MSc @IST

24/25

gaips

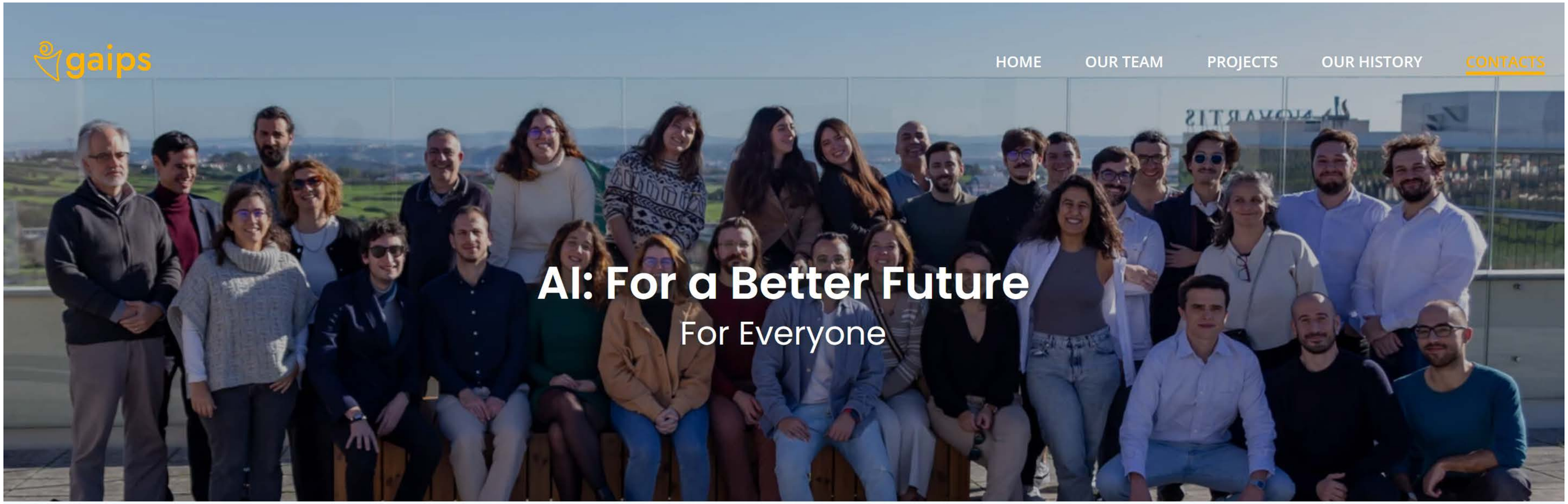
inesc id
lisboa
DEFINING TECHNOLOGY

Joana Campos


WELCOME

Who are we?

https://gaips.inesc-id.pt/



Your Turn!

- *Name*
- *Hobbies*
- *Other courses*
- *Thesis / Theme*
- *Expected grade?*
- *When do you expect to finish?*
  - Thesis challenge and goal?*

*(THIS IS HARDER THAN IT LOOKS)

Dos and Don’ts

For this year

Do NOT…

- Wait for the next meeting to ask questions

Do NOT…

- Wait for the next meeting to ask questions
- Stay behind

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- Wait for the next meeting to ask questions
- Stay behind
- Miss meetings (without a strong reason)

Do NOT…

- Wait for the next meeting to ask questions
- Stay behind
- Miss meetings (without a strong reason)
- Ignore what your supervisors say :-)

DO…

- Ask (all) questions (even the stupid ones)

DO…

- Ask (all) questions (even the stupid ones)
- Argue back

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- Ask (all) questions (even the stupid ones)
- Argue back
- Keep up the pace (do not take weeks off)

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- Argue back
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- Be proactive

DO…

- Ask (all) questions (even the stupid ones)
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- Keep up the pace (do not take weeks off)
- Be proactive
- Read! Read! Read!

