

## Object Interactions Ground Truth from Narrations

### Publications:

- [1] Damen, Dima and Leelasawassuk, Teesid and Haines, Osian and Calway, Andrew and Mayol-Cuevas, Walterio (2014). You-Do, I-Learn: Discovering Task Relevant Objects and their Modes of Interaction from Multi-User Egocentric Video. British Machine Vision Conference (BMVC), Nottingham, UK.
- [2] Damen, Dima and Haines, Osian and Leelasawassuk, Teesid and Calway, Andrew and Mayol-Cuevas, Walterio (2014). Multi-user egocentric Online System for Unsupervised Assistance on Object Usage. ECCV Workshop on Assistive Computer Vision and Robotics (ACVR), Zurich, Switzerland.

### Introduction:

#### Extract from [1]

*"The operators were then asked to watch the videos, and write down a narration of what they have performed. Narrations were stemmed manually to unify nouns and verbs which are semantically identical (e.g. adapter vs. charger, pick vs. retrieve). Nouns narrated by more than 50% of the operators represent the twenty ground-truth TROs. Narrated verb-noun combinations are labelled as MOIs. Objects varied between having a single MOI (e.g. door handle: open) and up to three different usage methods (e.g. sugar jar: pick, put, get sugar)."*

This document contains the original narrations and ground-truth TROs and MOIs

## I. Final Task-Relevant Objects (TRO) Ground-Truth

Object	Object usage	Object type
charger	pick, plug	moveable
socket	plug, power	fixed
screwdriver	plug	moveable
tape	pick	moveable
box	put tape	fixed
paper tray	open, close	fixed
printer pad	press	fixed
door lock	use card	fixed
door/handle	open	fixed
mug	pick, stir	moveable
sink	wash mug	fixed
coffee machine	put mug, press	fixed
heatmat	put cup	fixed
sugar jar	pick, put, open	moveable
drainer	pick	fixed
treadmill panel	press	fixed
bicycle panel	press	fixed
seat level adjuster	adjust	fixed
chest pad adjuster	adjust	fixed
weight adjuster	adjust	fixed

## II. Final Modes of Interactions (MOI) Ground-Truth

Mode of Interaction	Object Number	Ground truthers (by ID)
pick	charger	02,04,03,01,00
plug	charger, socket	02,04,03,01,00
run	cable	01
pick	screwdriver	01
plug	screwdriver	02,04,03,01,00
place	screwdriver	01
power	socket	02,04,03,01,00
pick	tape	02,04,03,01,00
move	tape	04
put	tape, box	02,04,03,01,00
open	paper tray	04,03,01,00
close	paper tray	04,03,01
press	printer pad	02,04,03,01,00
use card	door lock	02,04,03,01,00
open	door	02,04,03,01,00
pick	mug	02,04,03,01,00
open	tap	01
wash	mug, sink	02,04,03,01,00
fill	cup	03,01
turn off	tap	01
take	mug, coffee machine	04
put	mug, coffee machine	02,04,03,01,00
press	coffee machine	02,04,03,01,00

take out	mug, coffee machine	02,04,01
put	mug, heatmat	02,04,03,01,00
pick	sugar jar	02,04,03,01,00
put	sugar jar	02,04,01
open and take spoon	sugar jar	04,03,01,00
pick	drainer	02,04,03,01,00
put sugar	mug	01
stir	mug	02,04,03,01,00
treadmill panel	press button	05, 06, 07
bicycle pedal	adjust	05
bicycle panel	press buton	05, 06
chest pad adjuster	adjust	05, 06, 07
seat level adjuster	adjust	05, 06, 07
weight adjuster	adjust	05, 06, 06, 07, 07

### III. Operators' Narrations

Subject# 00:

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pick the charger and plug it into the socket. Connect the other end to the screwdriver before powering the socket. Check that the screwdriver is powered by looking at the button. Pick the tape and place it in the box.

Walk to the printer.

Open the drawer to check the paper, and press keys on the printer pad

Get out of the office towards the other lab

Use the card to unlock the door

open the door and walk through the corridor

In the kitchen.

Pick up the mug and wash it in the sink.

Put the mug in the coffee machine and press the button.

Pick the mug from the machine and place it on the mat

Get the sugar jar.

Get a spoon from the drainer.

Open the jar and get a spoon of sugar

Stir the sugar into the mug.

