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**RoboJackets**  
FIRST - IGVC - BATTLEBOTS - ROBOCUP



The George W. Woodruff  
School of Mechanical Engineering

**Georgia**  
**Tech** | College of  
Computing

# Intro to Robotics

## September 15, 2009

### RoboJackets TE Sessions

[www.robojackets.org](http://www.robojackets.org)



# Key Information

**Klaus 1116 Tuesday 5PM – 7:30PM**

Andy Bardagjy – [andyb@gatech.edu](mailto:andyb@gatech.edu)

Stefan Posey – [stefan.posey@gatech.edu](mailto:stefan.posey@gatech.edu)

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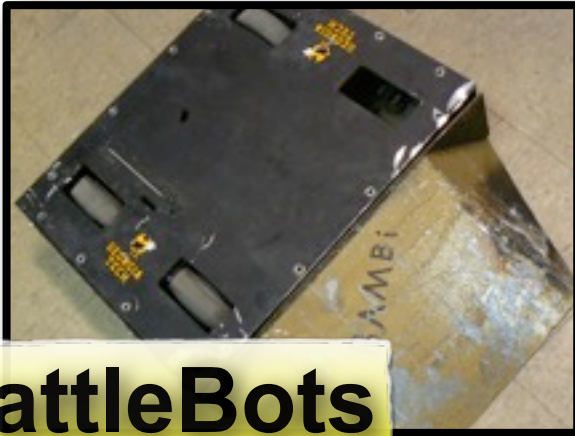
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**RoboJackets**



# RoboJackets



**BattleBots**



**IGVC**



**RoboCup**



**FIRST**

**RoboJackets**



# Mission Statement

## Promote - Educate - Advance

### Educate

Provide tools to students students so they can successfully participate in the FIRST FTC and FRC competitions.

Expose students to STEM concepts using robotics as a vehicle.



# TE Schedule

## Introductory

Introduction	09/15
Mechanical Power Trans	09/22
Fluid Power & Automation	09/29
Manipulation	10/06
Manipulation II	10/13
Drive Types	10/20
Autonomous Control	10/27
Autonomous Control II	11/03
Competition Techniques	11/10

## Special

Autonomy
Autonomy II
AutoDesk Inventor
Computer Vision
Electrical Design
Electrical Design
Compact RIO
Compact RIO II
Mechanical Design



# INTRODUCTION TO ROBOTICS

**RoboJackets**

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# What is a robot?

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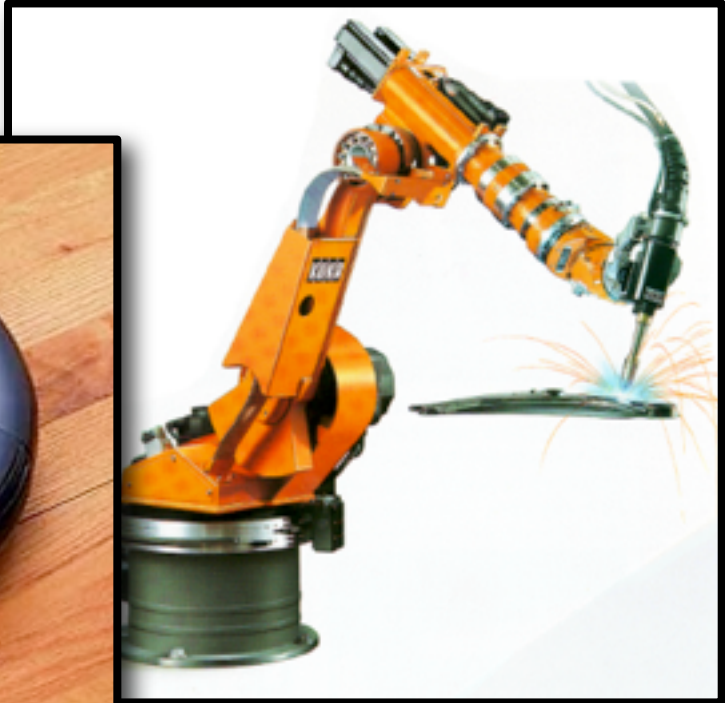


