*Required

Medical device design criteria for low-resource settings

This short (10 min) survey aims to identify essential criteria that, in your opinion, should be considered while designing Medical Devices (MDs) that will be used in lower income settings. This survey aims to explore which elements should be considered during the design of MDs to make them more resilient to operational conditions that in lower-income settings are more challenging than in higher-income ones (e.g., lack of specialised staff, health technology management issues, poor supply chain etc.).

Your name has been suggested by your colleagues and IFMBE AC members, which consider you as one of the leading experts for medical device assessment, maintenance or regulation.

The answers will be anonymized and used by IFMBE (http://ifmbe.org) studies and in research studies within the Applied Biomedical Signal Processing and Intelligent eHealth Lab (https://warwick.ac.uk/fac/sci/eng/research/grouplist/biomedicaleng/abspie) at the University of Warwick, led by Dr Leandro Pecchia.

Your answers will not be disclosed and your participation to this study will remain confidential. Your email is collected only to share with you the final results of this survey. Since this is an electronic survey, taking part in the survey and transmitting your answers online, we assume that you give your consent and agree that we can use the information you provide us with for the purposes of our study.

This study was approved by the Biomedical & Scientific Research Ethics Committee (BSREC) at the University of Warwick (REGO-2018-2283).

1. Email address *

2. In which nation do you work? *

3. What's your field of expertise? *

4. How many years of experience do you have in the field? *

5. USER TYPE: What is the importance of considering the END USERS' BACKGROUND (e.g., doctors, nurses, biomedical engineering technicians etc.) during the design of MD which

will be used in low resource settings? *

Very low

Low

Medium High Very high Do not know

Mark only one oval per row.

Select an option

Select an option		N.									
	Very	low	Lov	۸,	Medium	Hiah	Very	hiah	Do n	ot know	
	VELY		LOV	<u> </u>	Medium	Tilgii	Very	Tilgii	0011	Ot KIIOW	
USER TYPE: What i training required to will be used in low i Mark only one oval p	becc resou	rce :	skille	ed '	with this	idering techno	the T logy)	RAIN durin	ING N	EEDS (e design o	.g., the of MD whic
	Very	low	Lov	٧	Medium	High	Very	high	Do n	ot know	
Select an option		$\overline{}$)					(
be used in low reso Mark only one oval p		N.	i ngs Lov		Medium	High	Very	high	Do n	ot know	
Select an option		$\overline{}$		$\overline{)}$					(
						_					
NSTALLATION REC resource settings?	QUIRI *	EME									
INSTALLATION REC resource settings? Mark only one oval p	QUIRI * er rov	E ME I <i>N</i> .			ring the	design	of ME) whic	ch will	be used	
INSTALLATION REC resource settings? Mark only one oval p	QUIRI *	E ME I <i>N</i> .		du		design	of ME) whic	ch will		
INSTALLATION REC resource settings? Mark only one oval p	QUIRI * er rov	E ME I <i>N</i> .	NTS	du	ring the	design	of ME) whic	ch will	be used	
INSTALLATION REC resource settings? Mark only one oval p Select an option HTM: What is the im design of MD which	Very	low ance	Lov	v on	Medium	High	Very	high	Do n	ot know	in low
INSTALLATION REC resource settings? Mark only one oval p Select an option HTM: What is the im design of MD which	Very	low ance	Lov	v on	Medium	High	Very	high	Do n	ot know	in low
INSTALLATION REC resource settings? Mark only one oval p Select an option HTM: What is the im design of MD which Mark only one oval p	Very	eMEI //. low ance be us //.	Lov	w comin I	Medium	High the MA	Very LINTE	high NANC	Do n	ot know	in low
INSTALLATION REC resource settings? Mark only one oval p Select an option HTM: What is the im design of MD which Mark only one oval p	Very nport	eMEI //. low ance be us //.	Lov e of c	w comin I	Medium sidering ow resou	High the MA	Very LINTE	high NANC	Do n	ot know	in low
INSTALLATION RECTESOURCE SETTINGS? Mark only one oval posterior Select an option HTM: What is the implementation of MD which mark only one oval posterior Select an option HTM: What is the implementation of MD which which makes on the implementation of MD which which implementation of MD which implementation is the implementa	Very very very very very very very very mport	low ance be us low ance be us low	Lov e of cosed i	du w con in l	Medium sidering ow resou Medium	High the MA urce set	Very LINTE ttings Very	high NANC high NANC	Do n Do n	ot know EQUENC ot know	In low
Select an option HTM: What is the im design of MD which Mark only one oval p Select an option HTM: What is the im design of MD which Mark only one oval p	Very very very very very very very very mport	low ance be use w. ance be use w.	Lov e of cosed i	du v con in l	Medium sidering ow resou Medium	High the MA urce set	Very LINTE ttings Very	high NANC ? * high NANC ? *	Do n CE FRI Do n	ot know EQUENC ot know	In low

