

00:08:48 Nathan Lepora: We can put questions to the speakers here...

00:09:16 Nathan Lepora: And also general chit chat, points of comment, etc during the talks...

00:22:24 Sara Hamdan: hi

00:22:26 Alexander: Hi

00:22:27 Yitao Ding: test

00:22:27 Emily Collins: Test

00:22:28 Jakub Tomasek: Hi

00:22:29 Robert Wilbrandt: works now

00:22:30 Efi Psomopoulou: Hello

00:22:33 Gautami: Test

00:22:34 Lorenzo Natale: hi

00:22:34 Sara Hamdan: working

00:22:42 Emily Collins: If I have to leave the chatroom at any point, can I get back in? Or is it locked now?

00:22:45 Sara Hamdan: no question thanks

00:24:44 Shihan Lu: Will the recording link be sent out to audience after the workshop?

00:25:30 Nathan Lepora: The intention is to put the link on the webpage for the WS

00:25:42 Nathan Lepora: ... but we can explore emailing everyone too

00:26:02 Shihan Lu: Thanks!

00:32:17 Sara Abad: Could you please share the reference for the 14x14 merkel cells in the fingertip?

00:33:51 Nathan Lepora: It turns out the youtube channel is linked to from the webpage... could participants subscribe to that channel please?

00:34:32 Yitao Ding: +1 for 14x14 merkcel reference

00:46:41 Benjamin Ward-Cherrier: Great talk Shan!

00:46:49 Shihan Lu: For attention based method, how to select the inputs?

00:54:20 Lorenzo Natale: Question for Shan Luo: one of the problem integrating vision based tactile sensors in robots is their relatively large size, do you think in the future we can have more integrated sensors with smaller size? are there technological limits that prevent that?

00:57:13 Yitao Ding: @ Robert Haschke: What type of piezo resistive foam are you using?

01:00:39 Nathan Lepora: Answer for Lorenzo - cameras are rapidly being miniaturized because of smartphone tech - there are several recent papers on arxiv using the gelsight-type design that have miniaturized the sensor to fingertip sized (and Shan's work is one of these); my group has also done this, which I'll cover in my talk

01:01:13 Yitao Ding: @Robert Haschke: Also, do you have any long term stability data of the MEMS barometer sensors? Since, they are originally designed to measure pressure.

01:06:39 Shan Luo: Answer for Shihan Lu: We don't select the input but we pay different attention, i.e., assign different weights to, different inputs.

01:07:47 Shan Luo: Answer to Sara Abad: I will dig into my literature library on the 14x14 reference, which is in another pc, and will send it here later.

01:13:39 Nathan Lepora: @ Robert Haschke - the combined tactile-

visuo servoing to move an object using visual servoing with tactile servo control to maintain a grasp is great... do you have a paper out on this?

01:15:50 Robert Haschke: @Yitao: Are you fearing that the sensor gets damaged during intensive use? That might be possible. We don't yet have long-term data on that. But the TakkTile sensors from Howe's lab (2013) are a successful commercial product. So I don't fear this so much..

01:17:24 Yitao Ding: @Robert: I just thought the silicone may have some effects on the silicon MEMS structure.

01:17:39 Shan Luo: Answer to Lorenzo: Like Nathan mentioned, there are attempts to minimise the camera-based sensors, you will see some update from Roberto Calandra as well. I think the technological limits are mainly the light transmission in the sensor that takes space.

01:31:19 Panpan Cai: Question to Huaping: how is active exploration incentivized in the proposed approaches? by the reward function of RL? is information gain explicitly measured and rewarded??

01:32:13 Panpan Cai: motivated or rewarded

01:33:09 Panpan Cai: I see. So it is implicitly motivated by the final success of task?

01:33:20 Panpan Cai: coll

01:33:22 Panpan Cai: cool

01:34:33 Robert Wilbrandt: we can see it

01:38:26 Atieh Merikh nejadasl: Will you record whole meeting?