# What is a Robot?

- It is artificially created
- It can sense its environment, and manipulate or interact with things in it
- It moves without direct human intervention
- It appears to have intent or agency



# What is a Robot?



Robotics

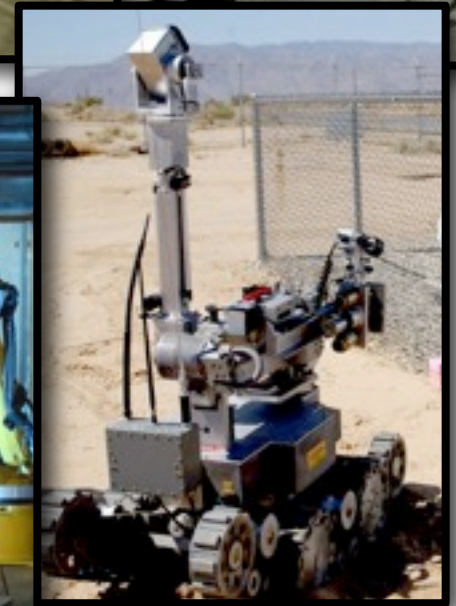


# Robot Applications

## 20th Century

### Three “Ds”

- Dirty
- Dull
- Dangerous





# Commercial / Industrial

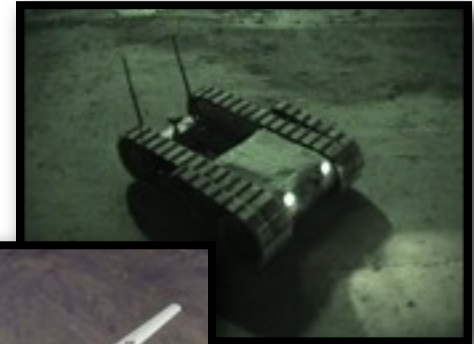
- iRobot
  - Roomba
- KUKA
- FANUC
- EPSON





# Government / Military

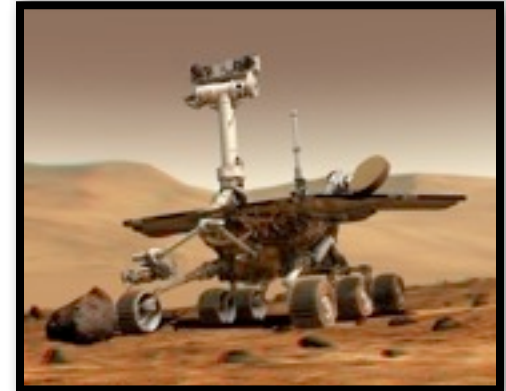
- Defense
  - Phalanx CIWS
- UAV
  - Surveillance
  - Communication
- Rescue
- Bomb Disposal





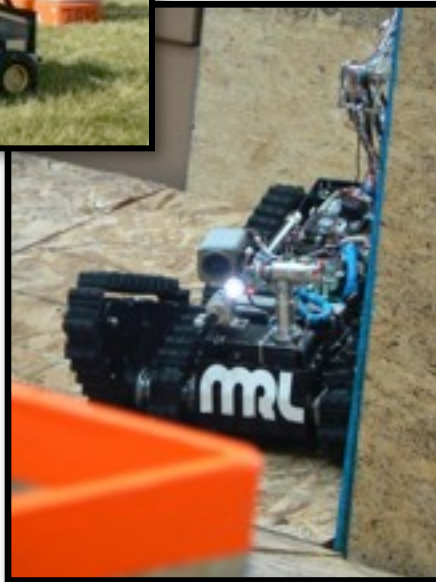
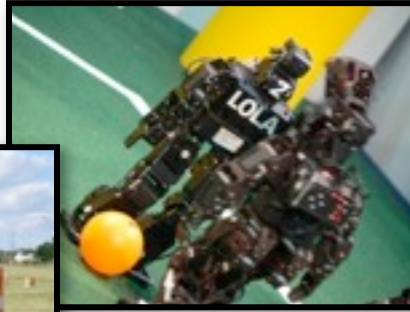
# Research