DO…

- Ask (all) questions (even the stupid ones)
- Argue back
- Keep up the pace (do not take weeks off)
- Be proactive
- Read! Read! Read!
- Take Notes! (From the meetings and while you’re reading)

DO…

- Ask (all) questions (even the stupid ones)
- Argue back
- Keep up the pace (do not take weeks off)
- Be proactive
- Read! Read! Read!
- Take Notes! (From the meetings and while you’re reading)
- Come up with new ideas

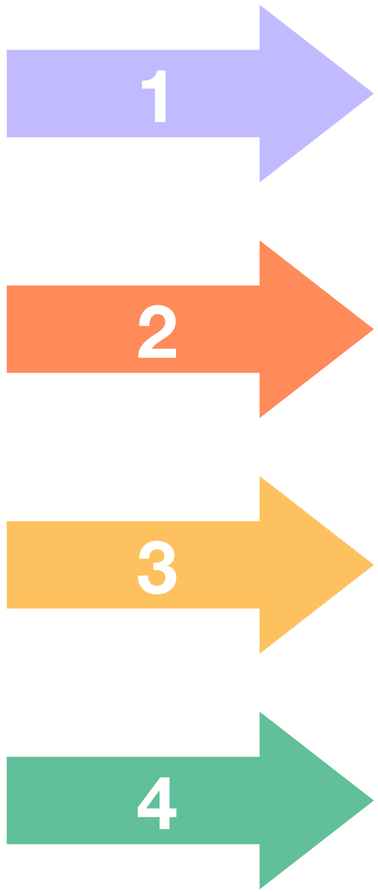
What is expected?

Dissertation (What is the scientific contribution?)

Prototype (to demonstrate the scientific contribution)

Publishable Paper (result of the distilled work)

