

D10

Technology Demonstrators

ESR 4 - Smart Cities
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E-I Overview

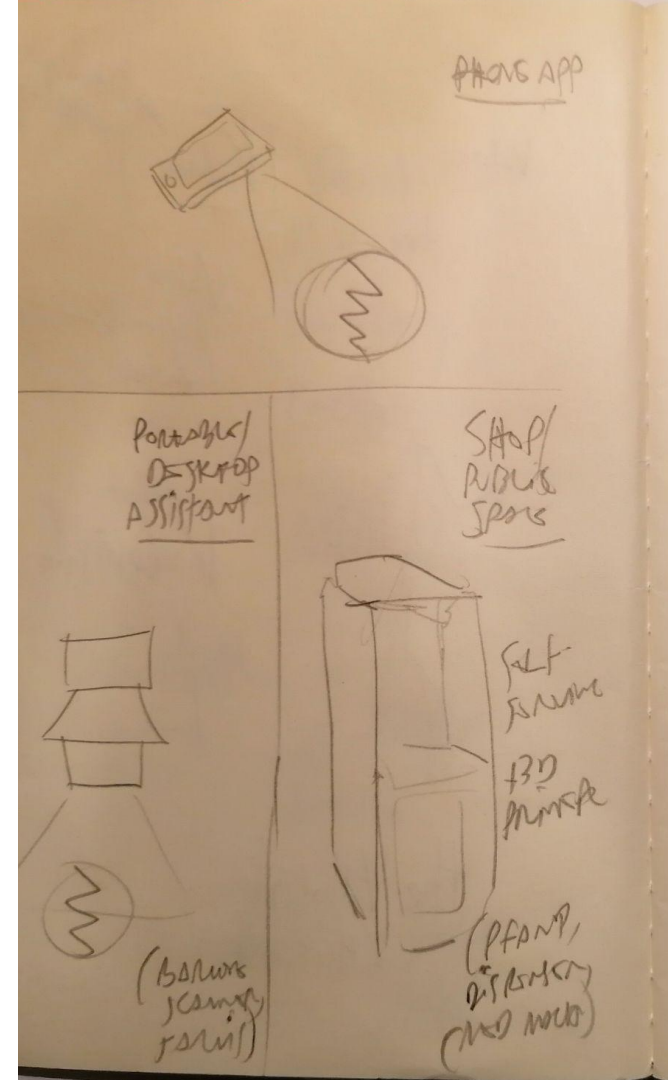
E-I, short for Evaluation Interface, is a combination of speculative technologies conceived to help society reuse discarded materials. It addresses the following Research Questions:

1. What are the skills and abilities involved in the reuse of materials?
 - 1.1. Can those skills they be augmented and replicated with the aid of digital systems?
 - 1.2. What kind of hardware and software would contribute to make that happen?

The main purpose of E-I is allowing users to assess the potential value of materials. E-I does that by identifying objects and parsing them against an open database with information relevant for evaluating and reusing said objects.

E-I can be deployed in different form factors: an app for mobile devices; a workbench equipment; or even a larger version shaped as a kiosk or vending machine.

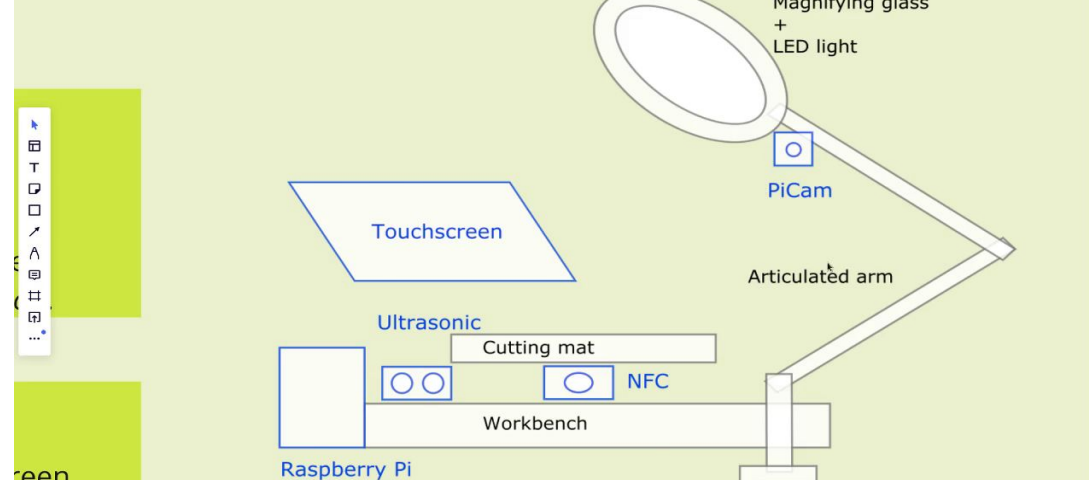
For the purposes of this research, the workbench version was chosen.



