PRIMARY STUDIES CLASSIFICATION

Table 2 - Robotic Platform

	Primary Studies
no hardware	P2, P4, P5, P8, P10, P11, P12, P16, P17, P18, P23, P28, S02, S04, S06, S07, S08, S10, S13, S14, S15, S17, S19, S21, S22, S24, S27, S30, S31
Turtlebot	P7, P13, P24, P25, P29, P32, S01, S12, S16, S23
Kobuki	P6, P22, S01, S11
Care-O-bot	P20, S09, S28
KUKA	P26, P27
AgRob	S05, S16
PR2	P29, S28
Telerob	P1
Twist	P3
FPGA	P9
Flightgoggles	P14
Parrot	P14
M4K	P15
EvoRally	P19
Ford Hybrid Escape	P21
Landshark	S18
Raspberry	S20
FASTEN	S25
M3-Neony	P30
NAO	P31
Auto-ID	S03

Table 3 - ROS Ecosystem Level

	Primary Studies
filesystem	P1, P2, P3, P4, P5, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P29, P32, S01, S02, S03, S05, S06, S07, S09, S11, S14, S17, S21, S22, S23, S24, S25, S27, S28, S29, S30, S31
computation graph	P1, P2, P3, P4, P6, P7, P8, P9, P11, P13, P14, P17, P18, P19, P20, P21, P22, P24, P25, P30, S05, S08, S09, S10, S11, S14, S15, S16, S18, S20, S26
community	P4, P7, P8, P12, P13, P16, P23, P28, P31, S04, S12, S13, S19

Table 4 - Communication Paradigm

	Primary Studies
topic	P1, P2, P3, P6, P7, P8, P9, P11, P13, P17, P18, P19, P20, P21, P22, P24, P25, P26, P30, S01, S05, S08, S09, S10, S11, S12, S14, S16, S18, S20, S22, S25, S26, S31
-	P4, P5, P10, P12, P14, P15, P16, P23, P27, P28, P29, P31, P32, S02, S03, S04, S06, S07, S13, S15, S17, S19, S21, S23, S24, S27, S28, S29, S30
service	P3, P8, P11, P20, P22, P26, P30, S08, S09, S12, S16
shared memory	P3, S20

Table 5 - Quality Attribute

	Primary Studies
functional suitability	P2, P3, P6, P10, P11, P13, P14, P15, P18, P19, P20, P25, S01, S02, S03, S07, S08, S09, S10, S13, S15, S23, S26, S27, S29
maintainability	P1, P3, P4, P5, P8, P9, P10, P11, P12, P16, P22, P23, P24, P25, P30, S04, S06, S09, S16, S21, S25
portability	P1, P8, P12, P14, P16, P18, P19, P21, P23, P24, P25, P30, S03, S11, S13, S14

reliability	P1, P4, P6, P7, P8, P19, S07, S17, S18, S22, S26, S27, S29, S31
compatibility	P1, P3, P8, P11, P14, P15, P16, P21, P23, P24, P25, P29, P30, S02, S14
usability	P1, P8, P12, P13, P16, P17, P24, P31, S06, S13, S17, S19, S21
security	P4, P8, P25, P27, P28, S05, S17, S18, S24
performance efficiency	P26, P32, S12, S20, S28, S30, S31

Table 6 - Type of Robot

	Primary Studies
Mobile	P1, P3, P4, P6, P7, P13, P15, P18, P19, P20, P21, P22, P24, P25, P26, P29, P30, P31, P32, S01, S05, S09, S10, S11, S12, S16, S22, S23, S25, S26, S29, S31
-	P5, P9, P10, P11, P12, P16, P17, P28, S02, S04, S06, S13, S14, S15, S17, S18, S19, S21, S24, S27, S28
Fixed	P2, P27, S03, S08, S20
airborne	P14, P25, S07, S30

Table 7 - Cardinality

	Primary Studies
Single	P1, P2, P3, P4, P6, P7, P13, P14, P15, P19, P20, P21, P22, P24, P26, P27, P29, P30, P31, P32, S02, S03, S05, S07, S08, S09, S10, S11, S12, S14, S16, S22, S23, S25, S26, S28, S29, S30
-	P5, P8, P9, P10, P11, P12, P16, P17, P23, P28, S04, S06, S13, S17, S18, S19, S21, S24, S27
Multiple	P18, P25, S01, S02, S15, S20, S31

