MDAR VELBUS

consulting projects
eye scanning
text to/from voice

craig.gallen2@solent.ac.uk

Computing | Science and Engineering Department | Southampton Solent University

Project Brief 1 - Text to Speech / Speech to Text

The ability to use voice commands to control home automation is potentially a very useful feature for visually impaired people.

Similarly, the ability to use home controls, buttons or flash cards to generate speech is potentially a very useful feature for hearing impaired or non verbal people.

Using Home Assistant with embedded node red as a starting point, we need you to design a system which will

generate speech / text

- describing which lights or appliances are on or off on change of state
- tell the temperature or other status information when asked
- provide a 'flash card' or other control on the HA dashboard which will generate known phrases in response to user input and/or door bell actuation
- system must be autonomous without reference to external models e.g. Siri etc.
- generate MQTT messages indicating change of state
- any other use case you can think of...

Project Brief 2 - Eye Tracking

In this uses case, consider a child/young person who is non-verbal and unable to use motor functions. This person could be helped to interact with their environment if eye / head tracking software could be used to follow the gaze of the young person and turn on/off appliances based upon where they are looking.

Using a home automation platform (e.g. **OpenHAB)**as a starting point along with other eye tracking software, we need you to design a system which will

- identify the users eye movements and identify curated known objects / positions being looked at
- use these movements to actuate VELBUS controls - turn on lights, generate messages
- generate MQTT messages indicating change of state
- any other use case you can think of...

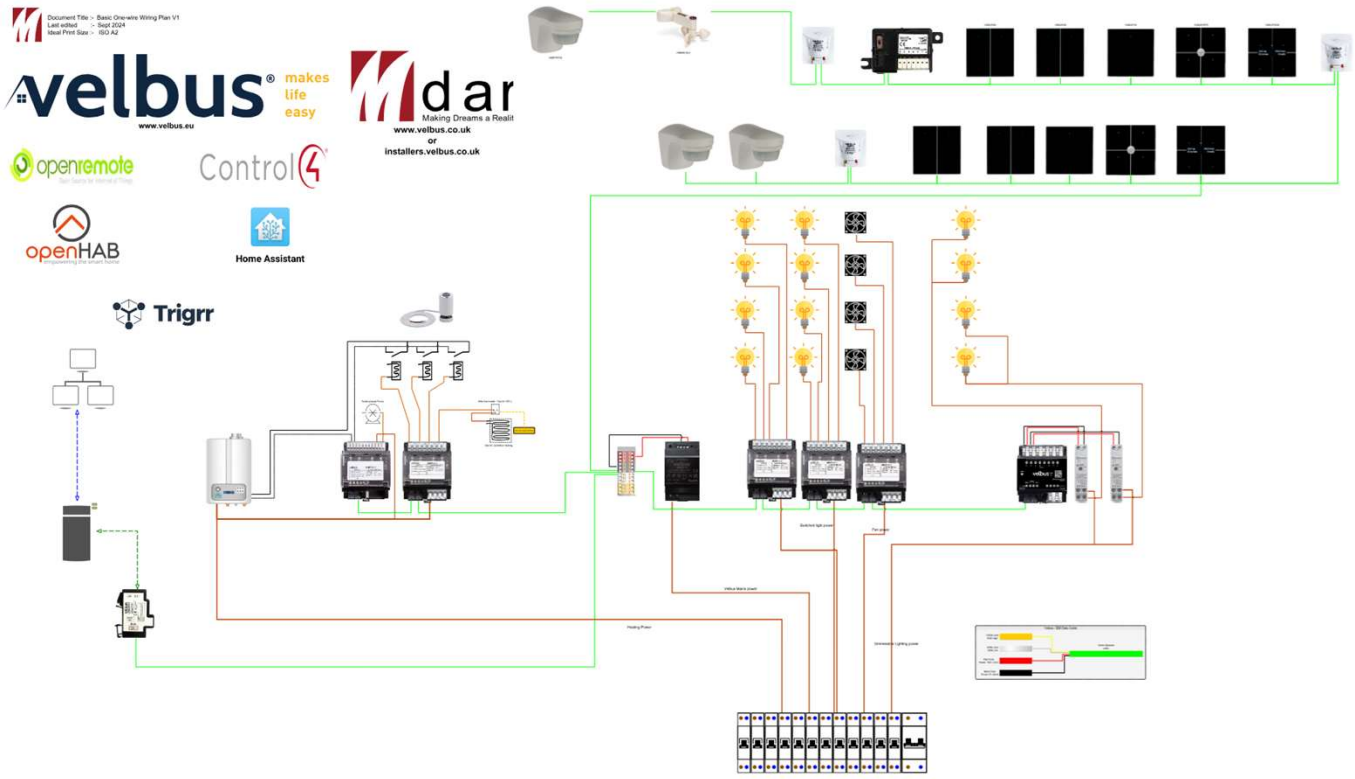
Velbus / Velbus Link

Velbus Home Automation

Electrical power controlled by distributed relay modules

Modules controlled by a 4 wire data protocol proprietary to Velbus.