- NASA
  - Rovers, Landers, Satellites
- DOD
  - DARPA
- Georgia Tech
  - Robotics and Intelligent Machines
    - <http://robotics.gatech.edu>
  - BORG Lab, IMDL, UAV Lab, etc
  - GTRI





# Education

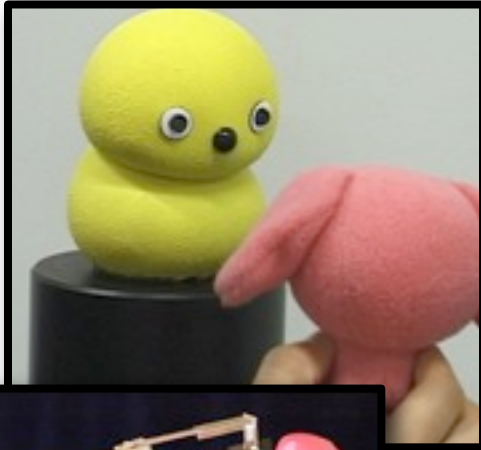


- FIRST\* (mentor)
- RoboCup
  - Small Size\*
  - Medium
  - Humanoid
- BattleBots\*
- AUVSI
  - IGVC\* – Ground
  - AUVC – Underwater
  - IARC – Aerial
- IEEE