Table 8 - Application Field

	Primary Studies
-	P5, P10, P11, P12, P16, P17, P21, P28, S02, S04, S05, S13, S14, S15, S16, S17, S18, S19, S21, S24, S25, S27, S28
Navigation task	P6, P7, P13, P14, P15, P19, P24, P29, P32, S11, S12, S22, S23, S26, S28, S29, S31
Toy example	P2, P9, P22, P26, P27, P30, S01, S03, S06, S10
Multiple	P8, P23, P27, S08, S20
Unmanned	P25, S28, S30
Self-driving	P21, S25, S28
Home	P20, P31, S28
Medical	P3, S09
Search and rescue	P1
Military	P4
Leader/Follower	P18

Table 9 - ROS Version

	Primary Studies
ROS1	P26, P27, P28, P29, P30, P31, P32, S01, S02, S03, S04, S05, S06, S08, S09, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19, S21, S22, S23, S24, S25, S26, S27, S28, S29, S30, S31
ROS2	P28, S04, S06, S07, S10, S12, S13, S20
Not Restricted	P1, P3, P6, P9, P10, P13, P14, P16, P17, P18, P19, P20, P21, P22, P24, P25

Table 10 - Knowledge Area

	Primary Studies
design	P1, P7, P8, P9, P15, P21, P24, P26, P27, S01, S02, S03, S07, S08, S12, S13, S16, S17, S26, S27, S28, S31
quality	P4, P20, P28, P32, S01, S05, S06, S12, S15, S18, S19, S20, S21, S22, S24, S25, S28, S29
maintenance	P12, P16, P23, P28, P30, S08, S11, S14, S16, S25, S28
SE models	P1, P2, P3, P6, P7, P11, P18, P19, P20, P24, P25
testing	P5, P10, P14, P17, P18, P22, P23, S06, S10, S22, S29
construction	P13, P23, P31, S03, S30
management	P5, P7, P11, P24
requirement	S07, S18, S19, S23
practice	S03, S13

computing	P14, P29

Table 11 - Research Strategy

	Primary Studies
proposal	P1, P2, P3, P4, P5, P6, P7, P9, P11, P14, P15, P17, P18, P19, P20, P21, P22, P24, P25, P26, P27, P29, S01, S02, S03, S05, S06, S07, S08, S09, S10, S11, S14, S15, S16, S18, S21, S22, S23, S26, S27, S29, S31
evaluation	P5, P8, P12, P13, P16, P23, P28, P30, P31, P32, S03, S05, S12, S13, S15, S16, S19, S20, S24, S25, S28, S30
validation	P1, P3, P6, P7, P14, P15, P18, P19, P21, P24, P25, P26, S12
philosophical	P10, S04, S17

Table 12 - Research Method

	Primary Studies
lab	P13, P15, P25, P26, P27, P29, P32, S01, S02, S06, S09, S11, S12, S19, S20, S23, S24, S26, S27
simulation	P1, P7, P14, P18, P19, P21, P24, P25, P31, P32, S03, S08, S10, S18, S22, S30, S31
concept	P2, P4, P6, P9, P10, P11, P17, P20, P22, P30, S07
deployment	P3, P14, P28, S05, S14, S15, S16, S25, S28, S29
mining	P5, P8, P12, S04, S12, S13, S17, S21
Survey	P8, P16, P23
Interview	P16, P23

Table 13 - Future Challenges and Limitations

	Primary Studies
Multi-language	P2, P11, P14, P15, P17, P20, P22, P27, P29, P31, S01, S08, S09, S10, S11, S13, S15, S16, S20, S24, S25, S29
Further validation	P1, P4, P10, P11, P13, P21, P24, P25, P26, P29, S03, S07, S11, S17, S20, S21, S26, S28, S30
Lack of generalization	P1, P7, P13, P16, P30, P32, S03, S06, S10, S12, S13, S14, S16, S17, S28
Support for complex specification	P2, P11, P22, P25, S01, S05, S09, S14, S22, S23, S26, S28, S29
Automation	P4, P6, P8, P10, P16, S03, S08, S09, S10, S15, S23
Performance improvements	P9, P14, P15, P21, P22, S03, S15, S18, S20, S29
Support for more reference	P8, P20, P23, P28, S05, S15, S17, S21, S26
Evaluation of quality	P3, P4, P10, S09, S18
Enable self-adaptation	P18, S23
Run-time support	P7, P17
Support for real-time properties	P25
Machine learning integration	P19