Subject# 01:

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Pick up wall wart

Insert wall wart into wall

run wall wart cable through hands to find end connector

pick up power screw driver with right hand

using left hand insert end connector into power screw driver

place power screw driver on table

flip power switch at the wall onto the "on" position

pick up power screw driver and check the charging indicator is lit

pick up red electrical tape

place red electrical tape in red box

[Walk to printer]

open bottom printer tray

close bottom printer tray

press ok button on the control panel

press back button on the control panel

[Walk away from printer]

use student id to open door

grab door handle and open door

[Walk through office]

[Enter kitchen]

pick up coffee mug

hold coffee mug under tap

turn on cold tap with right hand

rinse out coffee mug with left hand while holding it in right hand

turn tap to increase flow rate with right hand

fill mug with water

turn off water with right hand

place coffee mug in the coffee machine

press coffee machine button

pick up mug

place mug on heat mat

pick up sugar

place sugar next to mug

pick up spoon

open sugar pot lid

pick up some sugar with the spoon

drop the sugar off the spoon into the coffee

hold the mug with the right hand and stir in the sugar with the left.

let go of the spoon and leave it in the mug

[fade to black]

Subject# 02:

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approach the desk

pick up the power adaptor

plug it into the wall

plug the power into the screw driver

turn the power on at the wall

check that the power is on on the screw driver

pick up the tape

put the tape in a box

walk through the room

approach the printer

check the printer paper

press a button on the printer

press another button on the printer

walk away from the printer

leave the room

approach the door

use the card to unlock the door

open the door

enter the next room  
walk through the room  
enter the corridor  
walk through the door into the kitchen  
look at the kettle and mug  
pick up the mug  
wash out the mug in the sink  
put the mug in the coffee machine  
press a button on the coffee machine  
take the mug out of the coffee machine  
put the mug on a heat mat  
walk across the room to the sugar  
pick up the sugar  
walk back to the mug  
put the sugar down  
pick up a spoon  
put some sugar in the cup  
give the cup a good long stir

Subject# 03:

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approach work desk  
locate electric screwdriver  
pick up screwdriver plug  
insert plug into wall socket  
plug cable into screwdriver  
switch on wall socket  
pick up red tape  
place tape in red box  
turn away from desk  
walk, avoiding Walterio  
approach printer  
open and close paper drawer  
press buttons on keypad  
leave lab via (open) back door  
walk along corridor to door  
swipe keycard on door lock  
open door using handle  
walk the length of the lab  
turn left into kitchen  
search for coffee cup  
pick up coffee cup

rinse cup in sink  
fill cup with water  
place cup in coffee machine  
press some buttons  
move cup to red heat mat  
retrieve sugar jar  
pick up spoon from cutlery holder  
spoon sugar from jar  
stir sugar into water in cup  
step backwards

Subject# 04:

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I look at a screwdriver, then turn to the left and pick an adaptor. After that, I plug the adaptor to one of the sockets on the wall and put the other end to the screwdriver, then get back to the sockets and turn on the switch. I then look for a tape which is located on the left side of the table, pick it up and move to the right end of the table and put the tape in a red box.

Once everything on the table is sorted, I turn right and walk to a printer at the other side of the room. As I reach the printer, I open its paper tray, check if there are papers in it, shut it, then look up and press the OK and the BACK button on the printer pad. After this point, I then leave the printer and walk out the room at the back door.

I walk to another lab and open the door by touching a card at the card reader located on the left hand side of the door, push the door open, then walk across the lab corridor to the common room.

At the common room, I enter and walk to the end of the room, pick up a cup and rinse it at the sink next to a microwave. Then, I take the cup to a coffee machine, put the cup on its tray, press the button on the coffee machine and wait until coffee is filled up the cup. Once the coffee is done, I pick the cup and walk back to the microwave and put it on a red mat, then have to walk back to the coffee machine again to grab a sugar jar and bring it back to my coffee. I put the sugar jar next to the coffee, get a spoon from a spoon drainer next to the microwave, open the sugar jar, scoop up a tiny amount of sugar, put the sugar into the coffee and stir it for a little bit. Voila! a nice cup of coffee after a long journey is really good.

Subject# 05:

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Get on the treadmill, press the start button and start walking. Press the + button to increase the speed to 4.4 and continue walking for a bit. Press the ^ button to incline the slope to level 3 then reduce the speed to 4.0 and continue walking for a few seconds. Decline the slope to normal level and increase the speed to 4.3 and keep walking for another few seconds then press



the stop button. Move to the bike machine, adjust the paddle, and start paddling. Press the start button, then press the + button to increase the gear level to and keep pedaling.

Approach to the row machine, adjust the chest rest and the seat level. Put the weight to the lowest and start working the machine.

Subject# 06:

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Get on the treadmill, press the start button, increase the speed to 4.5, put the slope to 7, and start walking for a minute. Decrease the speed to 0.8, put the slope back to normal before pressing the stop button and get off the machine. Walk to the bike and start paddling. Press the start and stop buttons on the panel.

Adjust the seat level, pull the chest rest out, and get on the seat. Change the weight adjuster, start working out for one set. Put the weight adjuster back to the lightest then get up.

Subject# 07:

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Get on the treadmill, press the start button on the panel, adjust the speed to 5.0 using the numpad and start walking. After 30 seconds of walking, increase the slope to 2 and keep walking for another 20 seconds. Put the slope back to normal, set the speed back to 0 and stop the treadmill. Walk to the bike and start paddling for a minute. Stop the bike and get up.

Adjust the seat level, sit on it, and adjust the chest rest. Adjust the weight and start pulling the row handles for 11 times. Get off the seat and finish.