- based on CANbus ' controller area network bus' Originally developed to reduce the complexity and cost of electrical wiring in automobiles through multiplexing https://en.wikipedia.org/wiki/CAN_bus
- Specific extensions for reliability and distribute control
  - Module Protocols https://github.com/velbus/moduleprotocol
  - Packet protocol https://github.com/velbus/packetprotocol



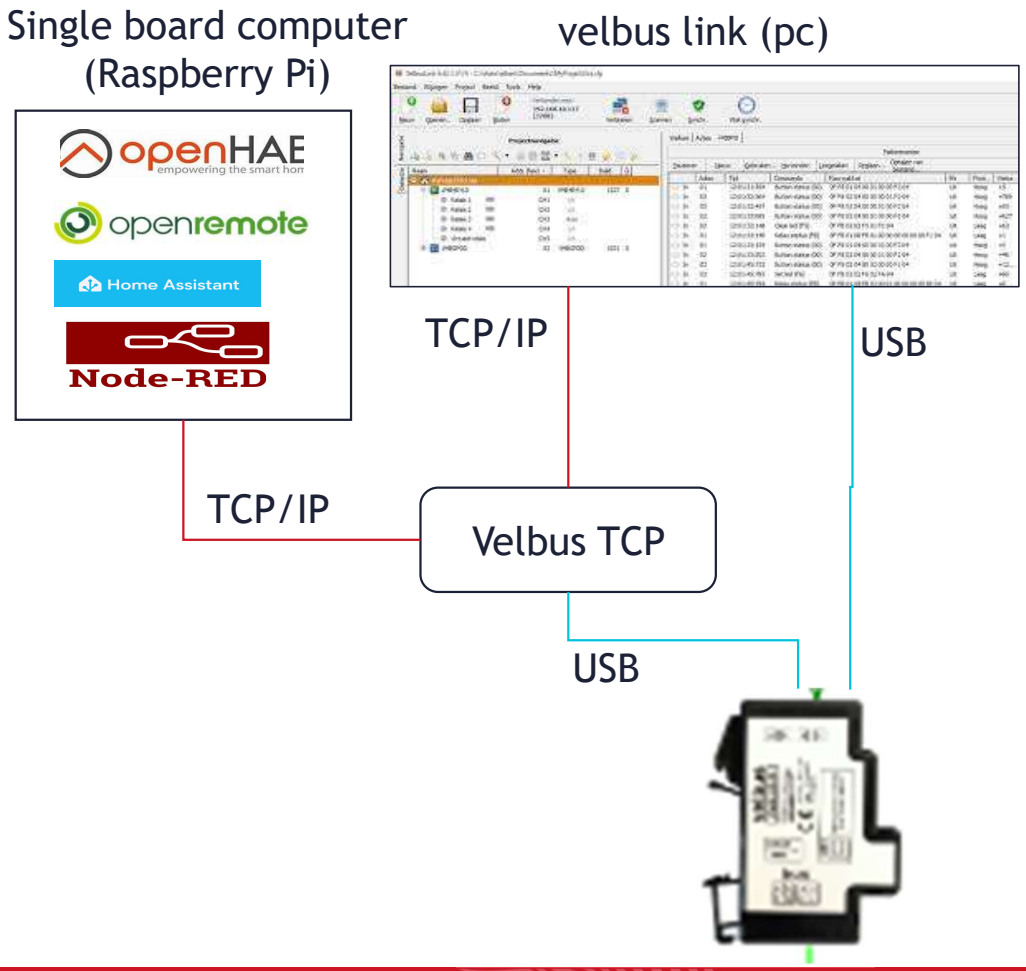
Velbus and Home Controllers

Velbus configuration SW

- Velbus Link https://www.velleman.eu/products/view/configuration-software-for-velbus-free-download-velbuslink/?id=376994&lang=en