Mark only one oval							
	Very low	Low	Medium	High	Very high	Do not know	
Select an option							
HTM: What is the interpretation of MD which will be Mark only one oval	e used in l					RE PARTS durir	ng the de
	Very low	Low	Medium	High	Very high	Do not know	
Select an option							
HTM: How importa	r (e.g., CO						
Mark only one oval	per row.						
	Very low	Low	Medium	High	Very high	Do not know	
Select an option							
				_ _ _			
ROBUSTNESS dur	ing the de						
ROBUSTNESS dur	ring the de per row.	sign of	MD whic	h will b	e used in l	ow resource se	
ROBUSTNESS dur Mark only one oval	ing the de			h will b		ow resource se	
ROBUSTNESS dur	ring the de per row.	sign of	MD whic	h will b	e used in l	ow resource se	
Select an option DESIGN: What is the	Very low he importa	Low	Medium	High THE N	Very high	Do not know COMPONENT	ettings? *
Select an option DESIGN: What is the	Very low he importa	Low	Medium	High THE Note that the second control in th	Very high	Do not know F COMPONENT ource settings?	ettings? *
Select an option DESIGN: What is the	very low he importadesign of loger row.	Low nnce of MD wh	Medium LIMITING	High THE Note that the second control in th	Very high NUMBER Of in low reso	Do not know F COMPONENT ource settings?	ettings? *
Select an option DESIGN: What is the Mark only one oval Select an option DESIGN: What is the Mark only one oval Select an option DESIGN: What is the which will be used	very low the importate design of low Very low Very low the importate in low res	Low Ince of MD wh	Medium LIMITING ich will be Medium consider	High GTHE N e used High	Very high NUMBER Of in low reso	Do not know F COMPONENT ource settings? Do not know	ettings? * 'S/SPARI *
DESIGN: What is to PARTS during the Mark only one oval	very low the importate design of low Very low Very low the importate in low res	Low Ince of MD wh	Medium LIMITING ich will be Medium consider	High THE N e used High ing the	Very high NUMBER Of in low reso	Do not know F COMPONENT ource settings? Do not know	ettings? * 'S/SPARE *

