

Voice Control of *da Vinci*[®] Checkpoint Presentation

Lindsey Dean and H. Shawn Xu
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Mentor: Anton Deguet

Background

- ▶ The *da Vinci*[®] is a robotic teleoperated surgical system
- ▶ Controlled by surgeon at HD workstation with hands and feet

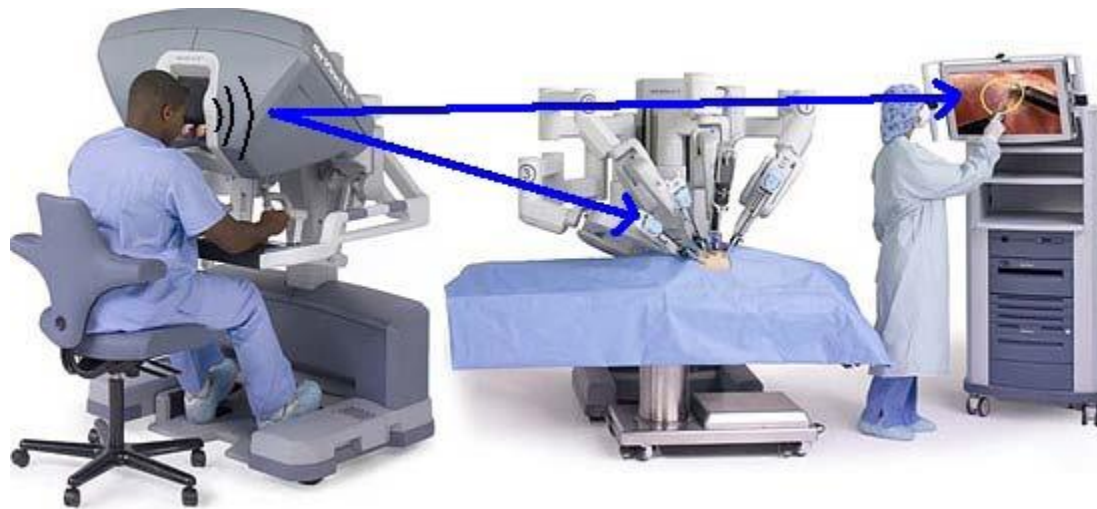
PROBLEM:

Complex gestures, stop–start procedures

SOLUTION:

Allow surgeon to control certain parts of the system via voice

Background (continued)