USB to TCP converter

- Velbus TCP snap https://github.com/velbus/velbus-tcp-snap



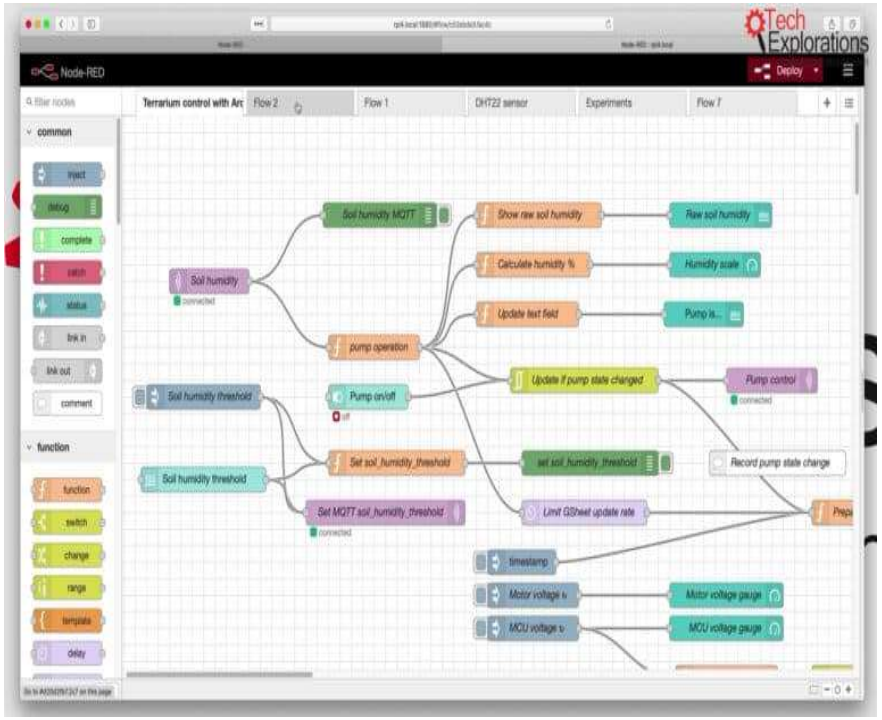
Node-Red

https://nodered.org/ Low-code programming for event-driven applications

Written in Javascript (based on nodejs)

Node Red Velbus Modules

- https://flows.nodered.org/node/node-red-contrib-velbus
- https://github.com/BiancoRoyal/node-red-contrib-modbus