It will take 4 stages



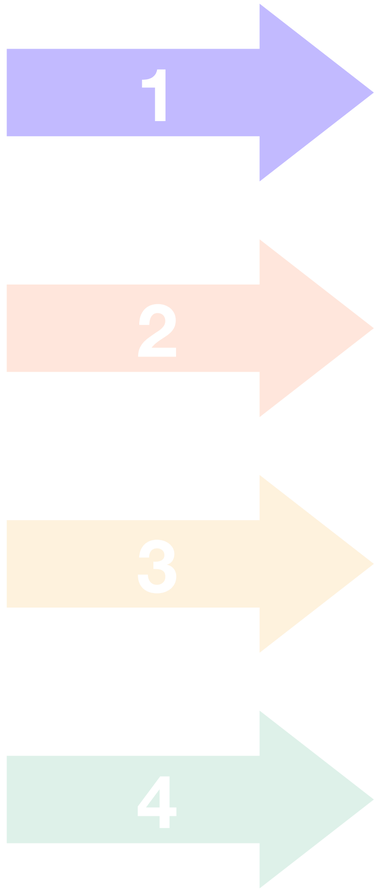
Related Work

Prototype

User Studies

Writing

It will take 4 stages



Related Work

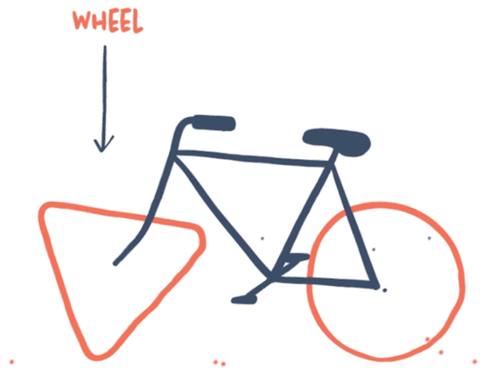
Prototype

User Studies

Writing

Related Work

Do not reinvente the wheel

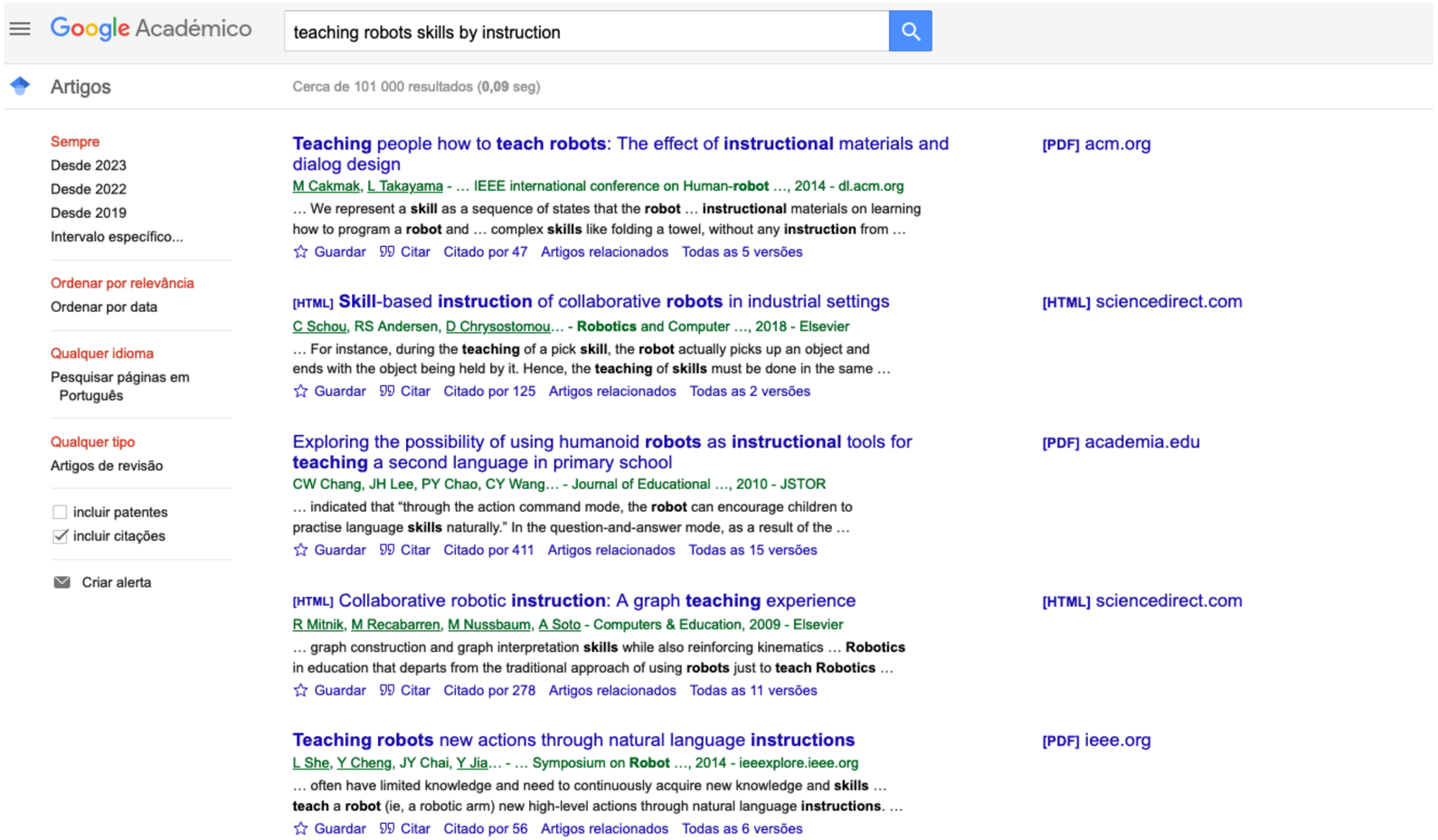


Related Work - HOW?

