Correction to: Enhancement of needle visualization and localization in ultrasound

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Correction to:

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The original version of this article unfortunately contained a mistake. The presentation of Table 1 was incorrect. The cell of "Steerable/Robot-assisted needles" should shift one column to the right.

The original article has been corrected.

The original article can be found online at <https://doi.org/10.1007/s11548-020-02227-7>.

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Table 1 A sample of the literature summarizing the variety of approaches enhancing needle visibility and localization

	Signal/image processing Line detection:	Needle modification Sensors/actuators/trackers:	Transmission modification Beam steering:	Motion analysis Doppler:	Machine learning
All studies	[9, 11–14]	[15, 16]*, [17–22]	[23]*, [24]	[25–27]*	[24, 28–33]
Validated in-vivo	[9, 13]	[16]*, [18, 19]	[24]	[16]*, [26, 27]*	[24, 29–32]
Validated ex-vivo	[11]	[18]	[24]	[27]*	[24, 28, 29, 33]
Phantom validation	[9, 11, 12, 14]	[20, 21]	[23]*	[25, 26]	[29, 31, 33]
Tip accuracy	[9, 11, 12, 14]	[17–19, 22]	–	[25, 26]	[28–31, 33]
Shaft accuracy	[9, 11, 12, 14]	[17, 20, 21]	[24]	–	[24, 28–32]
Failure rate	[13]	[19, 20]	–	[26]	[28, 30]
Projection-based:					
		Echogenic needles:	3D ultrasound:	Micro motion:	
All studies	[11, 34, 35]	[6]*, [36, 37]*	[10, 38]	[29, 30, 39]	
Validated in-vivo	[35]	[37]*	–	[29, 30, 39]	
Validated ex-vivo	[11]	–	[10, 38]	[29]	
Phantom validation	[11, 34, 35]	[6]*, [36]*	[29]		
Tip accuracy	[11, 34, 35]	–	[10, 38]	[29, 30, 39]	
Shaft accuracy	[11, 34, 35]	–	[38]	[29, 30, 39]	
Failure rate	[35]	[37]*	–	[30]	
Mechanical guides:					
	Image filtering:		Specialized transmission:	Motion estimation:	
All studies	[40, 41]	[42, 43]*	[44]*, [45]	[11, 30, 38, 39]	
Validated in-vivo	[41]	[43]*	–	[30, 39]	
Validated ex-vivo	[40]	–	[45]	[11, 38]	
Phantom validation	–	–	[44]*, [45]	[11]	
Tip accuracy	[40, 41]	[42]	[45]	[11, 30, 38, 39]	
Shaft accuracy	[41]	[42]	[45]	[11, 30, 38, 39]	
Failure rate	[41]	[42, 43]*	–	[30]	
Steerable/Robot-assisted needles:					
All studies		[11, 42, 43]*, [46]*, [47–49]			
Validated in-vivo		[43]* [47, 48]			
Validated ex-vivo		[11, 46]*, [47, 48]			
Phantom validation		[11, 49]			
Tip accuracy		[11, 42, 48, 49]			
Shaft accuracy		[11, 42, 47]			
Failure rate		[43]*			

*Are papers enhancing the needle visualization

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