SciRoc
European Robotics League plus Smart Cities Robot Competitions

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Instrument: Coordination and Support Action

ERL Consumer Service Robots Test Bed Certification Form

EUROPEAN ROBOTICS LEAGUE
Brought to you by SPARC

Please fill the questionnaire below, respecting the maximum number of characters per question, so as to apply to certify your test bed. The answer to all questions is mandatory, implying creating resources, if necessary (e.g., web page, graspable objects).

Test bed name: Cobot Maker Space Living Space

Test bed web page URL: https://cobotmakerspace.org

Name of Institution where test bed is hosted: University of Nottingham

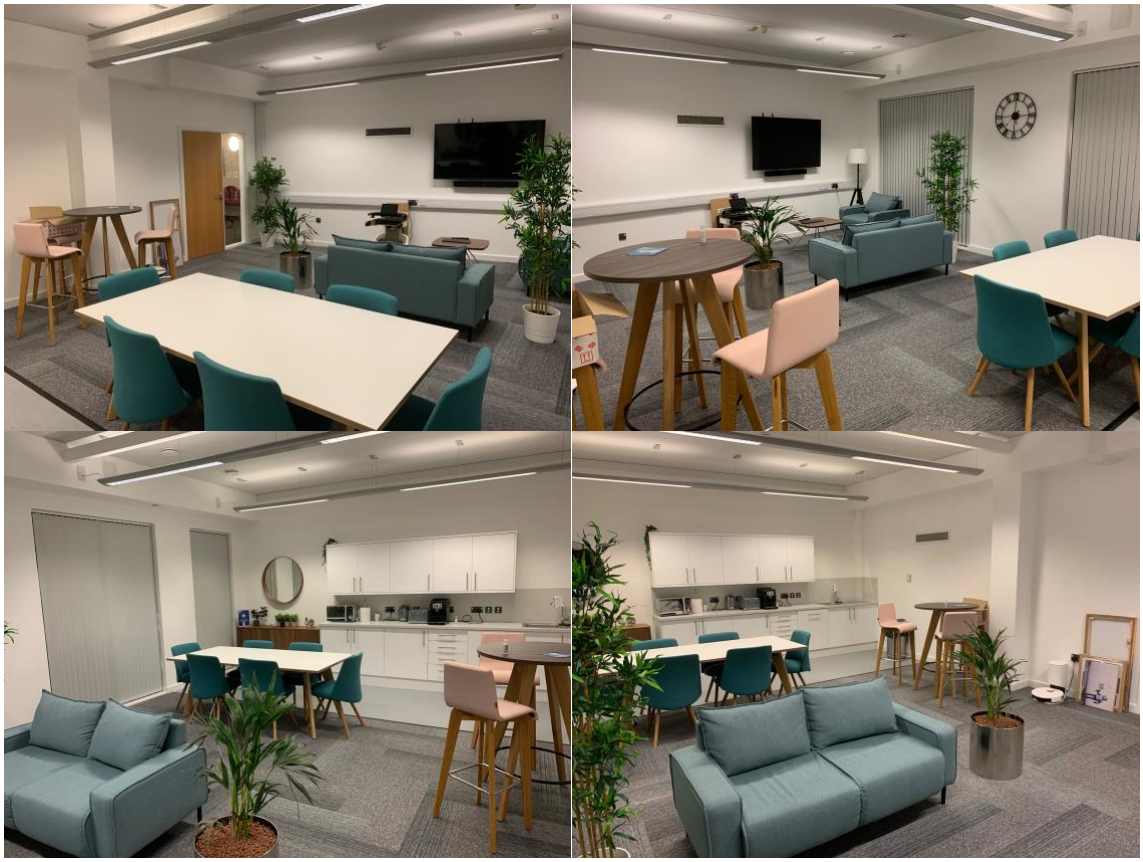
Designation of the lab/department/group where test bed is located: Computer Science

Name of responsible person: Dominic Price

Contacts of responsible person:

- **E-mail**: dominic.price@nottingham.ac.uk
- **Tel.**: +have 44 784 115 1594

Attach up to 5 (five) pictures with overview of the test bed



Short description of the facility, including the type of furniture used, wall materials, available objects and robot platforms [*max 1,000 chars (with spaces)*]:

The Cobot Maker Space Living Space facility is set up to mimic an open-plan style living space. It comprises the following facilities:

Furniture

- 2 seat sofa
- 1 seat armchair
- Occasional table
- Dinner table with 6 dinner chairs
- Tool 'bar' table with 3 stools
- Kitchen cupboards
- Sideboard with storage

Facilities

- Fridge
- Sink with hot and cold water tap
- Dishwasher
- Microwave
- Kettle
- Toaster
- Coffee machine

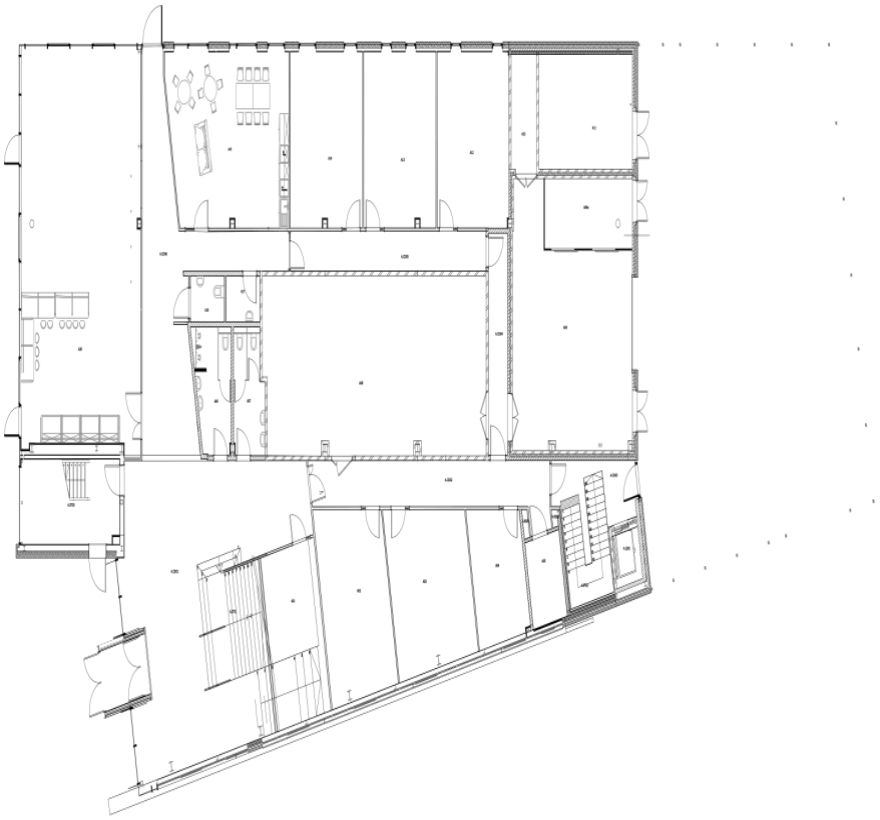
Wall Materials

- Exterior wall – brick
- Exterior windows – double glazed glass
- Interior walls – plaster and wooden frame

Robot Platforms

- LEA walker https://robots.nu/en/robot/lea-robot
- CSJBot Alice https://en.csjbot.com/content/12/1289.html
- Amy Robotics AMY-ARK universal chassis https://www.amyrobotics.com/indexpdetailsen?id=28&seriesid=15
    - With UVc sterilisation payload (AMY-M2-W1) https://www.amyrobotics.com/indexpdetailsen?id=21&seriesid=3
- Double 3 telepresence robot https://www.doublerobotics.com
- Ecovacs Deebot N8+ https://www.ecovacs.com/uk/deebot-robotic-vacuum-cleaner/n8-plus

Attach pdf with test bed layout, including dimensions, areas and room designations



List of home automation devices available, including photo, make, model and main features [*max 300 chars (with spaces) per device*]:

- OpenHab platform for connecting sensors to the Internet and managing them. The platform consists of OpenHab software running on a Raspberry Pi, which provides links to a user web portal and application back-ends, a client interface, which can be used to connect to any web API (REST and WebSocket). Sensor data can be directly accessed via TCPIP.
  https://www.openhab.org/
- 4 x Fibaro motion sensor. Battery powered (mobile) motion, light, and temperature sensing with Z-Wave connectivity.
  https://www.fibaro.com/en/products/motion-sensor
- 2 x Fibaro wall plug. Smart plug with power metering and Z-Wave connectivity.
  https://www.fibaro.com/en/products/wall-plug-uk
- 5 x Fibaro door/window sensor. Contact sensor with temperature measurement function, with Z-Wave connectivity.
  https://www.fibaro.com/en/products/door-window-sensor
- 1 x Fibaro universal binary sensor. Allows Z-Wave connectivity to be added to two binary sensors.
  https://www.fibaro.com/en/products/universal-binary-sensor
- 1 x Fibaro The Button. A battery powered wireless (Z-Wave) tactile button.
  https://www.fibaro.com/en/products/the-button
- 4 x Kontakt BLE beacon with iBeacon and Eddystone support.
  https://store.kontakt.io/product/smart-beacon
- 10 x wireless temperature sensors using the Ciseco SRF wireless serial protocol. Companion receiver modules for the Raspberry Pi platform are available.

Available Motion Capture system (make, model, and main features) if any [*max 1,000 chars (with spaces)*]:

The test bed does not have a typical Motion Capture System, but a camera system and software able to perform object detection and pose estimation based on fiducial marker detection from multiple cameras.

- 4 Dalsa Genie Nano C2050 GigE Vision cameras, 25mm lenses. 2064x1544 pixels, 37.8fps.
- 8 Dalsa Genie Nano C2050 GigE Vision cameras, with 8mm lenses. 2064x1544 pixels, 37.8fps.
- 2 Dalsa Genie Nano C1450 GigE Visions cameras, with ‘fish-eye’ lenses. 1456x1088 pixels, 76fps.
  https://www.teledynedalsa.com/en/products/imaging/cameras/genie-nano-1gige
- Sony FCB-EV7520A full-HD 30x zoom USB3 camera.
  https://www.image-sensing-solutions.eu/FCB-EV7520A.html
- Flir A655sc thermal camera, 45-degree field of vision, 640x480 resolution.
  https://www.flir.co.uk/products/a655sc

- Tobii Pro Glasses 3 wearable eye tracker. https://www.tobiipro.com/product-listing/tobii-pro-glasses-3
- Tobii Pro Fusion screen mounted gaze tracker. https://www.tobiipro.com/product-listing/fusion
- 2 Intel RealSense D415 depth camera. https://www.intelrealsense.com/depth-camera-d415

Please fill the rightmost column of the following table with the current list of ERL Consumer TBMs and FBMs, checking those for which your test bed is certified (i.e., meets both the rulebook specifications and has available the required devices).

Benchmark	Minimum required system / devices	Available in Test Bed
TBM1: Getting to Know my Home	RSBB	Yes
TBM2: Welcoming Visitors	RSBB, IP camera at entrance	Yes, Yes
TBM3: Catering for Granny Annie's Comfort	RSBB, HAD	Yes, Yes
TBM4: Visit My Home	None	
FBM1: Object Perception functionality	RSBB, MoCap	Yes, Yes (OpenPose)
FBM2: Navigation functionality	RSBB, MoCap	Yes, Yes (OpenPose)
FBM3: Speech Recognition functionality	None	
FBM4: People Perception functionality	RSBB, MoCap	Yes, Yes (OpenPose)
FBM5: Person Following functionality	RSBB, MoCap	Yes, Yes (OpenPose)
FBM6: Object Grasping and Manipulation functionality	RSBB, MoCap	Yes, Yes (OpenPose)

Table 1: List of the ERL Consumer benchmarks with their corresponding required systems

Any other relevant information [*max 1,000 chars (with spaces)*]:

The Cobot Maker Space Living Space is shown as room A15 on the accompanying plans and has an area size of 44.37m^2.