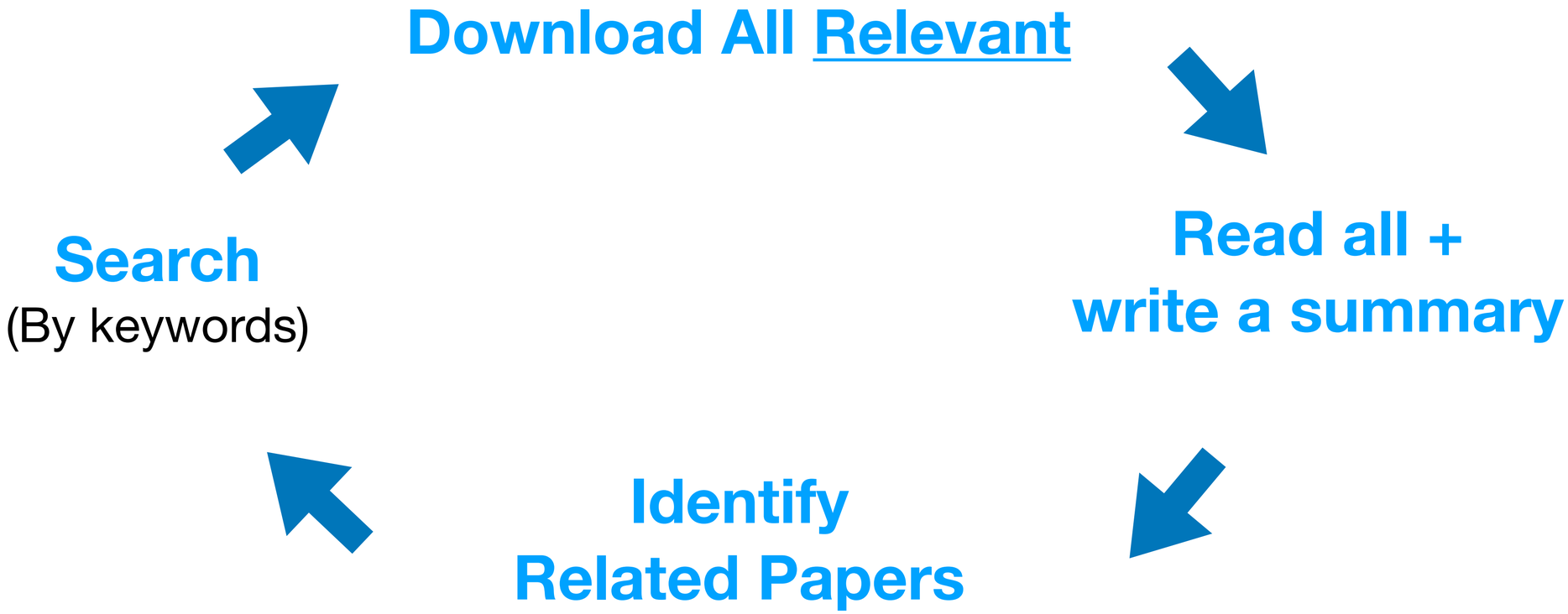
- Search “all” papers in the same research field
- Focus on those that address similar problems
- Write a report

Where do I search?

Google Scholar



And then what?



How do I know if it is RELEVANT?

Read the paper abstract.

Teaching People How to Teach Robots: The Effect of Instructional Materials and Dialog Design

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University of Washington
Dept. of Computer Science and Engineering
mcakmak@cs.washington.edu

Leila Takayama*
Willow Garage, Inc.
68 Willow Road, Menlo Park, CA 94025
takayama@google.com

ABSTRACT

Allowing end-users to harness the full capability of general purpose robots, requires giving them powerful tools. As the functionality of these tools increase, learning how to use them becomes more challenging. In this paper we investigate the use of instructional materials to support the learnability of a Programming by Demonstration tool. We develop a system that allows users to program complex manipulation skills on a two-armed robot through a spoken dialog interface and by physically moving the robot's arms. We present a user study (N=30) in which participants are left alone with the robot and a user manual, without any prior instructions on how to program the robot. Instead, they are asked to figure it out on their own. We investigate the effect of providing users with an additional written tutorial or an instructional video. We find that videos are most effective in training the user; however, this effect might be superficial and ultimately trial-and-error plays an important role in learning to program the robot. We also find that tutorials can be problematic when the interaction has uncertainty due to speech recognition errors. Overall, the user study demonstrates the effectiveness and learnability of the our system, while providing useful feedback about the dialog design.