• More RoboJackets Team



# Robot Applications



## 21st Century

### Human Centric Robotics

- Healthcare/Therapy
- Education
- Entertainment



# keepon

H. Kozima & M. Michalowski

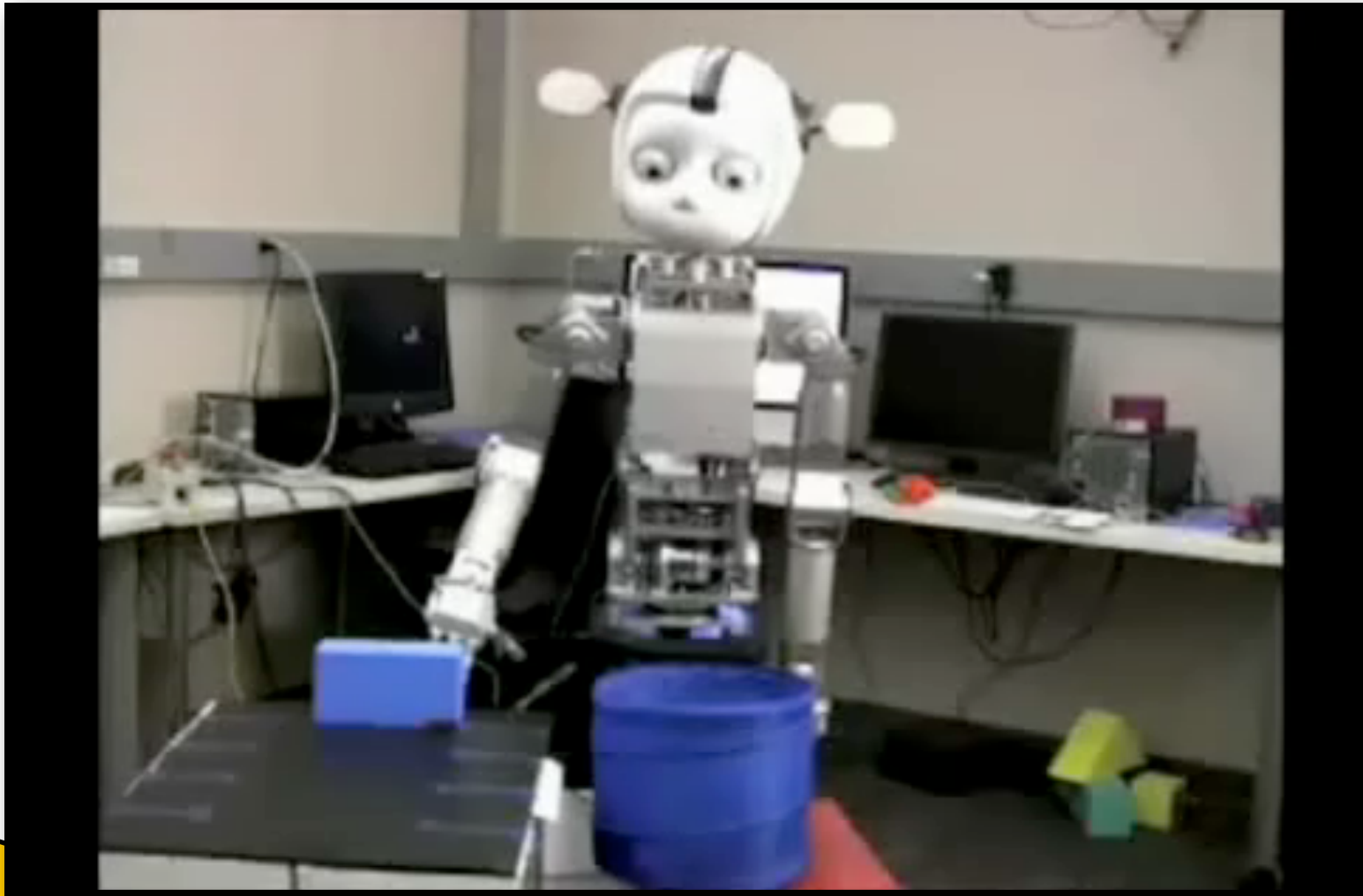
**Hideki Kozima  
& Marek Michalowski**





# Simon

Andrea Thomaz GaTech





# Hanson Robotics

ROBOT MIMIC GIVES A SPEECH

Footage courtesy of  
University of Bristol

**Robo**



# Pleo

**WHAT HAPPENS  
TO PLEO WHEN...**



# INTRODUCTION TO LABVIEW

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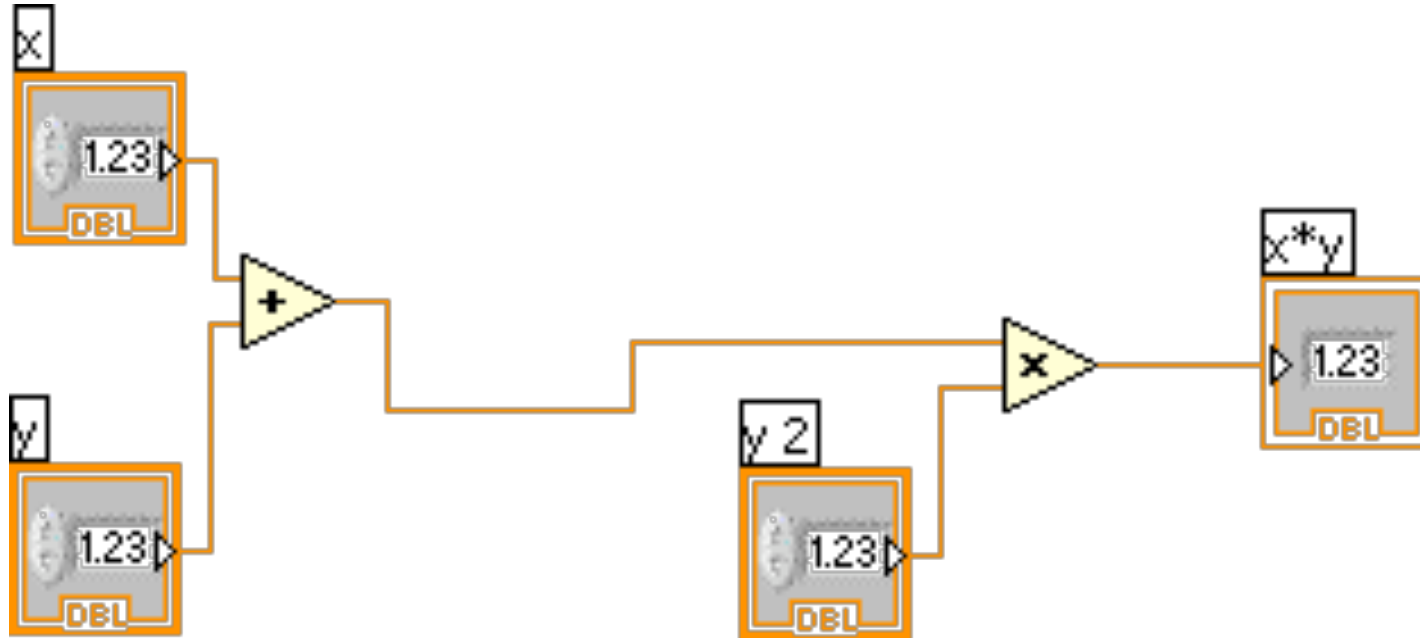
# What is LabVIEW?

