* Call with UK researchers
  + Get to know them
    - Tell us about the history/evolution of the work
      * motivation/background/validity
      * Useful for lit review/intro
    - What have you been working on for the past few months
    - What was the biggest challenge you faced?
      * What do you plan to work on in the future?
      * Ask for nugget (where could we contribute)
        + What hopes do you have for your research in the future?
  + Questions to ask (on table, as discussion goes):
    - What software did you use?
      * Tutorials used for Rhino
    - What are some alternatives to the David laser scanner that were considered and what would you recommend? \*
    - What materials did you experiment with? \*
      * PLA on PLA
      * Issues
        + What materials are we printing on
        + Hairspray? No that actually works I’ve done it - Aquanet Hairspray
        + Maybe use a specific surface and then change the extruded material according to that surface

We could test this pretty easily by just doing standard FDM printing on different print plates made of test materials

* + - What is your advice for concavity/in-situ?
      * Used point cloud and therefore need to see depth and points of the object
      * Nozzle of the extruder gets in the way
      * Need to be able to see depth
      * Scanning and printing problem
      * Problems to think about:
        + Can I scan it?

Maybe have the camera move?

* + - * + Can I print on it?

How can the nozzle reach something that is deep?

Think about ratio of nozzle to radius of cavity

* + - * Depends on the size/proportion of everything
    - What do you think would be the best way to further your own research? \*
    - What were some of your original methods that failed?
    - How did you decide on your methodology?
      * Just wanted a prototype
    - Should printing be always perpendicular to the surface or kept at constant angle?
      * Literature on printing at other angles?
    - Provide some helpful papers?
    - Ballpark how much does one of these printers cost?
      * GBP 2000 / $2500
    - Ask about printing on the walls of an open hole?
    - What advice would you have for an application to a robotic arm-attached tool drive extruder?
      * **Toolpath algorithms** (something that we need to spend time on)
        + Written by the student that didn’t document
        + *Iso-hops* went along with the contour of the object

Decreases the chances of hitting the object

* + - * + Always perpendicular to the surface of the object
    - Related software for algorithmic control for keeping the extruder perpendicular?
* Piping the files between software was all manual
  + Wish they could automate it all
* Current status of printer: project fell apart
* Student could not document what he did → much of the software could not be deciphered
* Good Arm → EXPENSIVE
  + Low cost is not accurate enough → basically useless
* Reserve the robotic arms (mounting/dismounting)
  + Arms are not meant to be modified → essentially destroying the arm if modifying them
  + Any modifying the machine is destroying the warranty
* Go for 3D printers instead (high cost 3D printer)
  + Unless you have a few hundred thousand dollars
* Interfacing with the software was difficult
  + Submission to github for requests to fix the code
* Software
  + Can’t just add another axis to the kuka(?)
  + Interfacing the software was hard
    - Look for Open source and modify
      * Github
* Scanning
  + David Laser Scanner → bought by HP now
  + Bought it when someone was returning it (lightly used)
    - Reason why the entire project could be done in 2000 GBP
* Concavity
  + Used point cloud and therefore need to see depth and points of the object
  + Nozzle of the extruder gets in the way
  + Need to be able to see depth
* Generate tool-path
  + Other project could not do it on the fly
* Just modified the degrees of freedom
* They could not find any other projects of similar nature
  + Other projects that did conformal printing had a known surface and could not generate a toolpath generally
* Would not suggest making own printer
  + Wonder how a delta printer could be used
* 5axismaker
* 10 degrees off for printer head - I think that was just an example
  + Needs testing (or find other researcher)
* Co-authors on publications and joint funding
* Limit ourselves to fit our time constraints
  + Have a discussion on how to limit the project
    - Priorities
      * need/want
    - Share with them