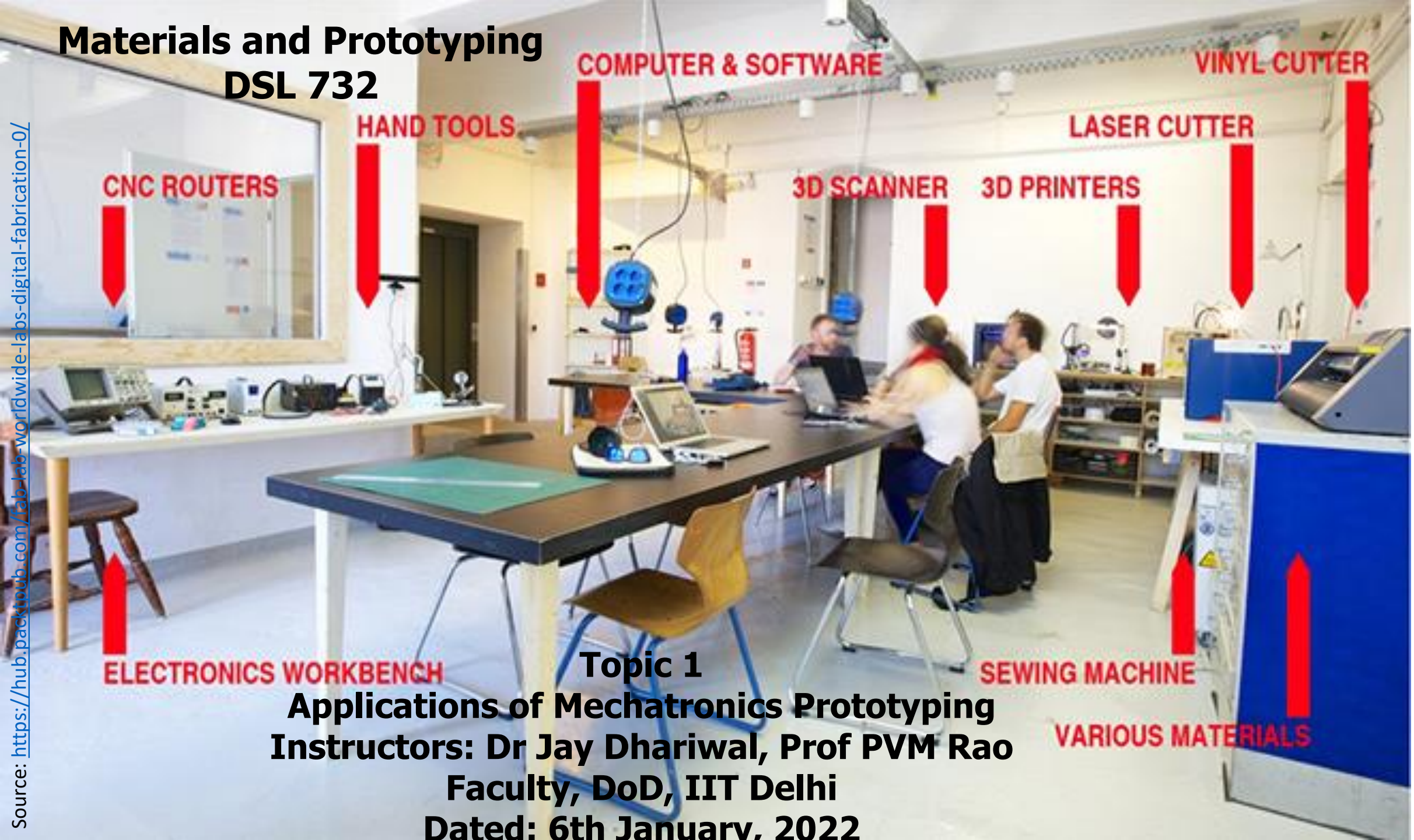
Materials and Prototyping
DSL 732



Source: https://hub.packtpub.com/fab-lab-worldwide-labs-digital-fabrication-0/

Topic 1
Applications of Mechatronics Prototyping

Instructors: Dr Jay Dhariwal, Prof PVM Rao
Faculty, DoD, IIT Delhi

Dated: 6th January, 2022

Topic Outline

- Projects from Assistech Lab
- My Projects (Medical Device, xy plotter, e-bike controller)
- Projects from DSL 732, Autumn 2019
- Fab Lab projects
- Instructables, DIY websites
- Project Management lessons