Categories and Subject Descriptors

I.2.9 [**Artificial Intelligence**]: Robotics; H.1.2 [**Models and Principles**]: User/Machine Systems

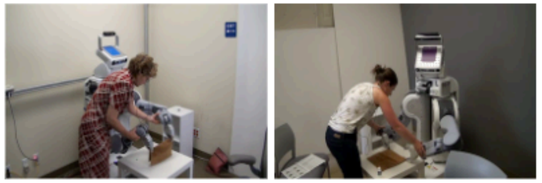


Figure 1: Participants in our user study, programming the PR2 to fold a towel by demonstration.

that are designed and pre-programmed to carry out a particular task, general-purpose robots offer the potential for end-users to program the robot for their unique purposes. This presents several interaction design challenges related to building tools that enable end-users to program new capabilities on their robots. It is crucial for such tools to give as much functionality to the user, while being easy to learn and not requiring in-person training of the end-user. A common method to allow end-users to program new capabilities on a robot is Programming by Demonstration (PbD). This involves demonstrating a desired capability to the robot, allowing it to model and reproduce the capability.

Demonstration is an intuitive way for users to communicate a desired capability. Nonetheless, details of the interaction through which users provide demonstrations might not be directly evident. For instance, even providing a sin-

How to be organized?

Suggested reference manager – *Mendeley – www.mendeley.com*

Import PDF or .bib (.bib is more reliable)

