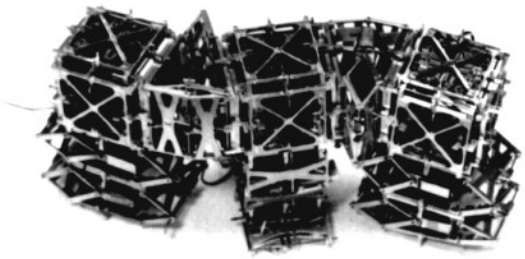
## Polypod, 1993:

Made up of 2 types of modules, segment and node. Each segment module contains all the components to be a stand-alone robot in itself (except for power):



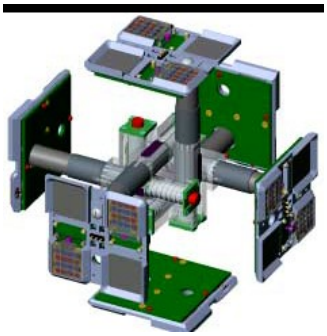
- •Computation: Motorola XC68HC11E2 (generously donated by Motorola)
- •Actuation: Two small DC motors with lead screw transmission
- •Sensing:
  - •IR proximity sensing
  - •crude force/torque sensing using IR
  - •joint angle position sensing (potentiometers)
- •Inter-module Communication: Global synchronous communication (Motorola SPI with RS485 drivers) between 68HC11's plus local IR communication between adjacent modules.

Nodes are rigid cube shaped modules roughly 2"x2"x2" with 6 connection ports whose main purpose is to hold gel-cel batteries and to allow for non-serial chain robots.

Ref: http://robotics.stanford.edu/users/mark/polypod.html

**Telecubes, 1998:**

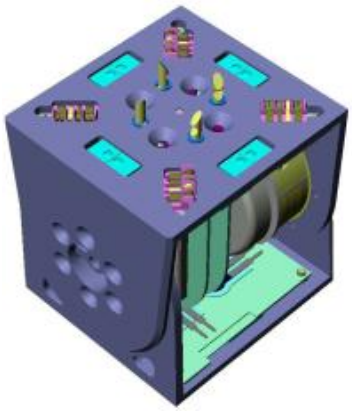
All the six faces of the cubical module are attached to the core using linear actuators. They have IR sensors on their faces to detect other modules and attach magnetically to other modules.



Refer ‘telecubes.pdf’

## PolyBot G3, 2002:

These have electrical contacts to transmit data and power, IR sensors to detect and orient with other modules and attach using Shape Memory Alloy latches. A flat brushless motor is used at the hinges with precise angle detection (0.04 degrees) using hall effect sensors



Refer ‘Evolution_of_PolyBot.pdf’ and this.

## ATRON, 2003:

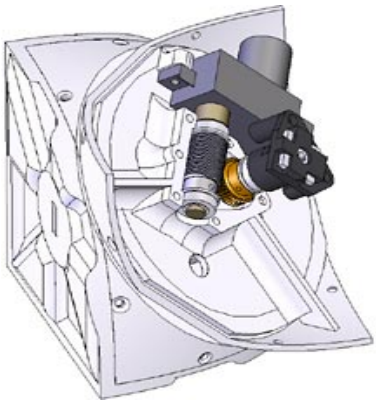
Each module consists of 2 half spheres which can independently rotate about themselves. Modules have metallic hooks and attachment bars. Hooks are actuated and is used to combine with other modules. Detailed design is explained in “ATRON_Design.pdf”

Also see: https://www.youtube.com/watch?v=SYizuooEs7s

## Molecubes, 2005:

This has a unique design where the cube has 2 halves which diagonally swivel about each other. They attach/ detach by selectively weakening electromagnets. Each module has a microcontroller which decides motion based on time and contact events. Data and power is transmitter through the metal contacts.

Reference, Video.



## Miche, 2006:

This system uses self-disassembly over self-assembly which is seen in other examples.
The cubes are assembled manually into a larger cube and the attach with each other using electromagnets. The modules are autonomous detect the presence of its immediate neighbor using infrared sensors. They collectively decide who should and should not be in the final structure-to-be-formed and let go and drop off under an external force, in this case, gravity.

Refer ‘Miche.pdf’

## Roombots, 2009:

It has diagonally swiveling half cube structure like the molecubes, but these cubes have a hook based attaching system like the M-TRAN. Modules are big so can support lots of sensors.

Video

## CKBot, 2009:

CKBot modules could either be assembled manually or they can self-reconfigure using magnets on their faces which were strong enough to hold 7 modules vertically before it caused chain disconnection. Modules can be connected manually using 3M screws and can be connected electrically to share power and communication on a CAN (Controller Area Network) bus using a 20 pin header. Modules that are on the same bus can communicate amongst each other using infra red (IR). There are seven IR pairs on a module that act as transmitters and receivers. Bluetooth and Xbee modules are used to connect via wireless and translates messages to and from the CANbus.
Reference: http://www.modlabupenn.org/2009/09/24/ckbot/

## SMORES, 2012:

Each modules has an ARM Cortex M3 based core with 3 dual motor drivers driving 5 motors(4 for motion, 1 for interlocking modules). Modules communicate with each other using Xbee.

Refer ‘SMORES.pdf’ and this.