

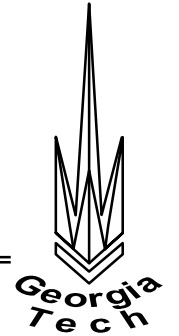
# ***Design of a PC-Based Open-Architecture Machine Tool Controller***

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# Commercial CNC Today

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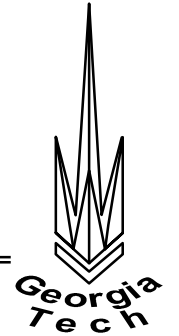


- ❖ Proprietary hardware-based controllers
  - Expensive
  - Inflexible
  - Require Extensive Training



# ***PC-Based Control***

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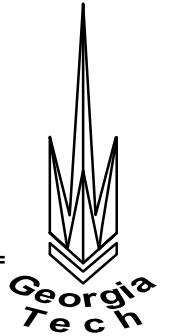


- ❖ Common hardware
  - Inexpensive
  - Easily Upgraded
- ❖ Software-based control
  - Flexible
  - Inexpensive
  - Common Interface Elements

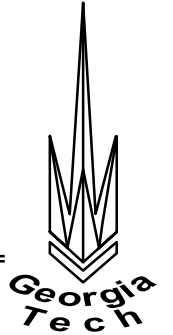


# *Project Goals*

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- ❖ Determine requirements for a modular machine tool controller
- ❖ Design a controller to meet these specifications
- ❖ Demonstrate the controller on various platforms (cylindrical grinder, SLA)



# *Elements of a Modular Controller*

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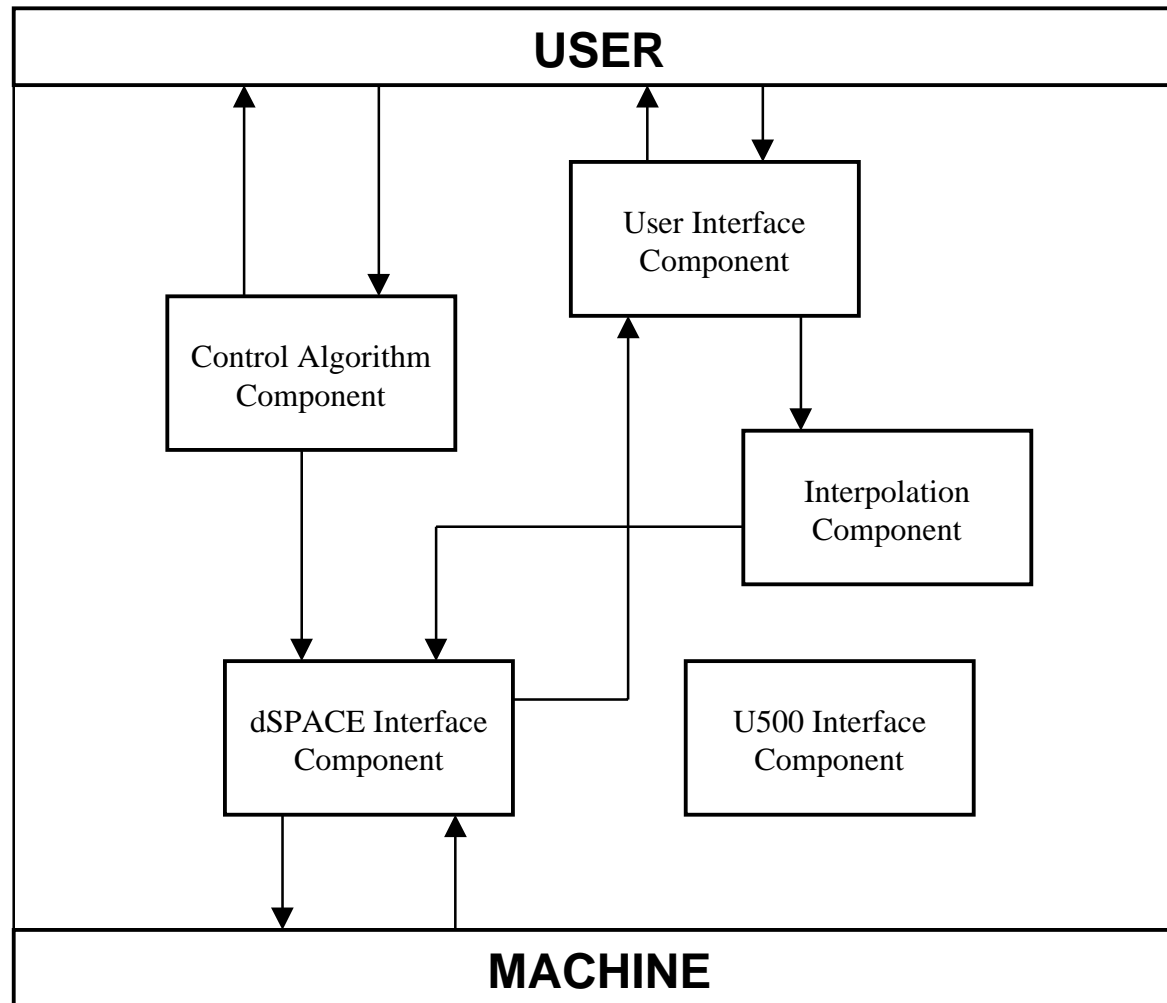
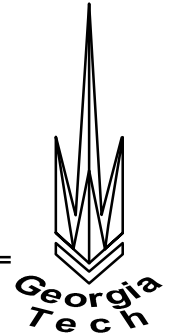
## ❖ Hardware

- PC
- Motion Control Board

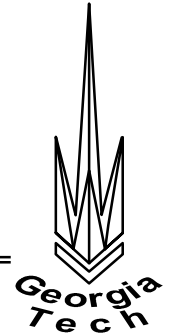
## ❖ Software

- Core Program
- User Interface
- “Middle layer” Control / Processing Elements
- Hardware Interface

# Program Module Connections



# User Interface



## ❖ User Interface Tasks

- Monitor Machine Status
- Configure Controller
- Load/Edit/Run Programs
- Direct Machine Control (Jog, Stop, etc)
- Auxiliary Function Control

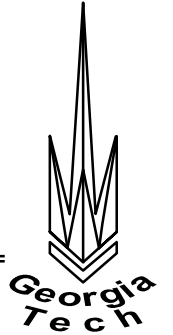
## ❖ User Interface Options:

- VB-Designed Interface
- Mock of Traditional Controller
- Standard Windows Interface
- Web-Based Control



# *Middle Layer Elements*

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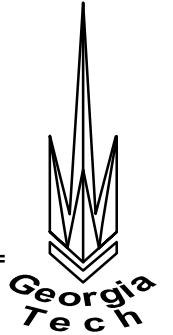


- ❖ Control Functions Executed on the PC
  - Interpolation Methods
  - Process Control
  
- ❖ Interface for DSP-Based Control Programs
  - Indicate Type of Controller
  - List Compatible Boards
  - Provide User Interface Information



# ***Hardware Interface***

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- ❖ Similar to a Driver
- ❖ Allows Common Function Calls by the Core Program
- ❖ Handles Board-Specific Tasks
- ❖ Provides Core With Information on Board Capabilities
- ❖ Allows for Expansion to Future Hardware