Features

The expected behaviour of the workbench version of E-I is designed around the steps below:

1. The user asks E-I about a specific object in one of the following ways:
 - placing the object on E-I,
 - typing a search query into a keyboard in its touchscreen, or
 - asking E-I about the object.
2. E-I compares images and other information collected from the product/object (weight, colors, barcode, QR code) against an open database of things
3. When information about the object is found, E-I retrieves it and delivers to the user via screen or voice.
4. When information about the object is not found, E-I allows the user to input it via keyboard or voice.



Prototyping

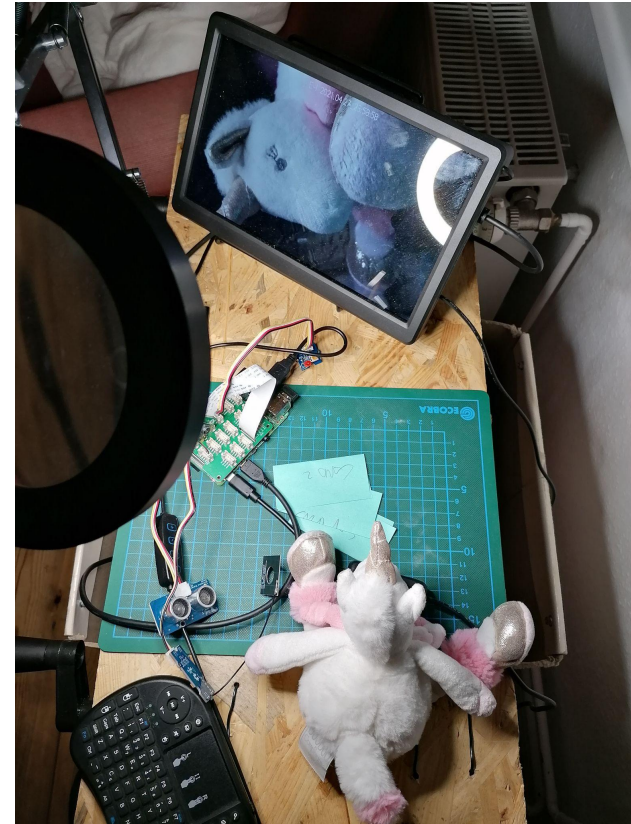
The exploratory version of E-I consists of the following:

1. An articulated arm is attached to a workbench with a cutting mat.
2. A proximity sensor (ultrasonic), a NFC reader, a video camera and a touch screen are attached to a Raspberry Pi.
3. When an object is put in the mat, the screen turns on. The image of the object is shown in a window.
4. Some predefined objects have a NFC tag. When these are recognised, the screen shows information about them.
5. When the object is not identified, the user can press a button and input information about it.