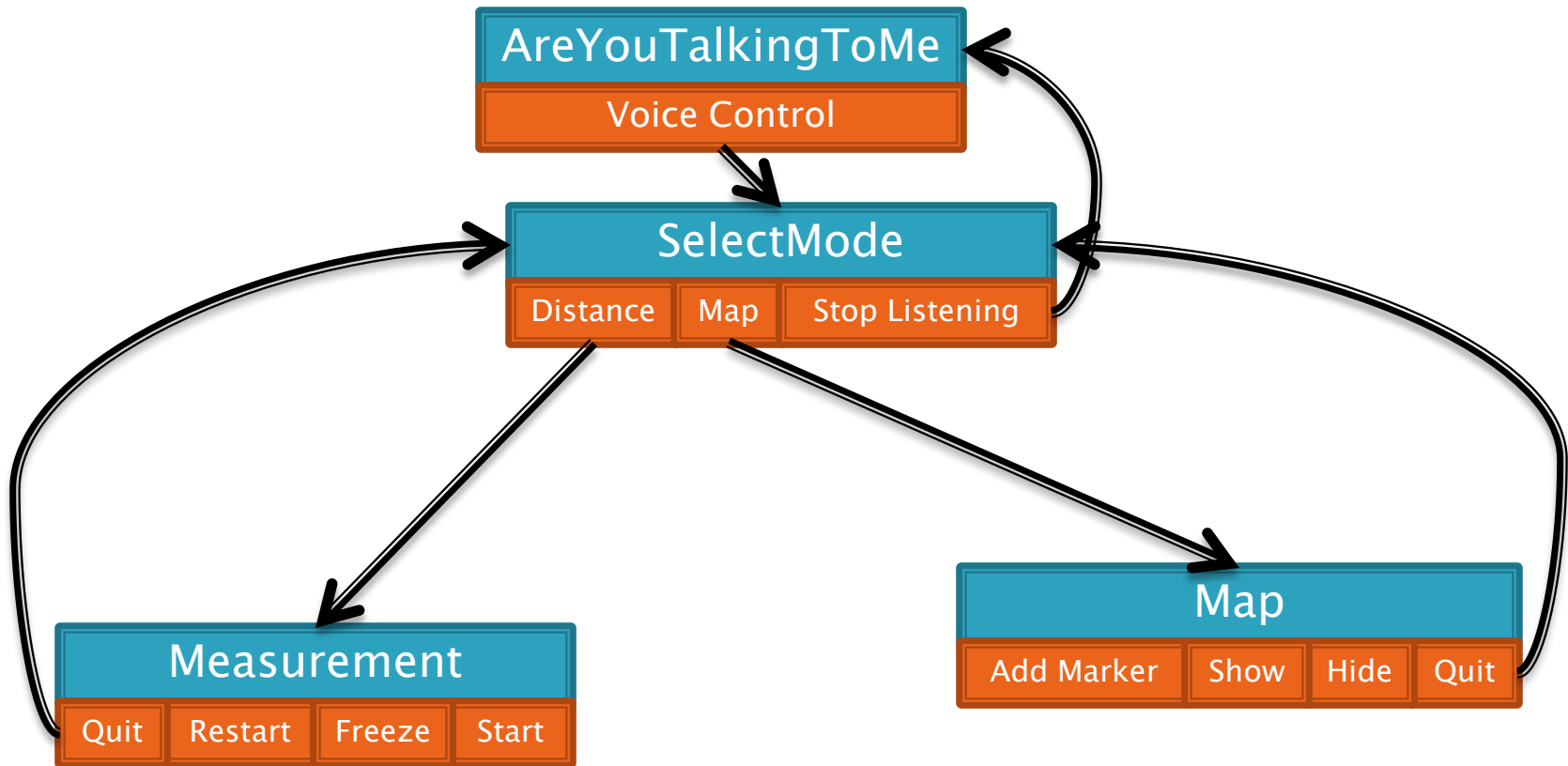
Dependencies

	Status	Planned Date	Date Accomplished
Access to Mock OR	x	2/21	2/28
Signed NDA with Intuitive	x	2/21	2/28
Account on DaVinci PC	x	2/27	3/3
Software Installation: Sphinx4 (w/ C++ wrappers), ITK, CISST libraries, 3DUI, DaVinci Wrappers, Rotorium	x	3/12	3/28
Anton's Time	-Has been very dependable and believe will continue to be so	Cont. through 4/26	4/26
Voice Package Functioning on PC		Mid-April (Next Week)	4/21





Completed Tasks

- ▶ We have met our minimum deliverable.
- ▶ We have successfully built our first demo (to be shown tomorrow at 9:30AM)
 - Allows surgeon to control 3DUI with voice