Smart Cane, Assistech Lab, IIT Delhi

Design and development of ChromoSpray (Improving chromo endoscopic surveillance for IBD)

Dr Jay Dhariwal, School of Mechanical Engineering, University of Leeds

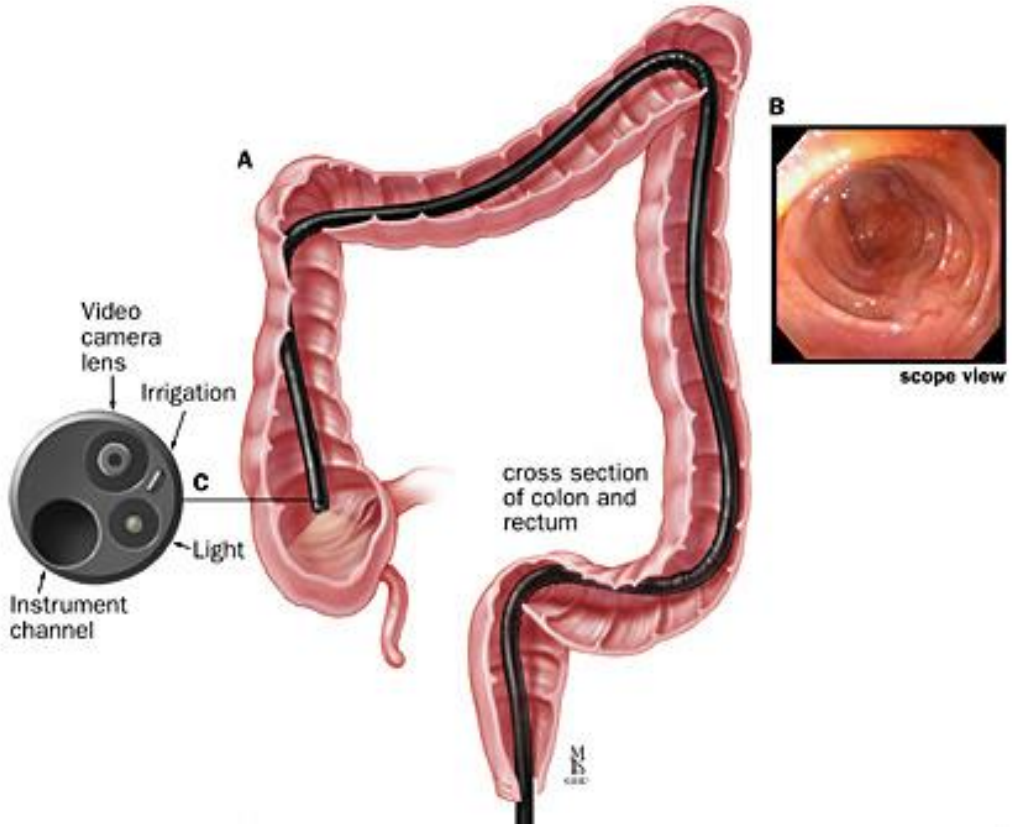
Dr Peter Culmer, Prof. Nikil Kapur
School of Mechanical Engineering, University of Leeds