Workbench E-I

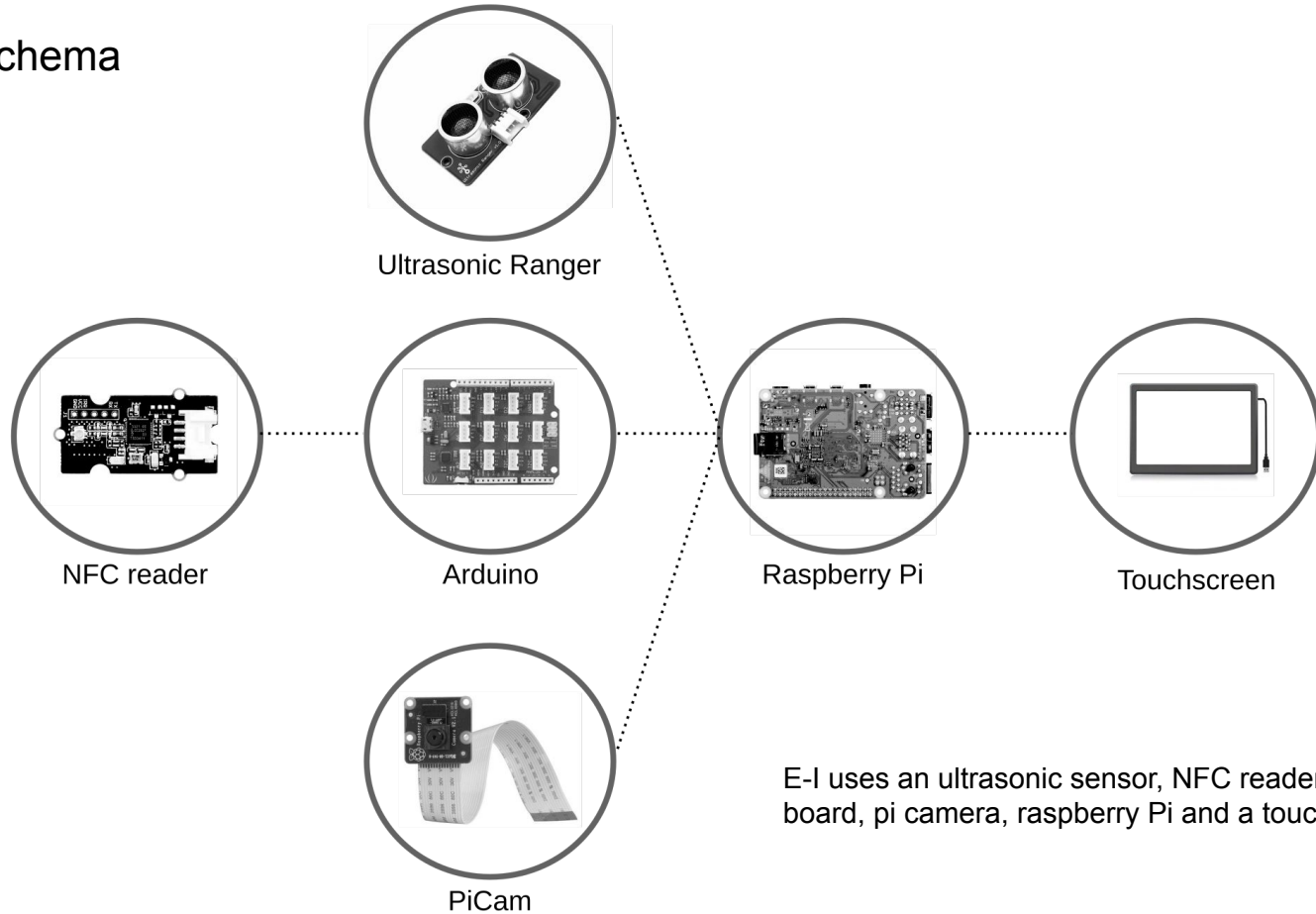


The goal of exploring E-I is not to develop a functional product, but experiment with speculative use cases. The idea is to devise technologies that might promote the reuse of a larger proportion of goods and materials.



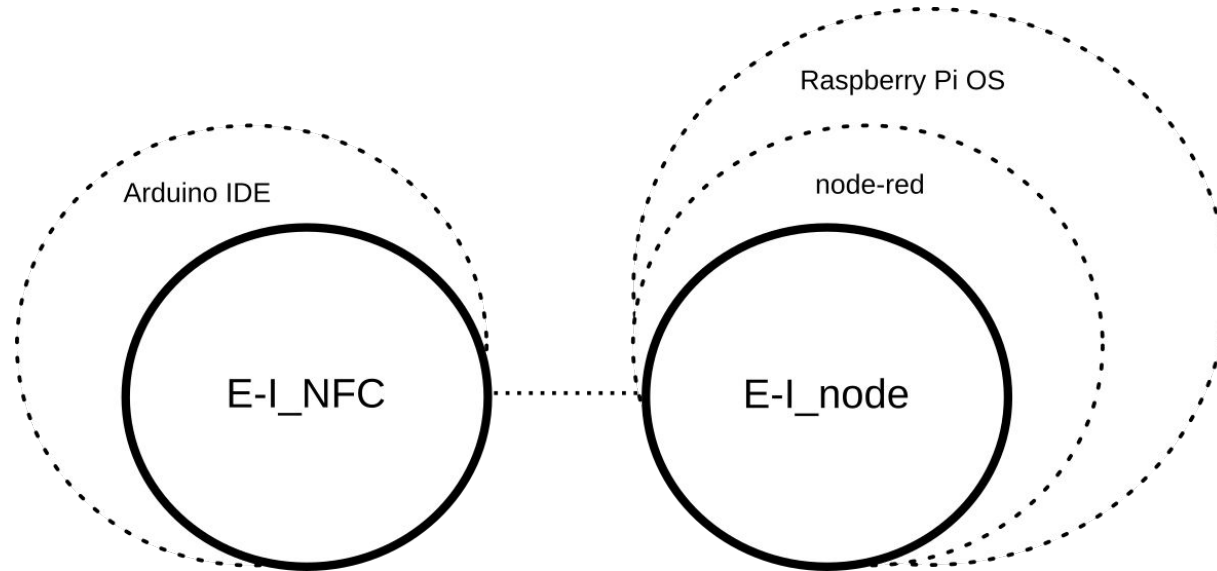
Other points of discussion are what would the implications of such technologies be in terms of use, privacy, health and safety, policy and economy.

Hardware schema



E-I uses an ultrasonic sensor, NFC reader, arduino board, pi camera, raspberry Pi and a touch screen.

Software



The NFC reader is attached to the arduino board and sends its readings via USB to the Raspberry Pi running the Debian based Raspberry Pi OS.

The Raspberry Pi board has node-red running locally, to which the camera and the ultrasonic sensor are connected. It displays information using the node-red dashboard module.

Complete documentation about E-I can be found in the project repository:

https://github.com/pendott-smartcities/II/tree/main/D10_technology-demonstrators