- LabVIEW is a graphical programming language
- Intuitive
- Used in research, industry and education (that's us!)
- Instrumentation





# Data Flow



- Graphical programming language
- *Data Flow* language



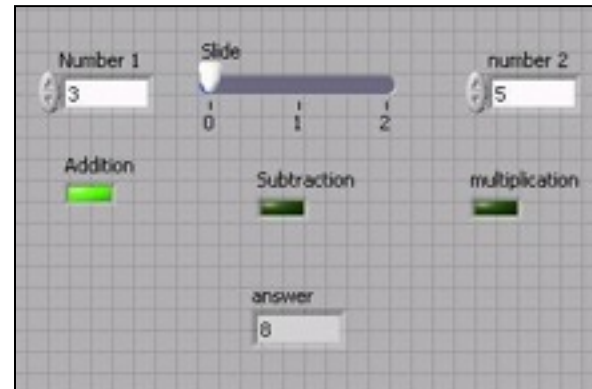
# LabVIEW Virtual Instruments

## Front Panel

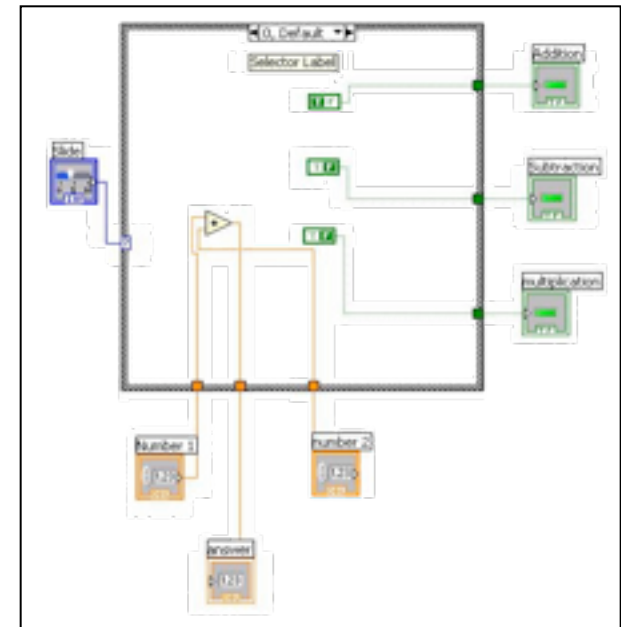
- User Interface
  - Controls = Inputs
  - Indicators = Outputs

## Block Diagram

- Data travels on wires from controls through functions to indicators
- Blocks execute by dataflow



