Milestone 3: Redesigning MiniMech with the STM8S208CB microcontroller

Daniel Babekuhl, SID: 450655096

Why the STM8S208CB?

This microcontroller is cheap ($3.18 on Digikey) [1], available, and for the purposes of this project has identical hardware requirements and features as the STM32F07VG microcontroller:

- 2 UARTs
- 6GPIO pins
- Runs on 3.3V

It is only 8-bit, however for this project an 8-bit MCU is sufficient. It has a standard peripheral library [2] available that ships with examples, and there are some examples available online of projects that use this library along with cmake [3]. All of these factors made it the best choice as a replacement for the STM32F407VG.

[1] https://www.digikey.com.au/product-detail/en/stmicroelectronics/STM8S208CBT6/497-8943-ND/2079920

[2] https://www.st.com/en/embedded-software/stsw-stm8069.html

[3] https://github.com/ulikoehler/stm8s-discovery-sdcc-blink/blob/master/demo-spl/CMakeLists.txt

Update of Components

This MCU is the only hardware component that required changing:
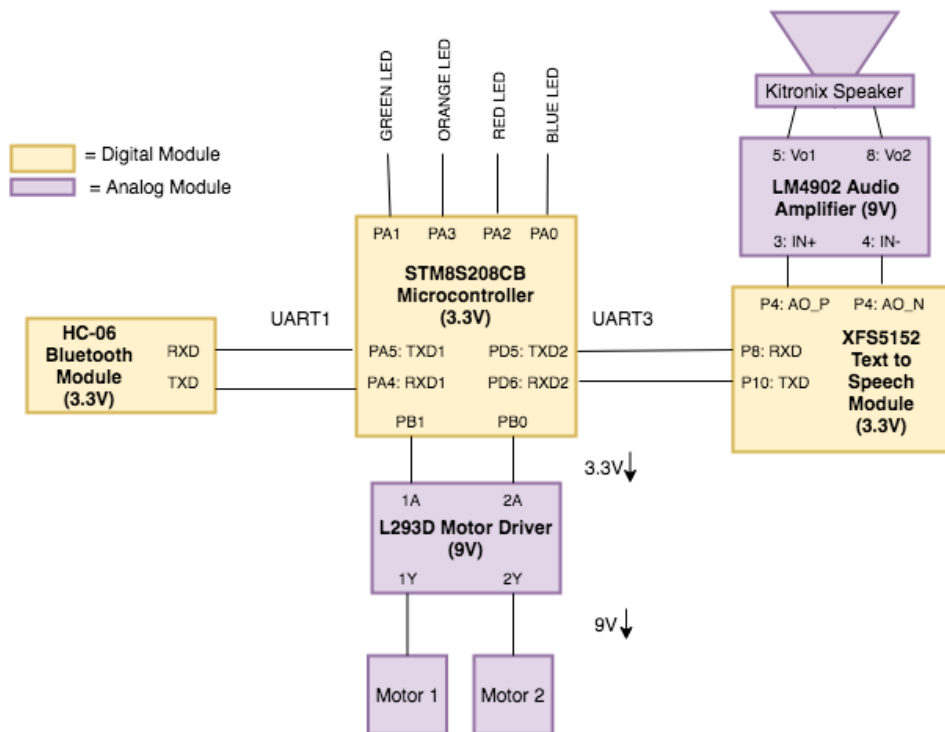
The only change required from Milestone 2 is the MCU and its pins

The firmware UML diagram which displays the MiniMech's state machine, also remains unchanged, although the lower layers of software required completely redesigning:

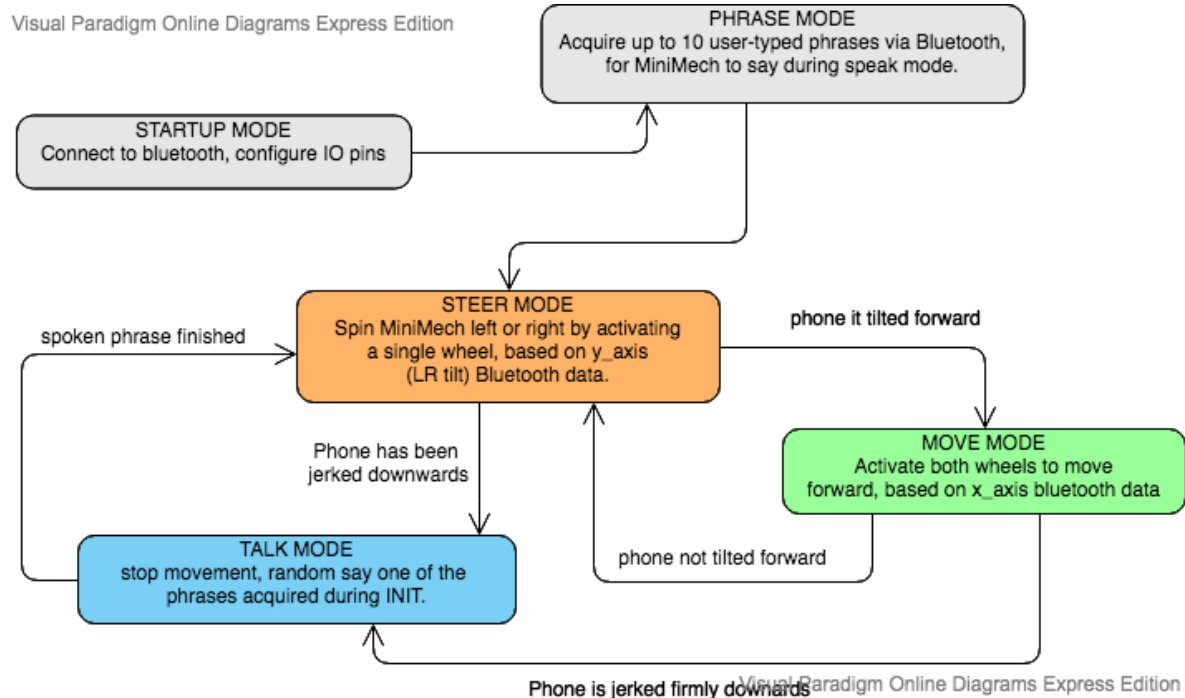It was decided to make the main MiniMech software as hardware-independent as possible, with a specific list of hardware functions that purpose-built libraries for each hardware module must supply. These are described in `MM_main.c`. The MiniMech software is now structured as follows:

```
                    ┌─────────────────────────────────────┐
                    │         MiniMech Software           │
                    │ (hardware-independent but requires  │
                    │   a set of MM hardware library      │
                    │             functions)              │
                    │                                     │
                    │              MM_main.c              │
                    │                                     │
                    │              MM_lib.h               │
                    └─────────────────────────────────────┘
                                     ▲
                                     │
    hardware libraries can    ┌─────────────┐
    use each other's          │ MM hardware │
    functions                 │   library   │
              ◄──────────────►│  functions  │◄──────────────►  ┌──────────────────────┐
                              └─────────────┘                  │ Text-to-speech       │
    ┌──────────────────┐             ▲│                        │ MiniMech firmware    │
    │ Bluetooth        │             ││                        │                      │
    │ MiniMech         │             ▼                         │ XFS5152 module       │
    │ firmware         │      ┌──────────────────┐             │                      │
    │                  │      │ MCU MiniMech     │             │ MM_t2s_xfs5152.h     │
    │ HC-06 module     │      │ firmware         │             └──────────────────────┘
    │                  │      │                  │
    │ MM_bt_hc06.h     │      │ STM8S208CB MCU   │
    └──────────────────┘      │                  │
                              │ MM_stm8s.h       │
                              └──────────────────┘
                                     ▲
                                     │
                              ┌──────────────────┐
                              │ STM8S/A standard │
                              │ peripheral       │
                              │ library          │
                              └──────────────────┘
```