Logic of Demo



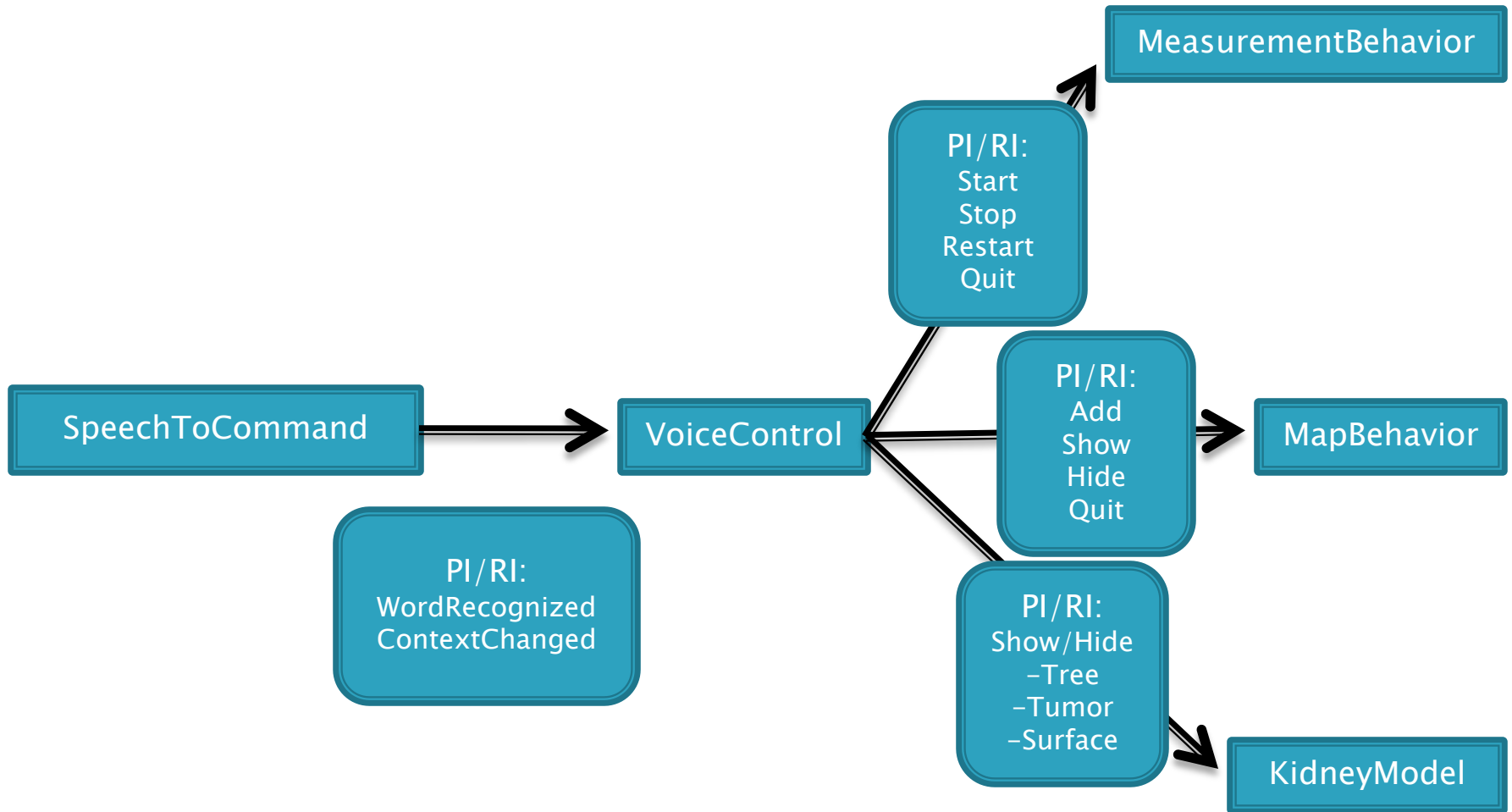
Milestones & Progress

	Milestone	Status	Planned	New Expected	Accomplished
	Overcome logistical dependencies		2/27	--	2/28
	Ready for Software Architecting		3/17	--	3/28
	Approved Documentation of Software Framework		3/23	--	4/10
	Working Demo of Voice Control of DaVinci	Live demo on 9/27 at 9:00AM	4/17	--	4/25
	Incremental improvement of first voice demo		--	--	--
	Wrap up all coding – produce final report		5/15	--	--

Design

- ▶ Three separate components
 - *da Vinci*®
 - 3D User Interface
 - Voice Recognition
- ▶ Our demo will be a 4th internal component (voice user interface)
- ▶ It will
 - Define contexts
 - Define grammars for each context
 - Listen for events from voice recognition
 - If input is defined in current context, either change context or communicate with *da Vinci*® or 3DUI
- ▶ Easy to add/modify behaviors: simply change context/grammar definition and change links between provided and required interfaces

Voice Control of CISST 3D-UI



Current Status

- ▶ Solved previous difficulties
- ▶ Sphinx 4 on Windows
 - Tinkered with configuration
 - Still not perfect, but working well enough for proof-of-concept demonstration
- ▶ Shared vs. static library conflict on Windows
 - Problem solved (THANKS ANTON)