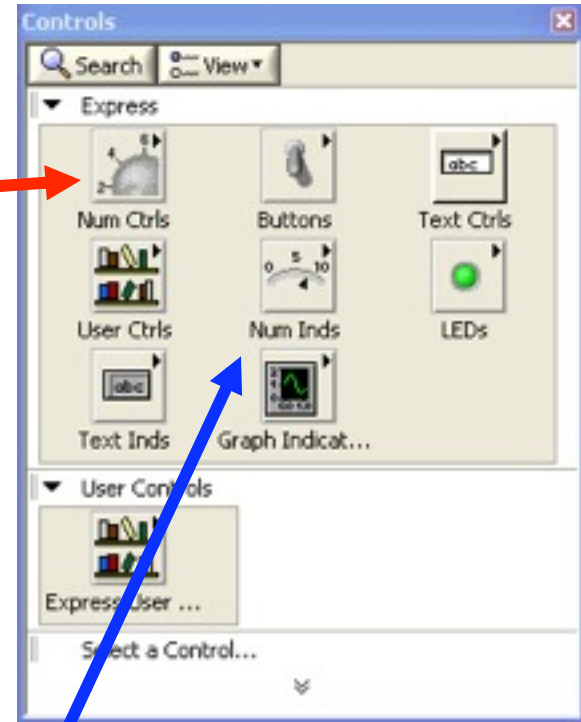
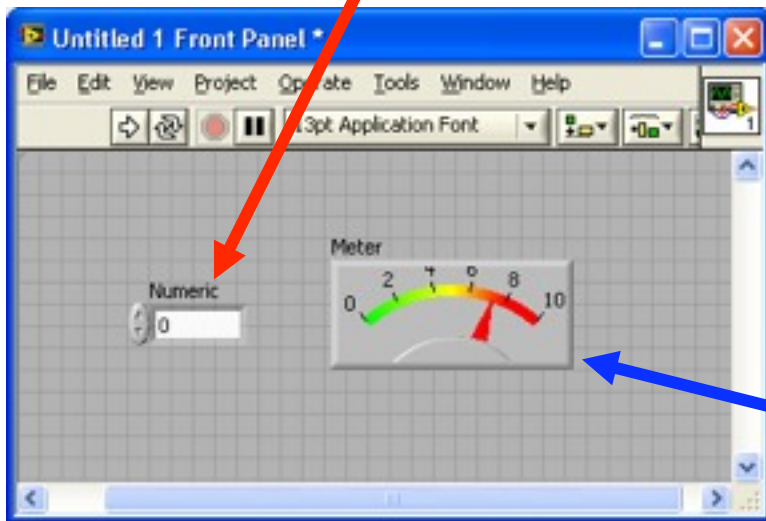
Called  
“VI”