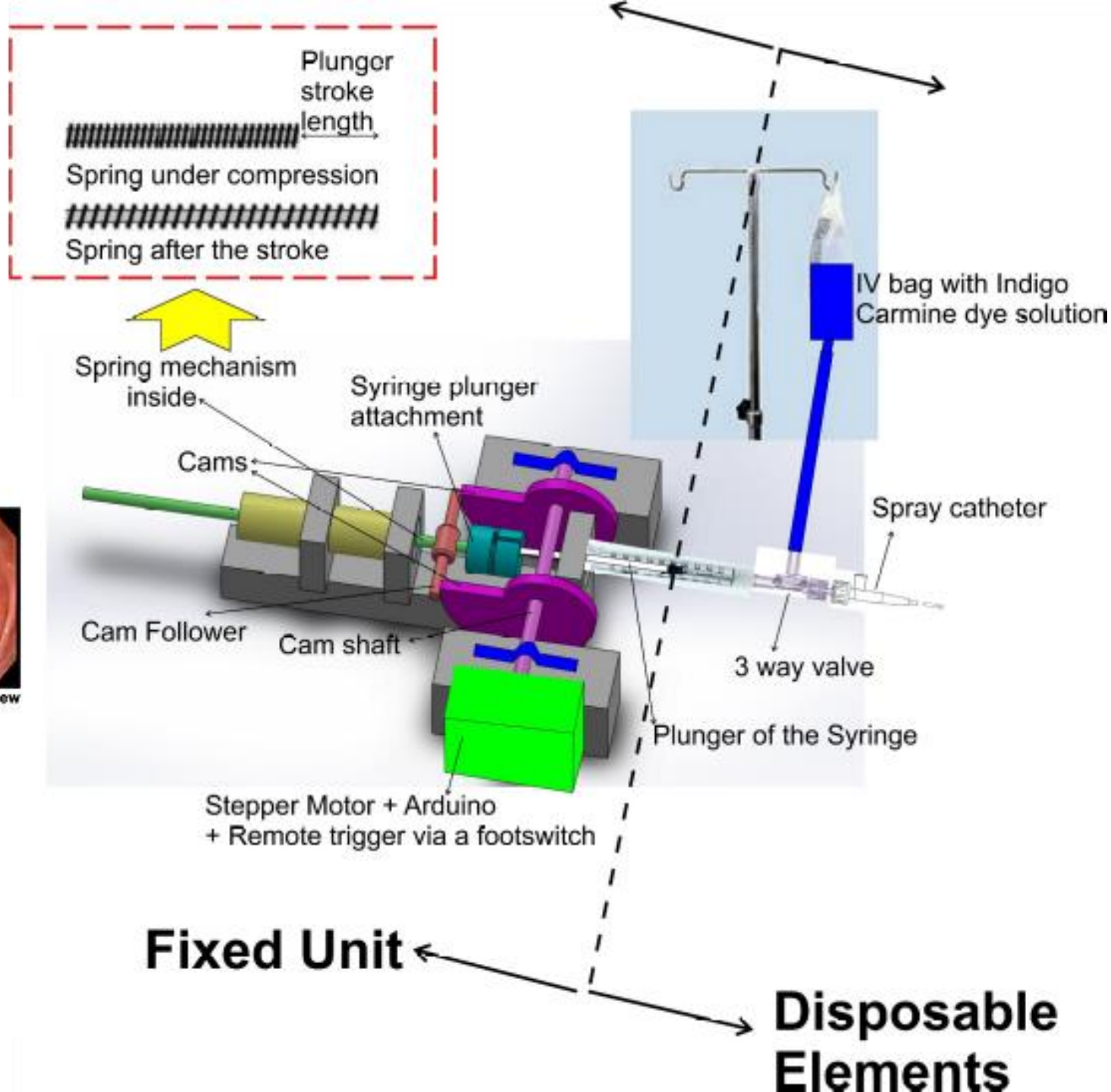
Dr Venkat Subramanian, Dr Richard Lord
Leeds Institute for Biomedical and Clinical Sciences, University of Leeds

