This paper describes the core of a complex cellular processor research project - construction and verification of cellular algorithms, the basis for cellular programming. Other important components of the project as theoretical /mathematical/ investigations, simulation language design and simulator implementation, cellular microprogramming will nearly be omitted, other components of central importance will only shortly be sketched and referred to the extent of making understandable the conditions e.g. requirements for and possibilities of the cellprogramming. /basic cellular processor architecture, integration of cellprocessors into digital architecture, real application areas/. Attention will be focused on the class of cellular algorithms tailored to the introduced universal microprogrammable cellprocessor. Less discussions can be devoted here to the important methodology and practice of the cellware - cellular specialized hardware - design and implementation.

SINGLE PROCESSORS - /V/LSI - MULTIPROCESSORS

There exists real need for bigger, faster and more effective computers. Approaching the limits of the technological development of the up to now monopolistic single processor systems with centralized, sequential execution and relatively low data rate broad interest has been switching to multiprocessor systems with distributed, parallel execution and high data rate. With the advent of LSI and VLSI era both need and possibilities have raised for parallel and for homogeneous systems: with growing system size parallel processors have become a real alternative while the LSI and especially the VLSI design and production objectives KUNG, 1980 tend to homogeneous parallel structures.
on chip level and inside of the chips on circuit level.

Another typical product of the technological change is the appearance and predictable spread-out of electronic mass storage with the very important consequence of system architectural changes which will force the dominance of high data rate parallel processors.

According to the above argumentation different multiprocessor structures have been designed and implemented on different levels of maturity towards mass production and general use /pipe-lined arithmetic processors HWANG, 1979, symmetric multiprocessors, multi-micro architectures, data-flow machines, associative processors, cellular arrays etc./.

CELLULAR PROCESSORS

Up to now, despite their potential advantages /homogeneity, high level of parallelism/ cellprocessors are not up to mark in the competition of the parallel architectures. It is surprising as an excellent theoretical background has been established in the cellular automata theory. However there exists a big gap between the theoretical results and the engineering limitations /best seen in the failure of attempts to transplant mathematical cellular constructs that are very good as mathematical constructs, directly into the engineering field/.

The two hardest problems on the way to transform cellular automata into cellular processors are:

- untolerable system size yet with up-to-date technology /too big cells, too much cells needed/
- nearly total absence of practically usable cellular algorithms /for universal, programmable cellprocessors/

RESEARCH GOALS

A complete set of problems including the above two main ones should be solved:
- to minimize cell size preserving flexibility
- to work out programming methodology and effective cellular pro-