Can be integrated with MS Word, LaTex, Overleaf

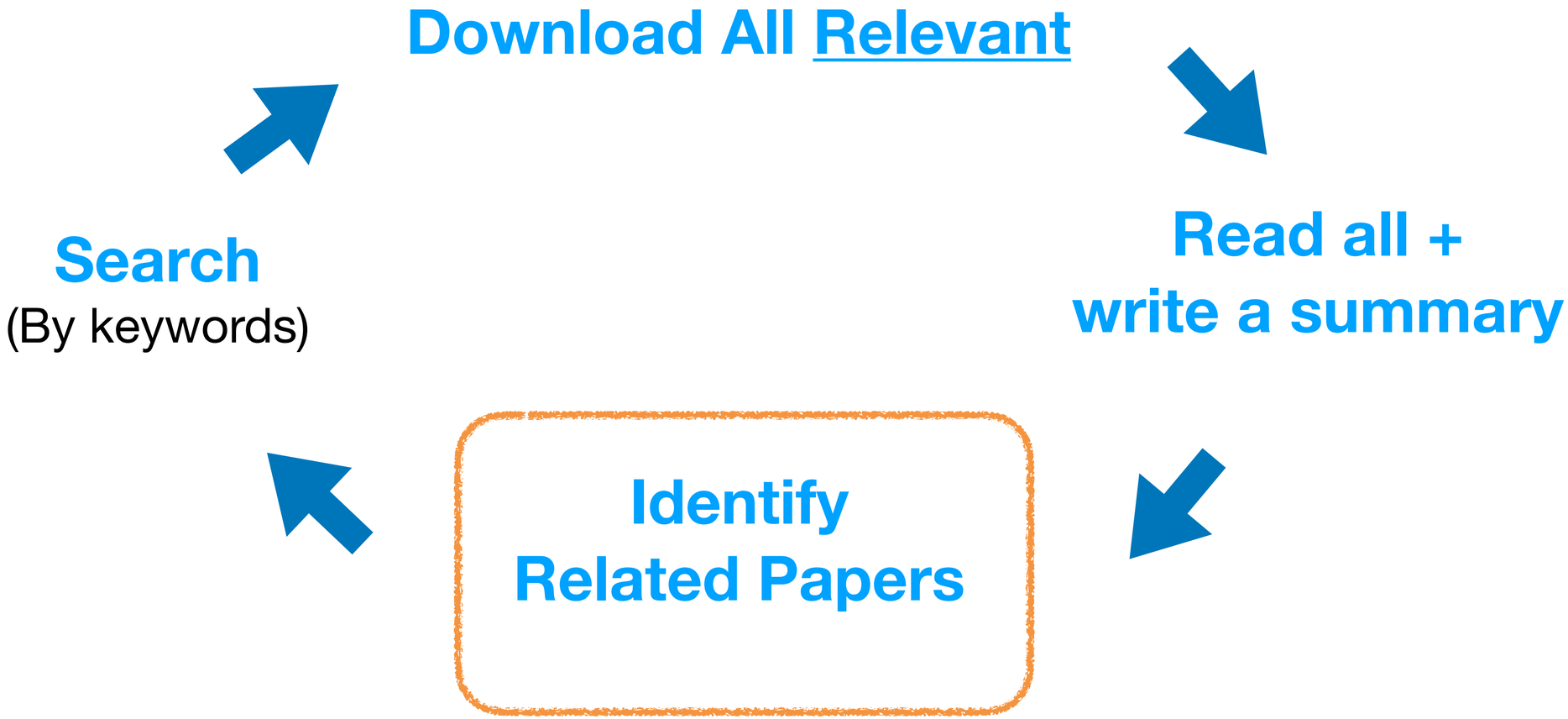
Read + Write

Always write a **SUMMARY**:

- Title
- Major contributions
- How they demonstrate their hypothesis (methods and results)
- Strengths and Weakness

(Typically 2 to 3 paragraphs)

And then what?



Teaching and Working with Robots as a Collaboration

Cynthia Breazeal, Guy Hoffman, Andrea Lockerd
MIT Media Laboratory
77 Massachusetts Ave, NE18-5FL
Cambridge, MA 02139
{cynthiab, guy, alockerd}@media.mit.edu

References within the text

Abstract

New applications for autonomous robots bring them into the human environment where they are to serve as helpful assistants to untrained users in the home or office, or work as capable members of human-robot teams for security, military, and space efforts. These applications require robots to be able to quickly learn how to perform new tasks from natural human instruction, and to perform tasks collaboratively with human teammates.

Using joint intention theory as our theoretical framework, our approach integrates learning and collaboration through a goal based task structure. Specifically, we use collaborative discourse with accompanying gestures and social cues to teach a humanoid robot a structurally complex task. Having learned the representation for the task, the robot then performs it shoulder-to-shoulder with a human partner, using social communication acts to dynamically mesh its plans with those of its partner, according to the relative capabilities of the human and the robot.

1. Introduction

Robots will inevitably become a part of our daily lives. Our research concerns how people will expect and want to interact with them. For example, efforts are underway in research labs around the world to put robots into homes assisting the elderly (e.g., [17]) and into space working in robot-astronaut teams [2]. As robots move into our natural environment, it is easy to envision situations that afford the need for efficient task learning and collaboration. Consider working together with a robot on a maintaining a flower garden, fixing a car, or cooking a large dinner. In each of these scenarios, one would neither want to wholly relinquish control of the process nor use the robot as a simple-minded tool that needs to be guided each step of the way. The robot should rather act as a partner that can be taught a complex goal-oriented procedure and then effectively collaborate with the human providing appropriate assistance in performing the learned task.

If the robot does not already know how to do a given task, a person must be able to teach the robot in a natural and intuitive manner. The robot, in turn, must be able to quickly learn the new skill from the human from only a few trials (in dramatic contrast to many statistical learning approaches that require hundreds or thousands of trials). Furthermore, once a new skill is learned, the robot should then be competent in its ability to provide assistance; understanding how to perform the task independently as well as how to perform it in partnership with a human.