				-			
RELIANCE ON EXT RELIANCE ON POV resource settings?	WER SOU						
Mark only one oval p							
	Very low	Low	Medium	High	Very high	Do not know	
Select an option							
RELIANCE ON EXT RELIANCE ON WA' resource settings? Mark only one oval	TER DISTE						
	Very low	Low	Medium	High	Very high	Do not know	
RELIANCE ON EXT RELIANCE ON MEI air-changes per ho settings? *	DICAL LO our) during	CATIO	N AIR (e.g	ı. filteri	ng, temper	ature, humidity	, numbe
RELIANCE ON EXT RELIANCE ON MEI air-changes per ho settings? *	DICAL LO our) during	CATIO	N AIR (e.g	ı. filteri	ng, temper	ature, humidity	, numbe
RELIANCE ON EXT RELIANCE ON MEI air-changes per ho settings? *	DICAL LOG our) during	CATIO	N AIR (e.g	ı. filteri ID whic	ng, temper	ature, humidity	, numbe
RELIANCE ON EXT RELIANCE ON MEI air-changes per ho settings? *	DICAL LOG our) during	CATIOI the de	N AIR (e.g esign of M	ı. filteri ID whic	ng, temper th will be u	ature, humidity sed in low reso	, numbe
RELIANCE ON EXTRELIANCE ON MEI air-changes per ho settings? * Mark only one oval per Select an option RELIANCE ON EXTUNDERSTANDINGS LOCATION CHARA MD which will be up	DICAL LOG our) during over row. Very low TERNAL FA STATING ACTERISTI sed in low	Low ACTOFTHE DICS (e.g.	N AIR (e.gesign of N Medium RS: What EPENDEN g. limited	High is the in	Very high	Do not know of ROM THE MED	, numbe urce ICAL
RELIANCE ON EXTRELIANCE ON MEI air-changes per ho settings? * Mark only one oval per Select an option RELIANCE ON EXTUNDERSTANDINGS LOCATION CHARA	DICAL LOG our) during over row. Very low TERNAL FA STATING SACTERISTI SEG in low	Low ACTORTHE DICS (e.g.	Medium Medium RS: What EPENDEN g. limited rce settin	High is the in ICE OF use in gs? *	Very high mportance THE MD F group 0, 2	Do not know of ROM THE MED or 3) during the	, numbe urce ICAL
RELIANCE ON EXTRELIANCE ON MEI air-changes per ho settings? * Mark only one oval parts Select an option RELIANCE ON EXTUNDERSTANDING LOCATION CHARA MD which will be up	DICAL LOG our) during over row. Very low TERNAL FA STATING ACTERISTI sed in low	Low ACTOFTHE DICS (e.g.	Medium Medium RS: What EPENDEN g. limited rce settin	High is the in ICE OF use in gs? *	Very high	Do not know of ROM THE MED	, numbe urce ICAL
RELIANCE ON EXTRELIANCE ON MEI air-changes per ho settings? * Mark only one oval publication RELIANCE ON EXTUNDERSTANDING LOCATION CHARAMD which will be used in low resour	DICAL LOG our) during oer row. Very low TERNAL FA STATING SECTERISTI SECTERIST SECTERISTI SECTERISTI SECTERISTI SECTERISTI SECTERISTI SECTERIS	Low ACTORTHE DI CS (e.g. resou	Medium RS: What EPENDEN g. limited irce settin Medium	High High High High High High High High	Very high mportance THE MD F group 0, 2	Do not know of ROM THE MED or 3) during the	, numbe urce ICAL design
RELIANCE ON EXTRELIANCE ON MEI air-changes per ho settings? * Mark only one oval publication RELIANCE ON EXTUNDERSTANDING LOCATION CHARAMD which will be upwark only one oval publication.	DICAL LOG our) during oer row. Very low TERNAL FA STATING SECTERISTI SECTERIST SECTERISTI SECTERISTI SECTERISTI SECTERISTI SECTERISTI SECTERIS	Low ACTORTHE DI CS (e.g. resou	Medium RS: What EPENDEN g. limited irce settin Medium	High High High High High High High High	Very high mportance THE MD F group 0, 2	Do not know of ROM THE MED or 3) during the	, numbe urce ICAL design

					_			
					_			
MATERIAL: What is used during the de								E MATER
Mark only one oval	-						•	
	Very I	ow	Low	Medium	High	Very high	Do not know	
Select an option								
MATERIAL: What in MATERIAL during Mark only one oval	the des	sign						
	Very I	ow	Low	Medium	High	Very high	Do not know	
Select an option								
include each belov	and r	ate	its imp	ortance l	oetweer		[e.g., "criteria 1	
include each belov	and r	ate	its imp	ortance l	oetweer		[e.g., "criteria 1	
include each belov or "criteria 1 (High COST: What is the	v and r), criter	ate ria 2	its imp ? (Medi	oortance I um), "	petweer	n brackets		(Very lo
include each belov or "criteria 1 (High COST: What is the which will be used	v and r), crited import in low	ate ria 2	its imp ? (Medi	oortance I um), "	petweer	n brackets		(Very lo
include each belov or "criteria 1 (High COST: What is the which will be used	import in low	ate ria 2	its imp ? (Medi ee of co ource	ortance I um), " onsidering settings?	g the IN	n brackets	T during the de	(Very lo
include each belov or "criteria 1 (High COST: What is the which will be used Mark only one oval	import in low	ate ria 2	its imp ? (Medi	ortance I um), " onsidering settings?	g the IN	n brackets	T during the de	(Very lo
cost: What is the which will be used Mark only one oval	import in low per row	ate ria 2 cance res	ee of coource	onsidering settings?	g the IN	Very high	T during the de	(Very lo
cost: What is the which will be used Mark only one oval	import in low per row	tance res	ee of coource	onsiderings? Medium onsiderings?	g the IN	Very high	T during the de	(Very l
COST: What is the which will be used Mark only one oval Select an option	import in low very l	ate ria 2 dance res	ee of coource	onsiderings? Medium onsiderings?	g the IN	Very high	T during the de	(Very lo
COST: What is the which will be used Mark only one oval Select an option	import in low per row Very l import e used	ate ria 2 and res ow	ee of coource Low ee of coource	onsidering settings?	g the IN	Very high AINTENAN	Do not know CE COST during	(Very lo
COST: What is the which will be used Mark only one oval Select an option	import in low very l	ate ria 2 and res ow	ee of coource	onsidering settings?	g the IN	Very high	Do not know CE COST during	(Very lo
cost: What is the which will be used Mark only one oval posterior of MD which will be Mark only one oval posterior of MD which will be mark only one oval posterior of Select an option cost: What is the select an option cost: What is the cost: What is the select an option cost: What is the cost: What is the	importin low Very I importe used per row Very I import	ate ria 2	te of coource Low Low Low Low ce of coource	onsiderings? Medium Onsidering Onsidering Ource set	g the IN g the M ttings? High	Very high Very high Very high	Do not know CE COST during Do not know	esign of
COST: What is the which will be used Mark only one oval and Select an option COST: What is the of MD which will be Mark only one oval and Select an option COST: What is the of MD which will be Mark only one oval and Select an option COST: What is the MD which will be used	import in low very l import e used per row Very l import sed in	tance res	te of coource Low Low Low Low ce of coource	onsiderings? Medium Onsidering Onsidering Ource set	g the IN g the M ttings? High	Very high Very high Very high	Do not know CE COST during Do not know	esign of
COST: What is the of MD which will be Mark only one oval	import in low very l import e used per row Very l import sed in	ance res	te of coource Low Low Low Low ce of coource	onsiderings? Medium Onsidering ource set Medium onsidering ource settir	g the IN High ttings? High g the Rings?	Very high Very high Very high	Do not know CE COST durin Do not know OSTS during the	esign of