# Controls Palette

**Control  
Numeric**

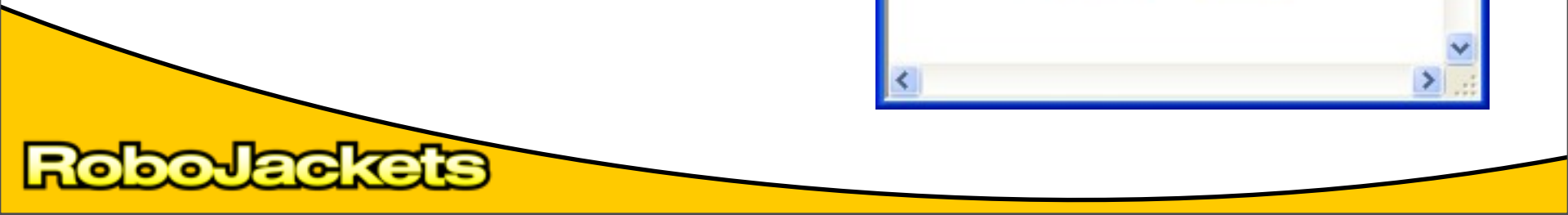
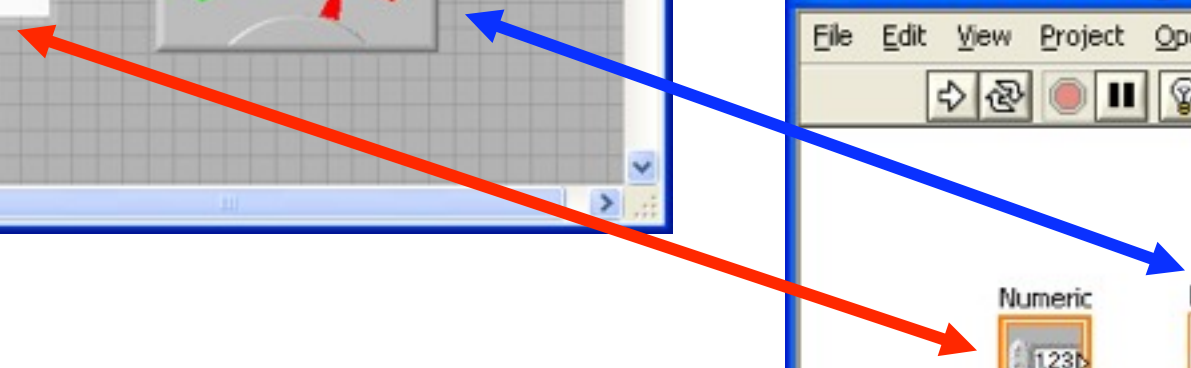
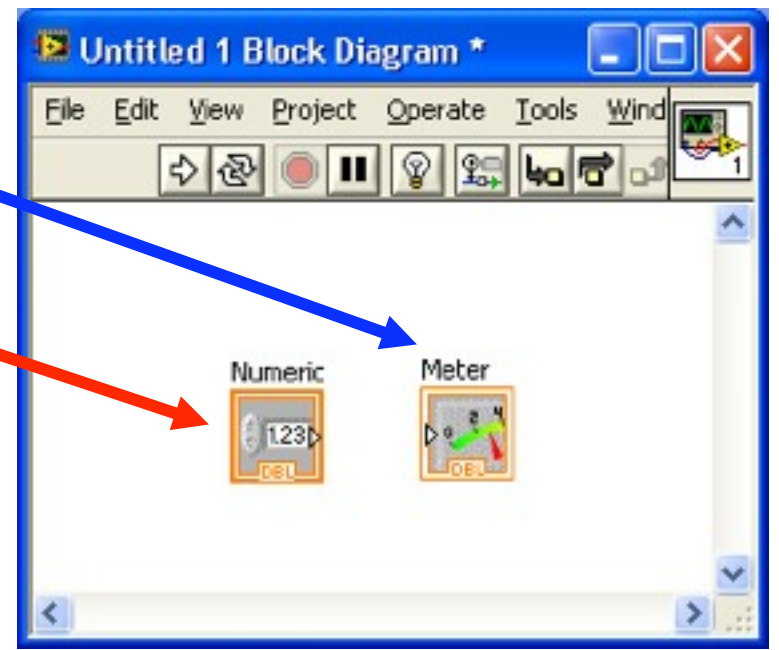
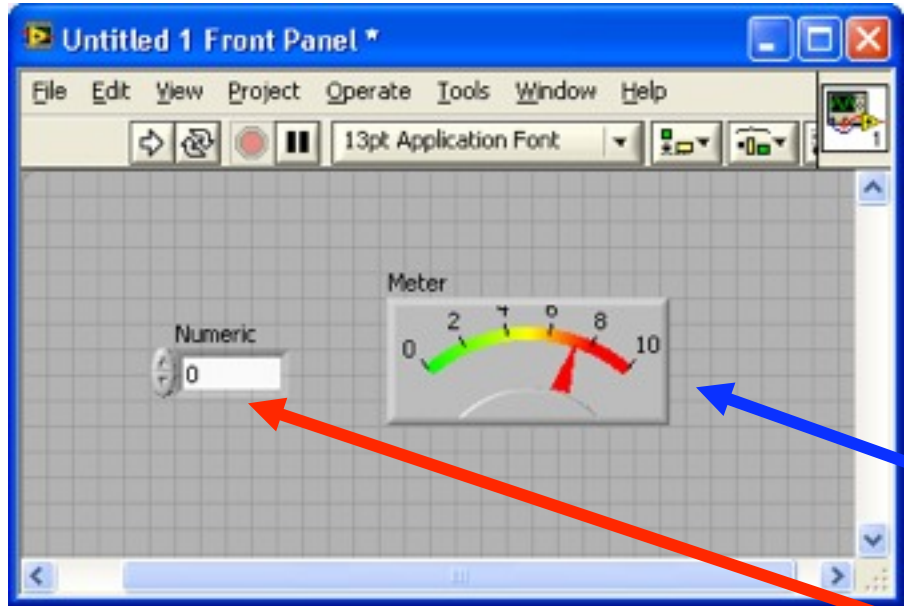