CROHN'S & COLITIS UK

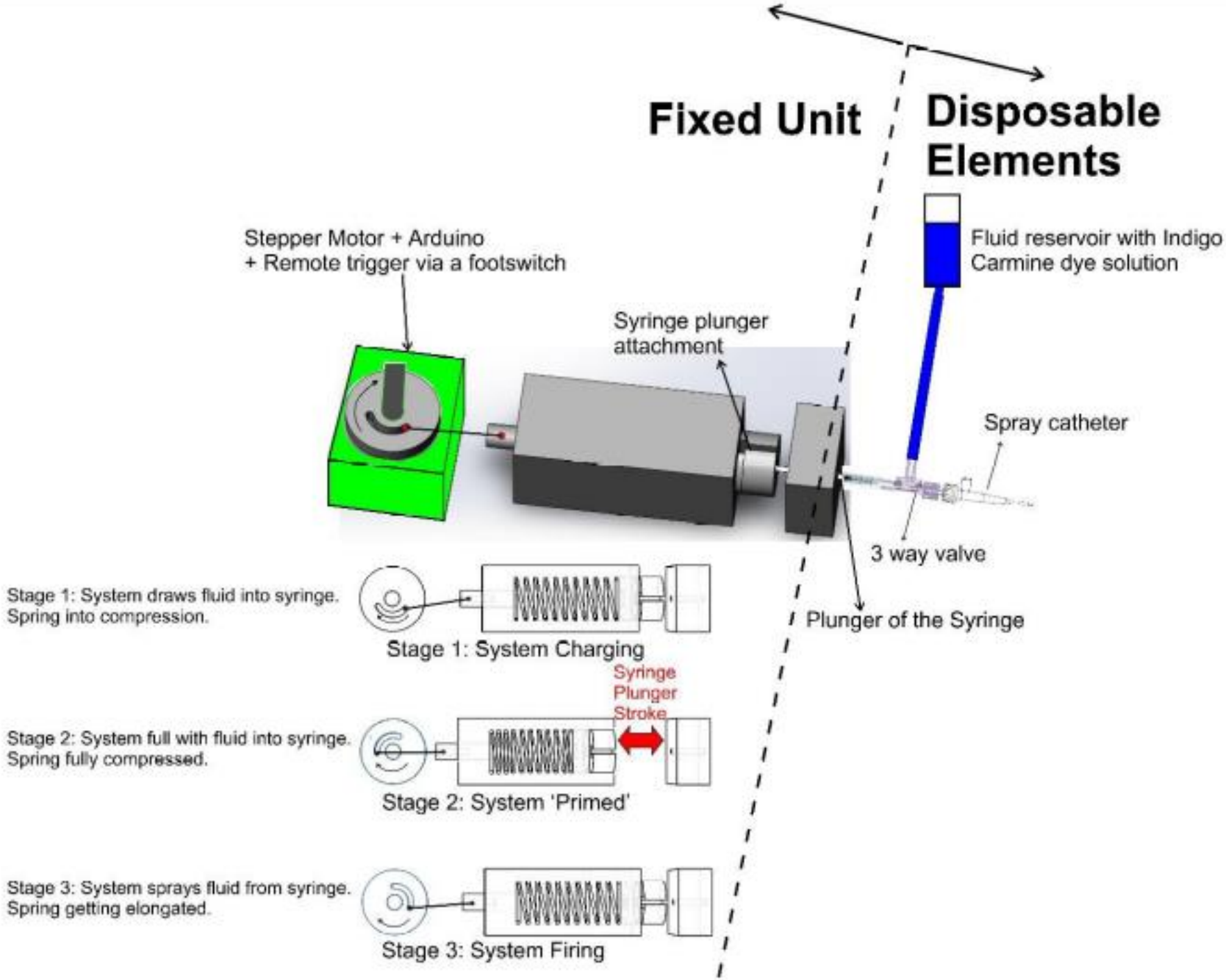