01:40:00 Nathan Lepora: yes - then split into individual videos if permission by speaker

01:43:59 Nathan Lepora: There is a youtube channel linked from the workshop website - please subscribe to this (also it helps us as with 100 subscribers we get to call it vitac)

01:48:36 fer: Please share a link to the youtube channel.

01:50:39 Robert Haschke: @Lorenzo: Great idea to combine DNNs and fast k-NN. Do you plan to provide the code open-source?

01:50:54 Nathan Lepora: Please refer to webpage as we may change the channel link later <http://wordpress.csc.liv.ac.uk/smartlab/vitac-2020/>

01:52:34 Robert Haschke: @Lorenzo: How do you segment the object during interactive training?

01:54:10 Shan Luo: As Nathan mentioned, we will record the meeting and split into individual videos if permission by speaker. We will send the updates to your registered emails

01:59:49 Nassir Oumer: @Lorenzo: what about training your model with randomized backgrounds? So that the object might be detected in any environment, such as on a table top as in your example?

02:01:18 Ruihan Gao: @Lorenzo: when the new object is actively trained, do u retrain the whole model or selectively a few layers?

02:06:23 Komal Vendidandi: Is the video sound low for everyone?

02:06:33 Brayon Impata: yup

02:10:36 Lorenzo Natale: @Robert: on the (old) iCub video we use depth information to segment the blob closest to the robot, on the (recent) R1 video we improved that procedure using OpenPose, so that the robot selects the blob that is closest to the hand of the

demonstator

02:11:48 Lorenzo Natale: @Nassir: yes data augmentation is another way to go, in our case we wanted to experiment with active learning, and in addition we have problems to remove the hand of the

demonstator to cut & paste the object with different background  
02:11:58 Sara Abad: @Nathan Lepora Are the robotic fingers close to the size of a human fingertip? If not, what is limiting the miniaturization?

02:13:09 Lorenzo Natale: @Ruhian: we remove the last layers from Faster RCNN (the classifier and the bounding box regression) and substitute them with kernel classifier and linear regression respectively. The latter are re-trained for new objects.

02:24:31 Jakub Tomasek: @Lorenzo: what is your initial Faster RCNN trained on?

02:26:22 Robert Haschke: @Nathan: Servoing (and rotating) on the ball: How do you localize globally? PoseNet / TacTip can only provide local information, right?

02:26:56 Yitao Ding: @Nathan: As Huaping mentioned, vision has the advantage of high spatial resolution, but with the trade-off of low temporal resolution (~50Hz).

What is your opinion to vision based tactile servoing and the latency induced by the large image processing pipeline. Is this a limitation that should be considered? Maybe open question to everyone...

02:28:10 Sara Abad: @Nathan Lepora: Have you tested in a deformable object?

02:28:28 Fedor Chervinskii: @Nathan: do you measure actual pressure/friction force applied to the object when scanning? What are the figures approx?

02:29:29 Ruihan Gao: @Nathan: how do you measure the performance of the PI control? The smoothness of tracking around the contour of the object?

02:29:30 Mohamad Chehadeh: Do you a controlled test for the robustness of pose estimation against change in roughness of the surface?

02:36:10 Nathan Lepora: @Kaspar - I really like your image of different force & tactile sensing technologies - is this image available anywhere?

02:40:32 Komal Vendidandi: @Kaspar What is the maximum Force that these sensors can measure?

02:42:35 Rui Ouyang: @Kaspar - what is the cantilevered sensor structure made out of? unde r"minituarized image based tip force sensors"

02:43:04 Lorenzo Natale: @Jakub: we pre-train on a subset of 100 objects different from the ones we add later, details in the paper: <http://lornat75.github.io/papers/2019/maiettini-auro.pdf>

02:45:56 Rui Ouyang: (Would it be possible to access some version of the slides in addition to the recorded talks? Thanks!)

02:47:08 Sara Abad: @Kaspar: Could you please share the reference of the skin developed at Queen Mary?

