Table S1 The strategies of article searched

Search databases	Query	Search details	Results
1-Medline (PubMed)	"Augmented Reality" AND "Total Knee Arthroplasty"	(("augmented reality"[MeSH Terms] OR "augmented reality"[All Fields] OR "AR technology"[All Fields] OR "mixed reality"[All Fields] OR "virtual reality"[MeSH Terms] OR "virtual reality"[All Fields] OR "VR"[All Fields] OR "extended reality"[All Fields] OR "XR"[All Fields]) AND ("total knee arthroplasty"[MeSH Terms] OR "total knee arthroplasty"[All Fields] OR "TKA"[All Fields] OR "knee replacement"[All Fields] OR "knee prosthesis"[MeSH Terms] OR "knee prosthesis"[All Fields] OR "arthroplasty, replacement, knee"[MeSH Terms] OR "knee surgery"[All Fields])) AND ((fha[Filter]) AND (ffrft[Filter]))	45
2-Scopus	"Augmented Reality" AND "Knee Replacement"	(("augmented reality"[MeSH Terms] OR "augmented reality"[All Fields] OR "AR technology"[All Fields] OR "mixed reality"[All Fields] OR "virtual reality"[MeSH Terms] OR "virtual reality"[All Fields] OR "VR"[All Fields] OR "extended reality"[All Fields] OR "XR"[All Fields]) AND ("knee replacement"[MeSH Terms] OR "knee replacement"[All Fields] OR "total knee replacement"[All Fields] OR "knee arthroplasty"[All Fields] OR "total knee arthroplasty"[MeSH Terms] OR "TKA"[All Fields] OR "knee prosthesis"[MeSH Terms] OR "knee prosthesis"[All Fields] OR "arthroplasty, replacement, knee"[MeSH Terms])) AND ((fha[Filter]) AND (ffrft[Filter]))	53
3-Web of Science	"Augmented Reality" AND "Knee Surgery"	(("augmented reality"[MeSH Terms] OR "augmented reality"[All Fields] OR "AR technology"[All Fields] OR "mixed reality"[All Fields] OR "virtual reality"[MeSH Terms] OR "virtual reality"[All Fields] OR "VR"[All Fields] OR "extended reality"[All Fields] OR "XR"[All Fields]) AND ("knee surgery"[MeSH Terms] OR "knee surgery"[All Fields] OR "surgery, knee"[All Fields] OR "knee operation"[All Fields] OR "knee arthroplasty"[All Fields] OR "total knee arthroplasty"[MeSH Terms] OR "TKA"[All Fields] OR "knee replacement"[All Fields] OR "arthroplasty, replacement, knee"[MeSH Terms])) AND ((fha[Filter]) AND (ffrft[Filter]))	71
4-Google Scholar	"AR Systems" AND "Knee Arthroplasty"	(("AR systems"[All Fields] OR "augmented reality systems"[All Fields] OR "AR technology"[All Fields] OR "augmented reality"[MeSH Terms] OR "augmented reality"[All Fields] OR "mixed reality"[All Fields] OR "virtual reality"[MeSH Terms] OR "virtual reality"[All Fields] OR "VR"[All Fields] OR "extended reality"[All Fields] OR "XR"[All Fields]) AND ("knee arthroplasty"[MeSH Terms] OR "knee arthroplasty"[All Fields] OR "total knee arthroplasty"[MeSH Terms] OR "total knee arthroplasty"[All Fields] OR "TKA"[All Fields] OR "knee replacement"[All Fields] OR "knee prosthesis"[MeSH Terms] OR "knee prosthesis"[All Fields] OR "arthroplasty, replacement, knee"[MeSH Terms])) AND ((fha[Filter]) AND (ffrft[Filter]))	63

Table S2 Key findings and summary of the papers included in the scoping review

Author, year	Key findings	Summary
Daniel *et al.* 2016 (20)	AR technology improves surgical assistance and visualization in TKA procedures	Augmented reality enhances intraoperative visualization and guidance
Pokhrel *et al.* 2019 (21)	AR significantly reduces cutting errors, improving bone resection accuracy	AR improves precision in surgical bone cutting, reducing technical errors
Wang *et al.* 2019 (22)	HoloLens-based AR navigation improves accuracy in minimally invasive TKA procedures	AR enhances navigation during minimally invasive total knee arthroplasty
Tsukada *et al.* 2019 (23)	AR-based navigation increases the precision of tibial bone resections in TKA	AR systems offer precise navigation for tibial bone resection during TKA
Fucentese *et al.* 2021 (24)	AR-based guidance improves intraoperative alignment and surgical precision	Novel AR systems achieve enhanced alignment accuracy during TKA
Tsukada *et al.* 2021 (25)	AR-assisted femoral resection improves precision compared to conventional techniques	AR enhances accuracy in femoral bone resections during TKA
Iacono *et al.* 2021 (26)	AR improves limb alignment and component positioning; pilot studies confirm clinical feasibility	AR enhances alignment precision; clinical trials highlight its feasibility in TKA
Tsukada *et al.* 2022 (27)	AR-aided UKA improves intraoperative alignment precision	AR offers improved precision in unicompartmental knee arthroplasty
Tsukada *et al.* 2024 (28)	AR navigation achieves non-inferior femoral alignment compared to accelerometer-based systems	AR provides similar alignment outcomes as accelerometer navigation systems
Bennett *et al.* 2023 (29)	AR navigation achieves accurate coronal alignment of components during TKA	AR demonstrates high precision for coronal component alignment during surgery
Castellarin *et al.* 2024 (30)	AR enhances surgical performance and improves component alignment precision in clinical practice	AR improves surgical workflows and precision for component positioning in TKA procedures

AR, augmented reality; TKA, total knee arthroplasty; UKA, unicompartmental knee arthroplasty.