Master's Thesis Engineering Technology

2022-2023

Integrating KNX into The Smart Home Controller

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KNX is a **standardized communication protocol** used in smart homes. It is preferred by electricians and recommended by architects. It uses a **bus** to connect all devices with just **one cable**, resulting in **greater flexibility** and **reduced labor and wiring costs**. Every **KNX** device has a **microprocessor** that communicates with the **bus** using **telegrams**. This master's thesis explores the integration of the **KNX** bus system into the **Smart home controller** (SHC).

Smart Home Controller

The **Smart Home Controller** , offered by Bits & Bytes, is a module for **managing home devices**, including blinds, lights, switches, outlets, electrical appliances, and climate control. The controller can operate as a **standalone module,** controlled by a **smartphone,** or be integrated into the **larger B&B home system**. Figure 1 shows the module attached to the KNX bus cable.

Serial Interface

The first part of this study identified the **Weinzierl BAOS Module 832** as the most suitable **serial interface**. It converts the 30 V KNX **telegrams** to 3.3 V **digital data** and sends it to the SHC's processor (and the other way around). It is **soldered** to the **PCB** of the SHC. Figure 2 shows the transceiver and figure 3 shows the **digital data** for turning on the first relay.

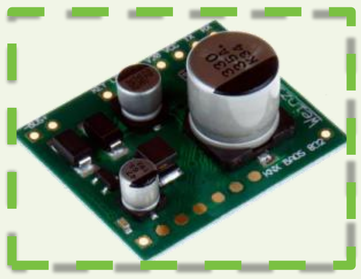

Figure 2: Weinzierl BAOS module 832 [2]

68	0A	0A	68	73	F0	C1	00	01	00	01	00	01	03	01	01	B9	16

Figure 3: Digital data generated by the Weinzierl BAOS Module 832 to turn on the first relay of the SHC

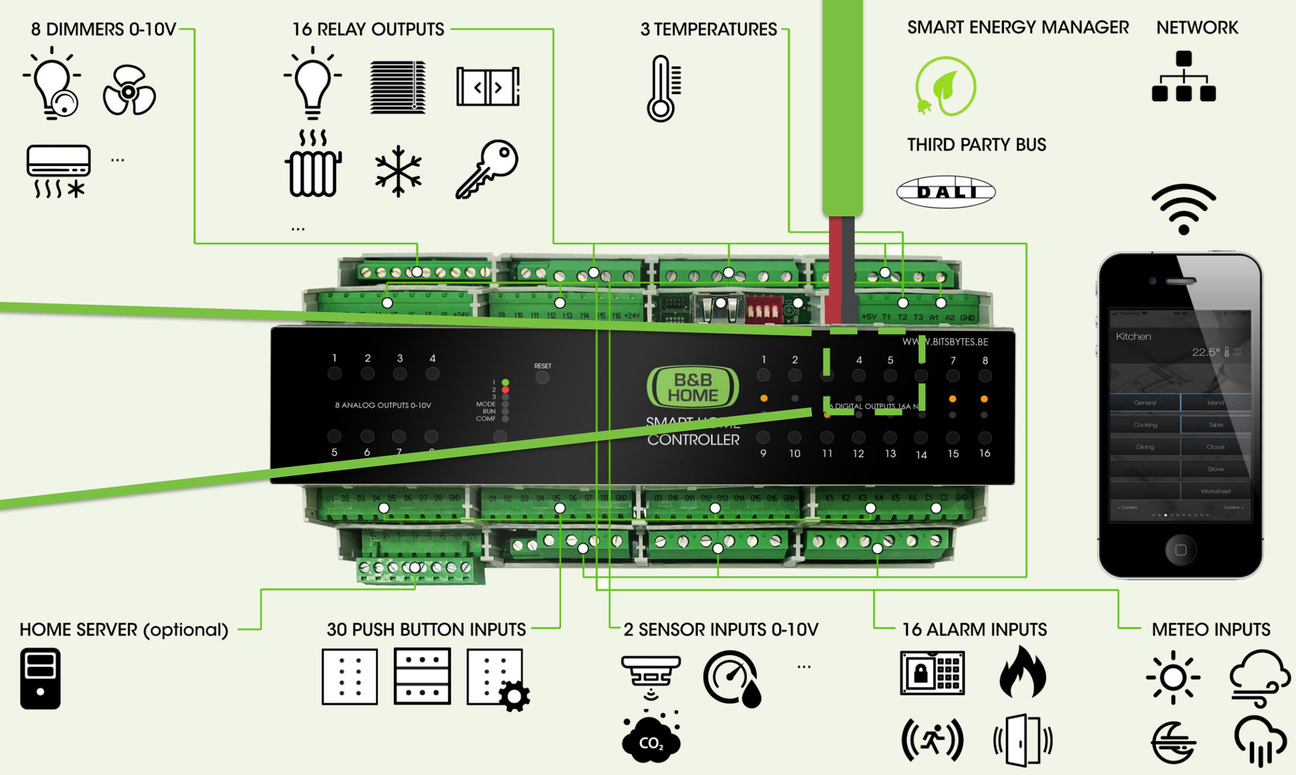

Figure 1: Smart Home Controller overview [1]

Code

The second part of this study was to expand the SHC's **C++** code to convert the serial interface's **digital data** into **internal commands** and **execute** them, while **minimizing** the **impact** to **existing functionality**. Additionally, the code was also designed to **send digital data** back to the interface **upon successful execution** of a command. Key aspects considered during this process were **threading** and **timing.**

ETS

The final part of this study was to create a **product database entry** in **ETS,** the KNX **programming software**. This makes it possible to **program** both the SHC's **I/O** and additional **configuration options** within **ETS**, enabling **full configuration** of the SHC. Figure 4 shows a screenshot of the configuration UI.

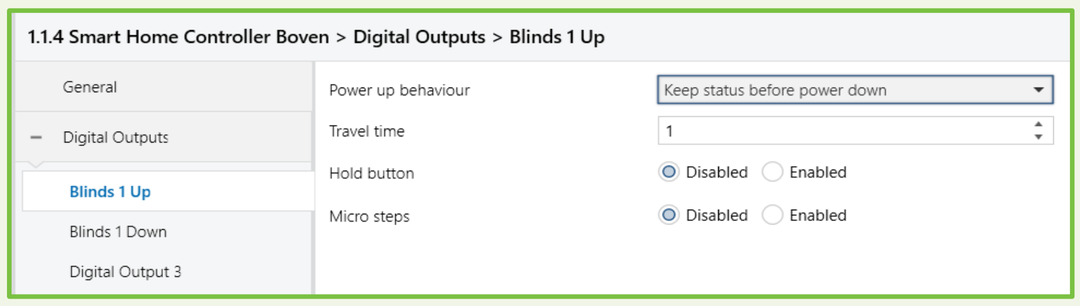

Figure 4: Screenshot of SHC ETS configuration

Result

During **internal testing** with the product database entry in ETS, the serial interface and the expanded code, **all I/O** was able to be **configured** and **programmed** in ETS. This integration can **increase** the device's **market potential** as a **home automation system**.

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Sources
[1] Bits & Bytes, "Smart home controller," (Last accessed on 11 June 2023). [Online]. Available: https://bitsbytes.be/en/products/smart-home-controller
[2] KNX BAOS Module 830 Serial Interface and ObjectServer for KNX Bus, WEINZIERL ENGINEERING GmbH, May 2022, (Last accessed on 11 June 2023). [Online]. Available: https://weinzierl.de/images/download/development/830/weinzierl-830-knx-baos-module-5171-datasheet-en.pdf