Moving Forward

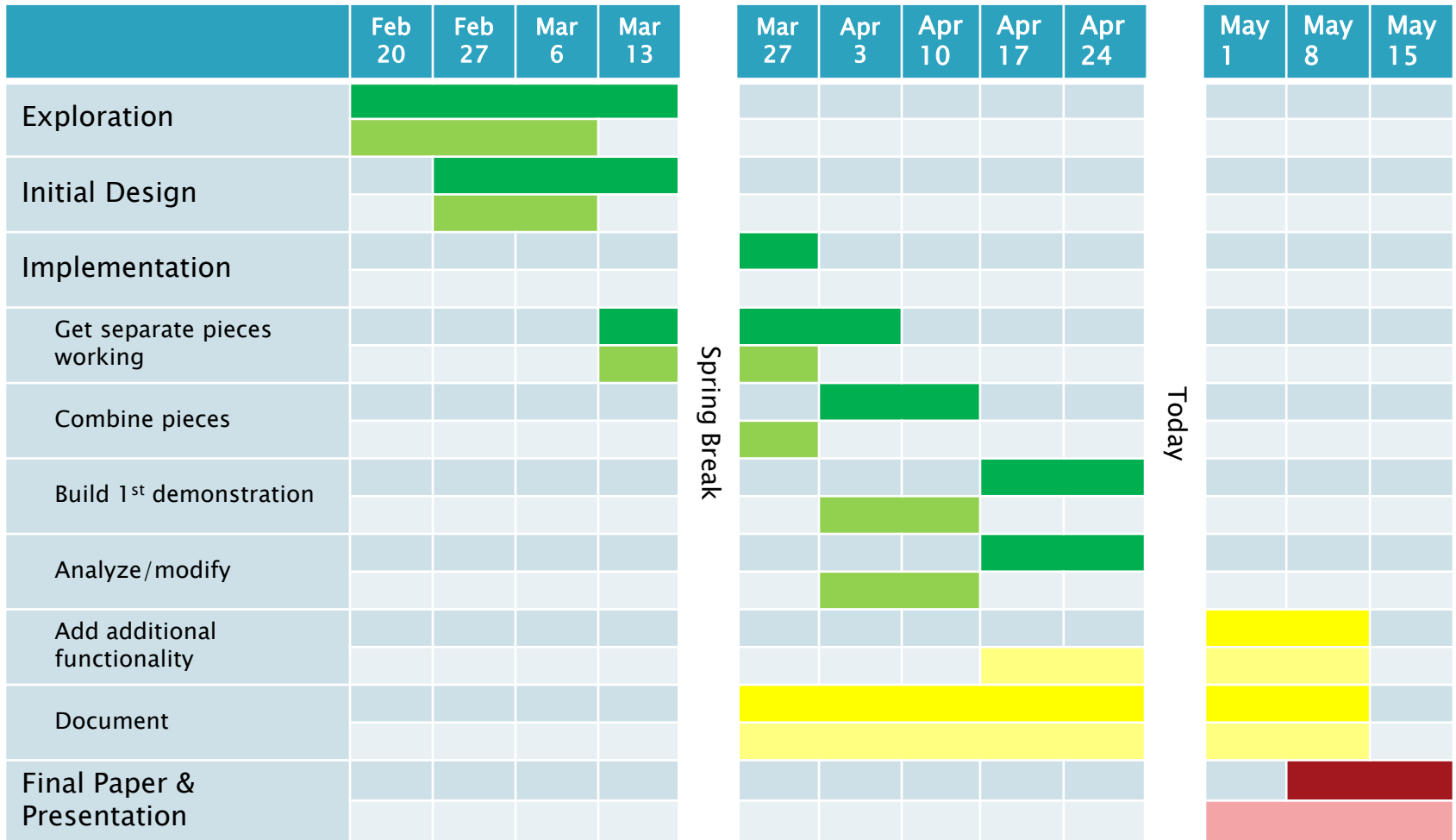
- ▶ Clean up logic
 - Currently a lot of the behavior logic is very confusing (was meant for 3DUI)
 - We hope to refactor the code so that adding additional functionality or connecting other components is more intuitive

- ▶ Implement additional functionality
 - Connect with *da Vinci*[®] console/arms directly
 - Control camera?
 - Select which arms the console controls?

Deliverables Unchanged

- ▶ Minimum (100%)
 - Well-documented demo program that adds singular functionality
 - A video demonstration of voice control
- ▶ Expected (75%)
 - Additional features in demo program that show different functions voice can perform on *da Vinci*®
- ▶ Maximum (→0%)
 - Fully-functioning library of states and commands that can be easily expanded upon

Timeline



Summary

- ▶ We are excited to have met our minimum deliverable, a working demo of voice control on the *da Vinci*®
- ▶ After tomorrow's live demo, we will continue to add functionality

Thank You!