**Indicator  
Meter**



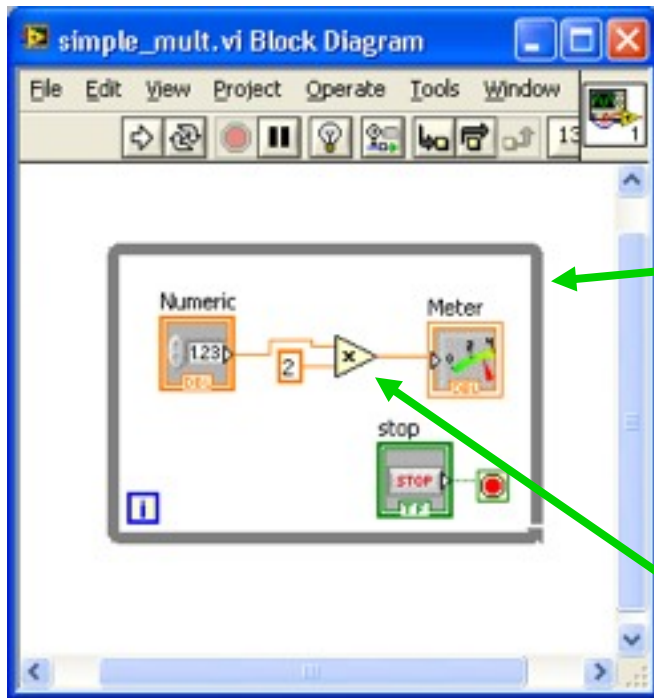


# Front Panel Block Diagram Mapping





# Functions and Structures Palette



Functions

- ▶ Programming
- ▶ Measurement I/O
- ▶ Instrument I/O
- ▶ Vision and Motion
- ▼ Mathematics
  - ▼ Numeric
    - ▶ Add
    - ▶ Subtract
    - ▶ Multiply
    - ▶ Divide
    - ▶ Quotient & R...
    - ▶ Conversion

Functions

- ▶ SignalExpress
  - ▼ Express
    - ▼ Execution Control
      - ▶ While Loop
      - ▶ Flat Sequence
      - ▶ Case Structure
      - ▶ Time Delay
      - ▶ Elapsed Time
- ▶ Addons
- ▶ Favorites
- ▶ User Libraries



# Installing LabVIEW

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# Installing LabVIEW

- **Windows** (XP, Vista, 7)
  - Insert CD, click **setup.exe**
  - Only install base package
- **Mac** (Leopard, Snow Leopard)
  - Insert CD, **click** the installer
- No **Linux** support  
for toolkit :(





# Authorize LabVIEW

- Not needed on OSX
- Have the key for Windows (see whiteboard)



# Getting the NXT Toolkits

- Connect to “robojackets”
- Windows
  - Go to “network shares”
  - Click “Tomato” “RED”
- OSX
  - Open Finder
  - Go -> Connect to Server
  - cifs://192.168.1.1



# Install NXT and FTC Toolkits

- Install **NXT Module 2009 Beta**
  - **Click** installer in directory (osx and windows)
- Install **FTC Toolkit 2010**
  - **Click** installer in directory (osx and windows)
- When you plug in the NXT brick
  - it will install the drivers
  - prompt to update the brick firmware



# Getting Started With Tetrix

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# Activity: Tower

Construct a tower using pieces  
from the **workshop kit only**

**Tallest tower to support  
roll of wire wins!**