wound, so normally you have to expect a lot of scar tissue, but it was not the case.

"It was a difficult surgery, but we could identify all the nerves that we wanted to and transfer them to the appropriate targets.";

In the coming months these nerves will grow. Cpl Garthwaite's mind will work out which nerves do what, and will learn how to control those nerves.

He will then be able to control his bionic arm in such a way that it will become intuitive, unlike the slow robotic movements of his current arm.

Prof Aszmann said the surgery went "extremely well";

He will be able to think several moves and his arm and hand will react naturally. His bionic arm will be thought-controlled.

'Exciting

prospect';

After his complex, remarkable surgery, Cpl Garthwaite will soon feel a hand on his chest, his own hand.

And, as the nerve endings grow he too will be able to operate his bionic limb by simply thinking about those hand and arm movements.

Prof Aszmann said: "For the first four to five months he will be very numb and not feel anything, but after around six months, he will feel his own index finger and thumb in his shoulder, so when he pinches his shoulder he will say 'oh this is my index finger or here's my thumb'.

"That's really exciting because, in the future we will have little senses in these artificial fingers and they will have direct sensory feedback.";

Before the surgery, Cpl Garthwaite said he was excited at the prospect of having a more natural arm movement and being able to use it quickly rather than the slow process it can be currently and even the possibility of being able to feel hot and cold.

He said: "I still have my down days and I still have flashbacks and memories, which will never leave us, but you just learn to crack on.

"With this new target I have got to hit now, it is keeping my mind occupied.

"You just want to look into the future and just think what's actually going to happen, how much it's going to benefit me.";

See more in Look North on BBC1 in the North East and Cumbria on Wednesday 25 January at 18:30.

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