The avremu Package

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CTAN: http://www.ctan.org/pkg/avremu

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```
#include <avr/io.h>

int
main(void)
{
  char *str = "Hello World!";
  char *p = str;
  while (*p) {
    UDR = *p++;
  }
  asm  volatile ("break;");
}
```

```
\avrloadc{hello-world.c}
\avrrun
UDR='\avrUDR' in \avrinstrcount\ instructions
```

UDR='Hello World!' in 153 instructions

LaTeX is known as a typesetting system. But the underlying TeX system is a powerful macro processor. In fact, TeX is a Turing-complete programming language. TeX can compute anything that is computable. Computeability is a concept from theoretical computer science. After visiting a theoretical computer-science course, you will know that there are things that cannot be solved by a machine. Never. Look out for the halting problem.

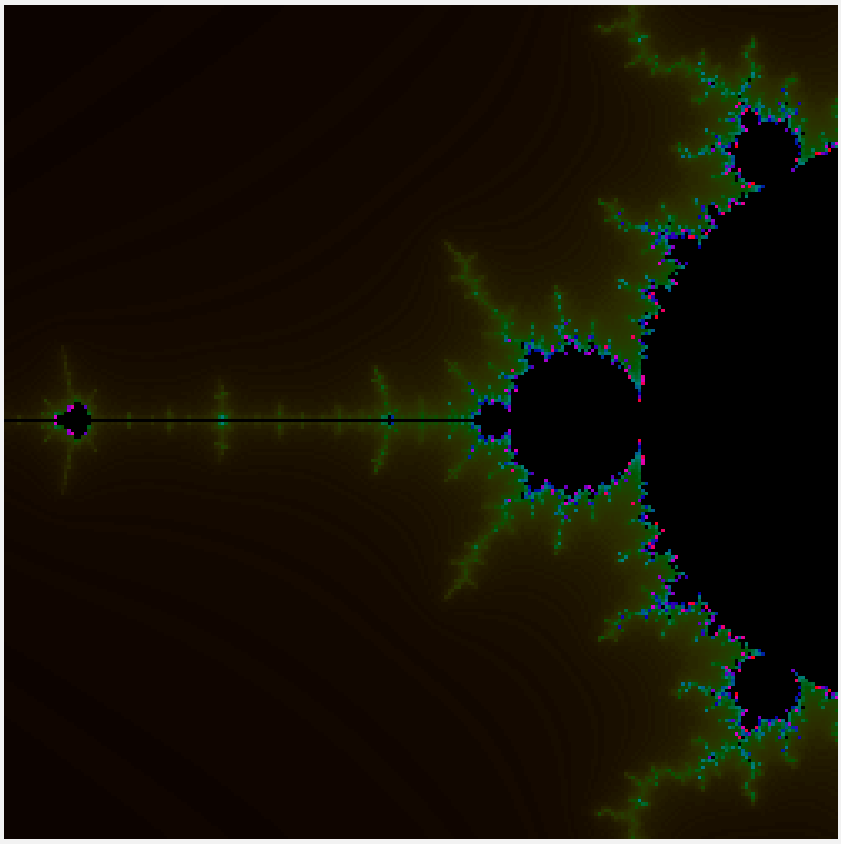
This package does contain an *CPU emulator* for the 8-bit microcontroller platform Atmel AVR, more precisely it implements the instruction-set architecture of the `ATmega8`.

```
\avrloadc{mandelbrot.c}
\avrrun

\avrdrawppm{mandelbrot.ppm}
\immediate\write18{convert mandelbrot.ppm mandelbrot.png}

\includegraphics[width=\linewidth]{mandelbrot.png}
```

This picture (250x250) took 44 hours to render. The source code can be found in the test-suite directory under mandelbrot.c.



1 Provided Commands

`\avrloadihex{`⟨*filename*⟩`}`

Load an Intel HEX formatted image of the flash into the code memory of the AVR emulator. Additionally the state of the AVR emulator is set back to zero.

`\avrloadc[`⟨*compiler options*⟩`]{`⟨*filename*⟩`}`

Requires `--shell-escape`. Compiles C source code file with `avr-gcc` and the given compiler options. The default compiler option set is `-mmcu=atmega8 -Os`. The resulting `.elf` file is transformed to an Intel HEX file and loaded into the code memory of the emulator.

`\avrrun`

Run the emulator until a **break** instruction occurs.

`\avrstep[`⟨*steps*⟩`=1]`

Run the emulator for N instructions. The default is a single step. The stepping does automatically end, if a **break** instruction is executed.

`\avrinstrcount`

Expands to the number of executed instructions.

`\avrsinglestep`

Starts an interactive single-stepping mode, which was mainly used for implementing the emulator.

`\usravremulibrary{`⟨*list of libraryies*⟩`}`

1.1 Access to the Serial Console

If the program write to the `UDR` IO register, the emulator catched those characters in an internal buffer.

`\avrUDR`

Expands to the internal UDR buffer.

```
\avrUDRclear
```

Clears the internal UDR buffer.

1.2 Draw Library

```
\useavremulibrary{avr.draw}
```

See source/test-suite/mandelbrot.c for more details.

2 Implementation Details

Read the source.