LIFETIME: What is MD which will be u	sed in lov				he MD I	LIFE	TIME	during t	he design o
Mark only one oval p	per row.								
	Very low	Low	Medium	n High	Very h	high	Do	not know	
Select an option									
LIFETIME: What is PARTS/COMPONE									
settings? *	N I S GUIIII	ig the d	iesign o	I WID WII	ich will	be t	isea	in low re	source
Mark only one oval p	per row.								
	Vorylow	Low	Madium	a ∐iah	Vonuk	hiah	Do	not know	
	Very low	Low	Medium	n High	Very h	nign	טט	not know	
								(
Select an option Do you suggest an include each below or "criteria 1 (High)	and rate	its imp	ortance	betwee					
Do you suggest an include each below or "criteria 1 (High)	and rate , criteria :	its imp 2 (Medi	oortance lum),	betwee "] *	n brack	kets	[e.g.,	"criteria	
Do you suggest an include each below or "criteria 1 (High)	and rate , criteria :	its imp 2 (Medi	oortance lum),	betwee "] *	n brack	ce se	[e.g.,	"criteria	
Do you suggest an include each below or "criteria 1 (High)	and rate , criteria :	its imp 2 (Medi	domain Very	betwee "] * for low	n brack	ce se	etting	"criteria ys * Very	1 (Very low Do not
Do you suggest an include each below or "criteria 1 (High) Please rate the imp	and rate , criteria :	its imp 2 (Medi	domain Very	betwee "] * for low	n brack	ce se	etting	"criteria ys * Very	1 (Very low Do not
Do you suggest an include each below or "criteria 1 (High) Please rate the imp Mark only one oval pure the second pure the s	oortance coer row.	its imp 2 (Medi	domain Very	betwee "] * for low	n brack	ce se	etting	"criteria ys * Very	1 (Very low Do not
Do you suggest any include each below or "criteria 1 (High) Please rate the imp Mark only one oval publication of the second o	oortance coer row.	its imp 2 (Medi	domain Very	betwee "] * for low	n brack	ce se	etting	"criteria ys * Very	1 (Very low Do not
Do you suggest any include each below or "criteria 1 (High) Please rate the imp Mark only one oval publication of the mark on the mark of the mark on the	ortance of the control of the contro	its imp 2 (Medi	domain Very	betwee "] * for low	n brack	ce se	etting	"criteria ys * Very	1 (Very low Do not
Do you suggest any include each below or "criteria 1 (High) Please rate the imp Mark only one oval pure the model of the	ortance of the control of the contro	its imp 2 (Medi	domain Very	betwee "] * for low	n brack	ce se	etting	"criteria ys * Very	1 (Very low Do not
Do you suggest any include each below or "criteria 1 (High) Please rate the imp Mark only one oval publication of the mark on the mark of the mark on the	ortance of the control of the contro	its imp 2 (Medi	domain Very	betwee "] * for low	n brack	ce se	etting	"criteria ys * Very	1 (Very low Do not