Home Assistant

Home Assistant

- https://www.home-assistant.io/

Documentation

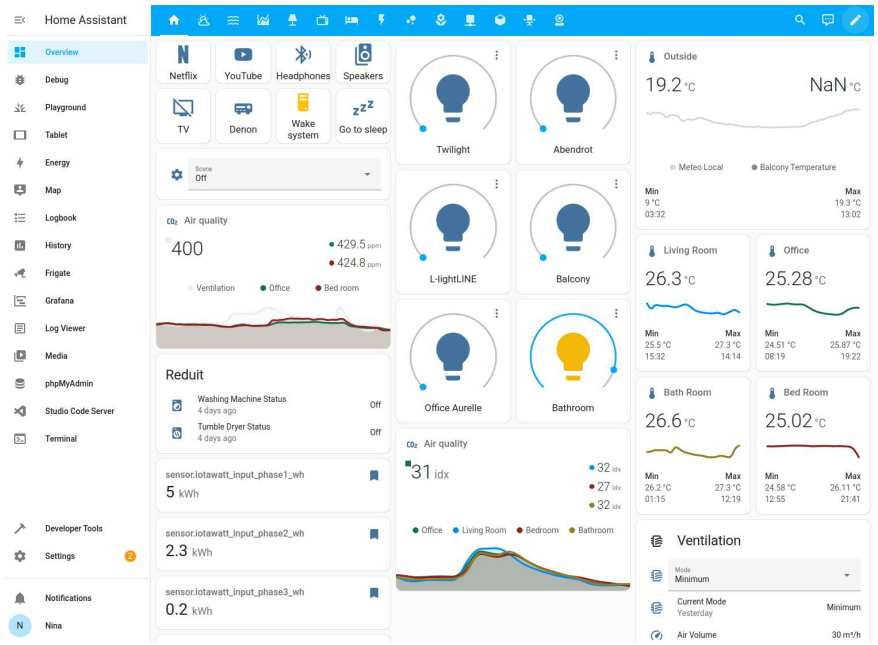
- https://www.home-assistant.io/docs/

Code

- https://github.com/home-assistant
- Written in python

AI/LLM

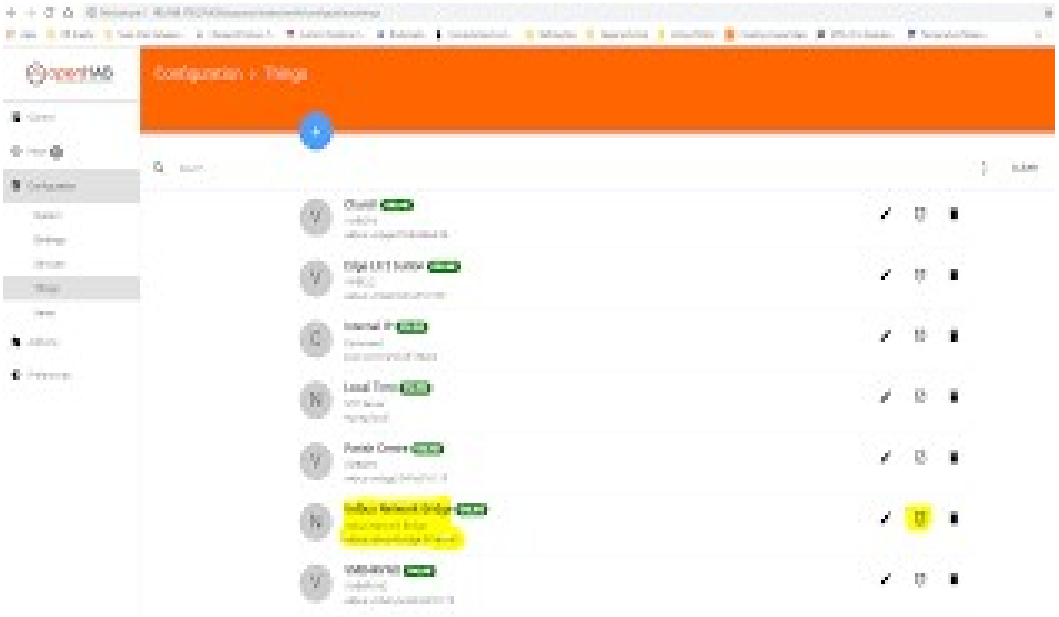
- https://developers.home-assistant.io/docs/core/llm/



OpenHab

https://www.openhab.org/

https://www.openhab.org/addons/bindings/velbus/



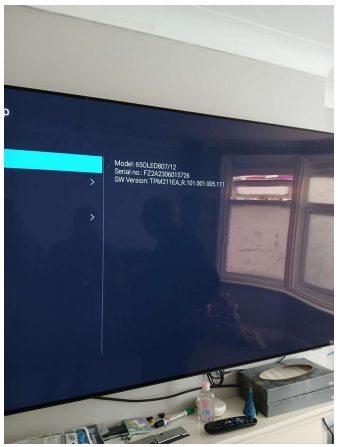
TV-Overlay

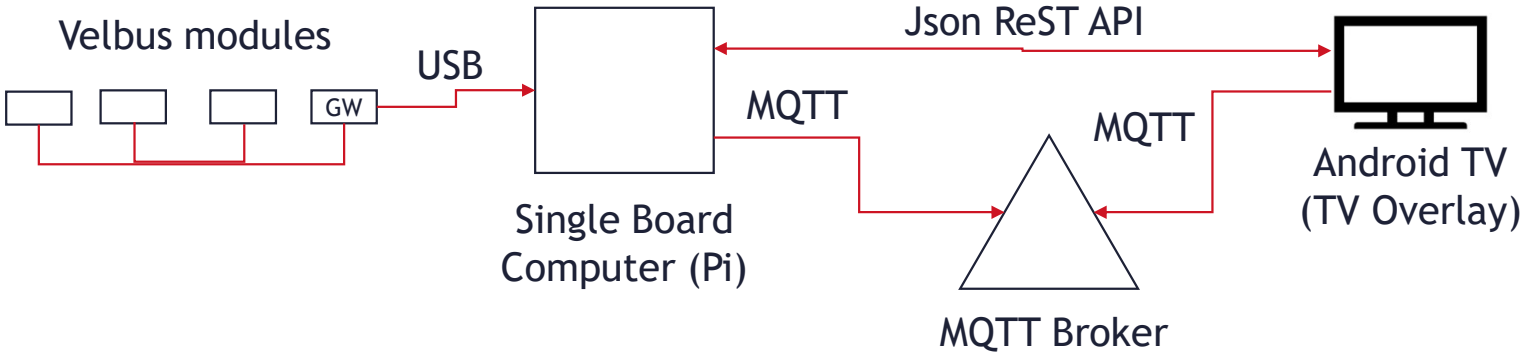
TV Overlay Project

- https://github.com/gugutab/TvOverlay
- https://play.google.com/store/apps/details?id=com.tabdeveloper.tvoverlay&hl=en_GB

TV In home

- Philips tv -android version 65OLED807_12
- https://www.documents.philips.com/assets/20230610/459059c5e3c94dabbe12b01d0068cdd0.pdf





Test KIT

Raspberry PI 5s

Velbus Demonstrators

Networking cables

Other Home Automation 'stuff'