02:51:47 Francesca Palermo: @Sara The paper is currently under review. Will reach out to you when it is available.

02:56:51 Sara Abad: @Francesca Thank you.

03:01:49 Sara Hamdan: can you zoom in maybe?

03:02:11 Daniel Fernandes Gomes: Probably he is sharing the app,

instead of sharing the screen.

03:02:45 Wanlin Li: @Nathan: Hi Nathan, I made that image of different force & tactile sensing technologies, I will send you the image via email :)

03:02:46 Daniel Fernandes Gomes: then, when starting the presentation another "window" opens, and Zoom still streams the initial window

03:07:21 Wanlin Li: @Komal: Different sensor prototypes have different measuring range, the previous sensor can measure normal force up to 70N, and the current small one can only measure small forces (around 8N for normal force for example)

03:09:14 Wanlin Li: @Rui Ouyang: The cantilevered structure of the sensor is 3d printed with Nylon I suppose

03:10:35 zhanat kappassov: @Vincent, I attended your actronica lecture. At this time, due to the zoom issues, we did not see videos and didn't hear the sounds. Those videos with saves and sounds are very interesting. You could share them maybe?

03:13:28 Kevin Deutmarg: @Wanlin: Could you also send me the Image? It is a very nice overview of all the measurement principles.

03:13:42 Kaspar Althoefer: @Komal: The maximum force depends very much on the geometry of the structure and the material that you use for the deformable structure. If you are talking about the our optic fibre based sensors then we can make them as strong as needed.

03:14:57 Kaspar Althoefer: @Rui: Extending from what Wanlin said: Most of our cantilever structures are made from 3D-printed materials, including ABS, PLA, Nylon. We are exploring making structures from silicone rubber.

03:17:21 Nathan Lepora: @vincent - do you think the Pacinian corpuscles are the main transducer of tactile waves? or is it more shared across all the mechanoreceptors?

03:17:31 Prasad Rayamane: is this possible use 3D printer for silicon ?

03:21:48 Wanlin Li: @Kevin: Thank you! and could you please drop me a message for the image :) There's my email: wanlin.li@qmul.ac.uk

03:26:03 Wanlin Li: @Kevin: Or maybe you could leave your email here so that I will send :)

03:27:44 arpital@andrew.cmu.edu: Maybe typing the question will help

03:35:14 arpital@andrew.cmu.edu: @carmelo : is the marker pattern deterministic?

03:37:28 Shan Luo: @Vincent, the human brain is sometimes like a black box, is there any way to measure/map the human touch response using sensors?

03:38:12 Shan Luo: @Carmelo, are the particles patterned or distributed randomly?

03:39:00 Nathan Lepora: @carmelo: do you use a high resolution image as input to the CNN - can see this might relate to particle size/distribution - how would this affect cnn training and prediction speed?

03:39:27 Carmelo Sferrazza: @ arpital & Shan Luo: The plastic particles are just mixed together with the silicone rubber during production. Therefore, the marker pattern is random and is different from sensor to sensor. However, extracting the optical flow allows

us to have features that are independent of the random pattern  
03:59:01 Brayan Impata: You have tactile sensors like BioTac that  
also measure temperature.

04:01:54 Francesca Palermo: [https://www.youtube.com/watch?  
v=0hvvIeG6TkM&feature=youtu.be](https://www.youtube.com/watch?v=0hvvIeG6TkM&feature=youtu.be)

04:02:06 Francesca Palermo: This is the Acktronica webinar

04:02:35 Vincent Hayward: [https://www.youtube.com/watch?  
v=0hvvIeG6TkM](https://www.youtube.com/watch?v=0hvvIeG6TkM)

04:18:29 Rui Ouyang: (I think it is also not possible for us to  
save the chat text (or perhaps my linux client is buggy). could an  
export from a host be emailed if this meeting will be exited?)

04:19:44 Rui Ouyang: @Wanlin thank you! I looked it up and I  
think it's veroclear rgd810