Our aim is to be able to teach a robot a structurally complex task that can later be performed collaboratively with a human. Ideally, such robots will be as fast and as easy to work with, communicate with, and teach as a person. This paper details our work towards supplying our expressive humanoid robot, Leonardo, with human-centered learning and collaborative abilities.

2. Theoretical Framework

In considering what characteristics a robot must have to effectively work with a human partner, we view both the problem of learning and that of collaborating in terms of dialog and joint intention theory.

2.1. Learning and Joint Intention Theory

Human-style tutelage is a social and a collaborative process [23] and usually takes the form of a dialog, a fundamentally cooperative activity [9]. A good instructor maintains an accurate mental model of the learner's state (e.g., what is understood so far, what remains confusing or unknown) in order to appropriately structure the learning task with timely feedback and guidance. The learner (robot or otherwise) helps the instructor by expressing their internal state via communicative acts (e.g., expressions, gestures, or vocalizations that reveal understanding, confusion, atten-

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Other papers from the same authors

Abstract

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[PDF] **Teaching** and working with **robots** as a **collaboration** [PDF] researchgate.net

C Breazeal, G Hoffman, A Lockerd - AAMAS, 2004 - researchgate.net

… Our aim is to be able to **teach** a **robot** a structurally complex task that can later be performed

… Ideally, such **robots** will be as fast and as easy to work with, communicate with, and **teach** as …

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Other papers
from other authors *potentially*
about the same topic

[PDF] **Teaching** and working with **robots** as a **collaboration** [PDF] researchgate.net

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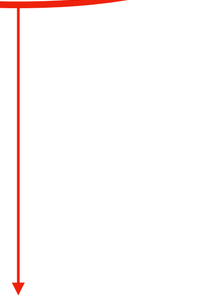


Other papers
from other authors *potentially*
about the same topic

WARNING!

It is easy to do not know when to stop reading
Ask Questions!

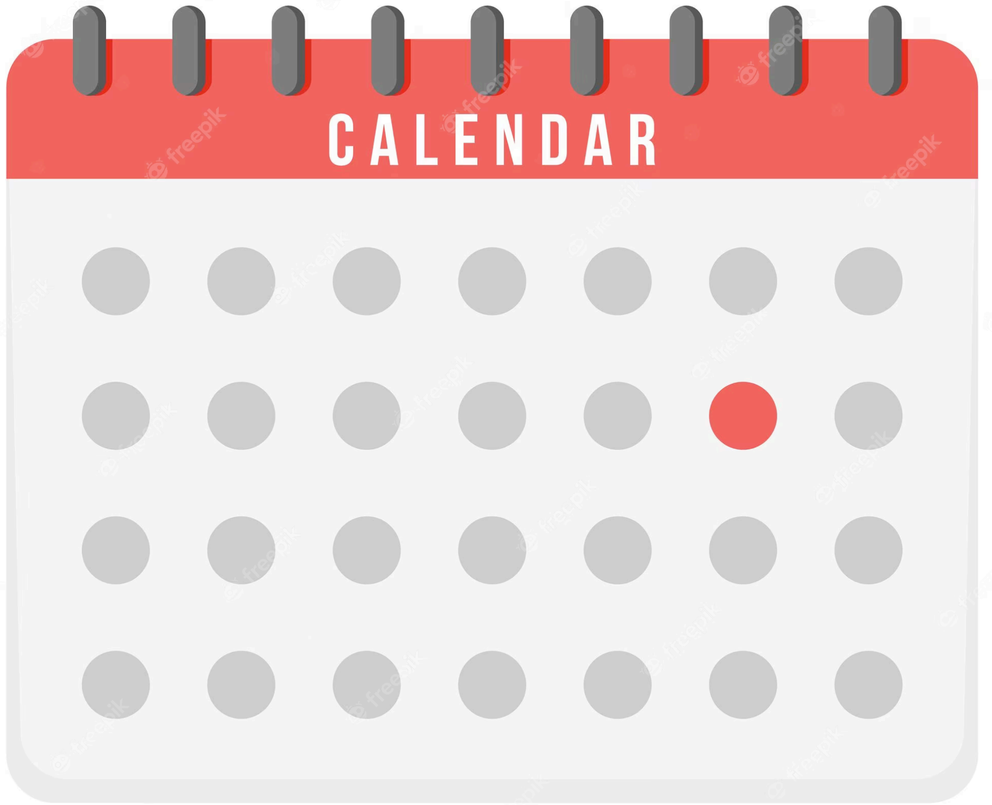
There are *certainly* more than 30 papers related to your work

Web pages *are not* scientific papers


START
NOW

Important Dates

12th January - Master’s Project

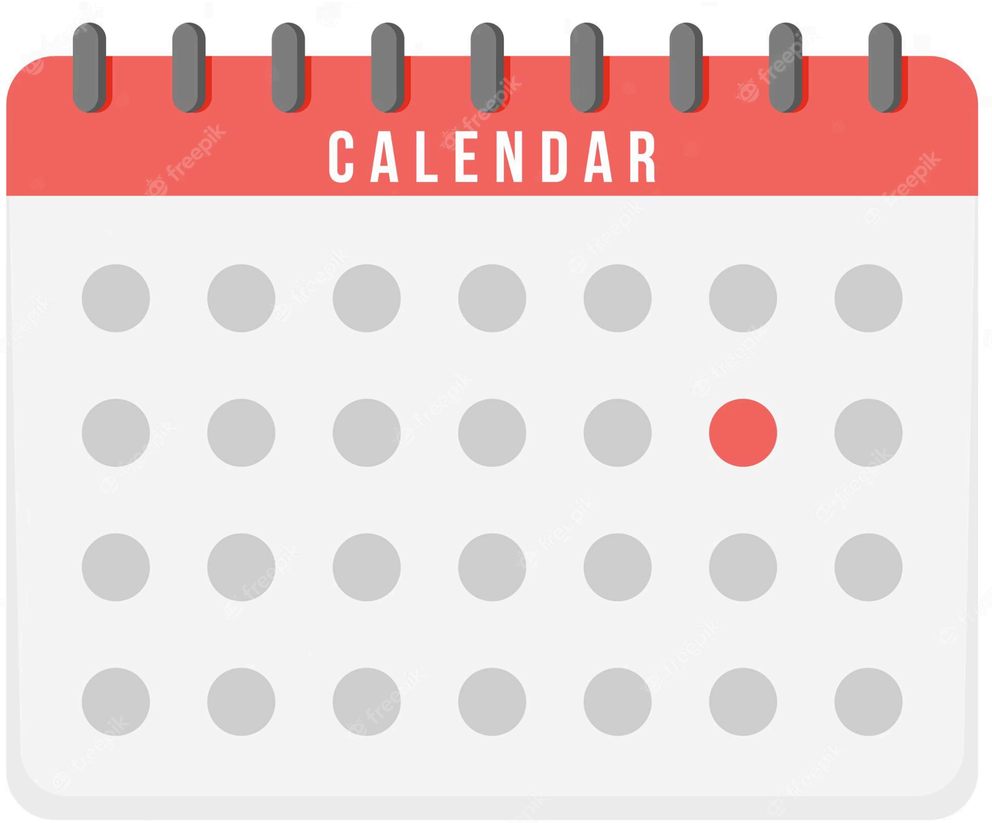


Important Dates

12th January - Master’s Project

Proposal Draft : 10th December

Related Work: 10th November



Meetings every two weeks

Bring your laptop

Prepare for the meeting

Add discussion points to the minute

Send documents a few days in advance (use your folder in OneDrive)

Meetings

Share Challenges

Discuss potential Solutions

Exchange Ideas

Next meeting

Summary of 10 papers

Top 3 papers, why?

5-minute presentation

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