UNIVERSITY OF LEEDS

ChromoSpray v1

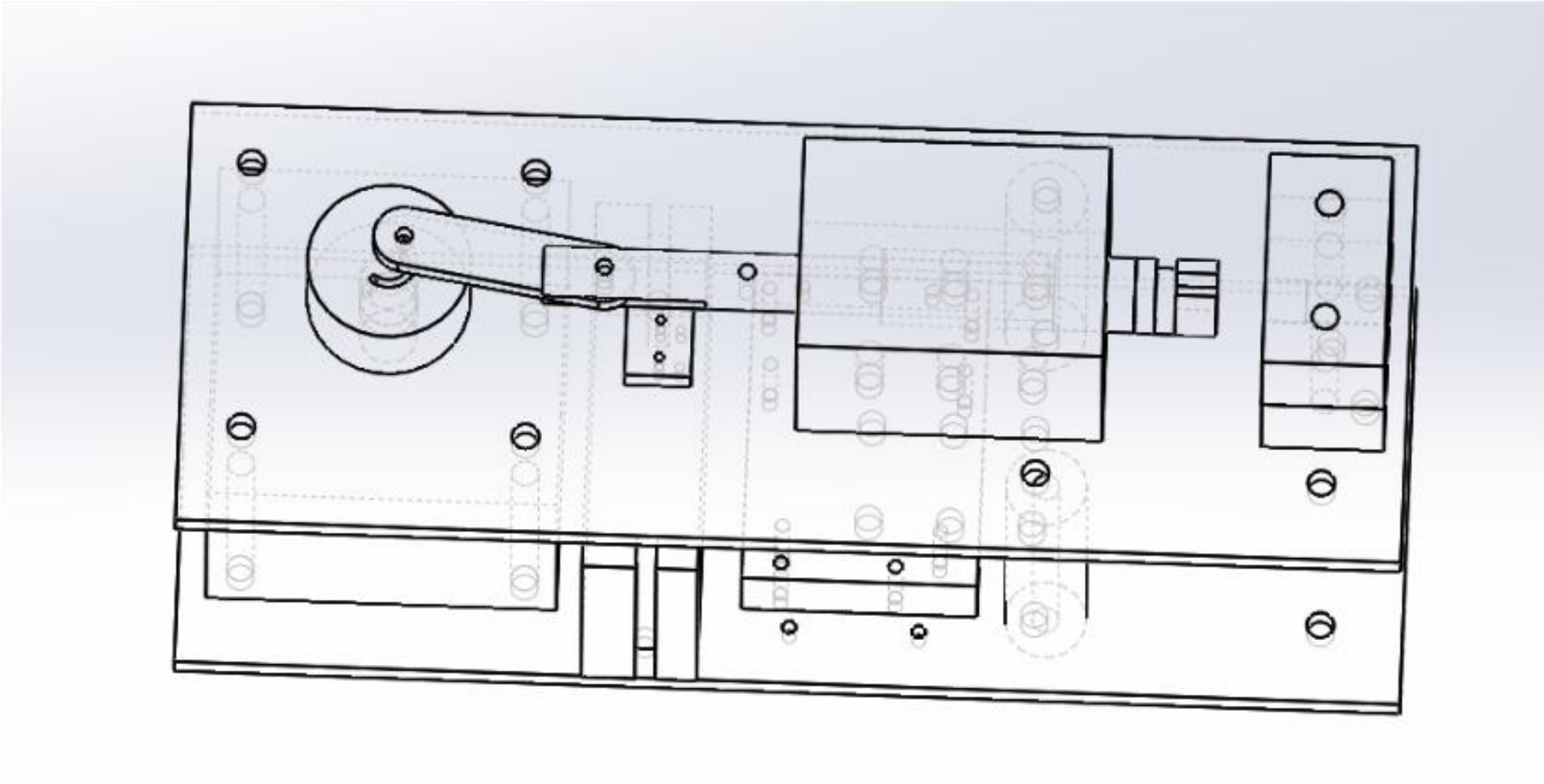




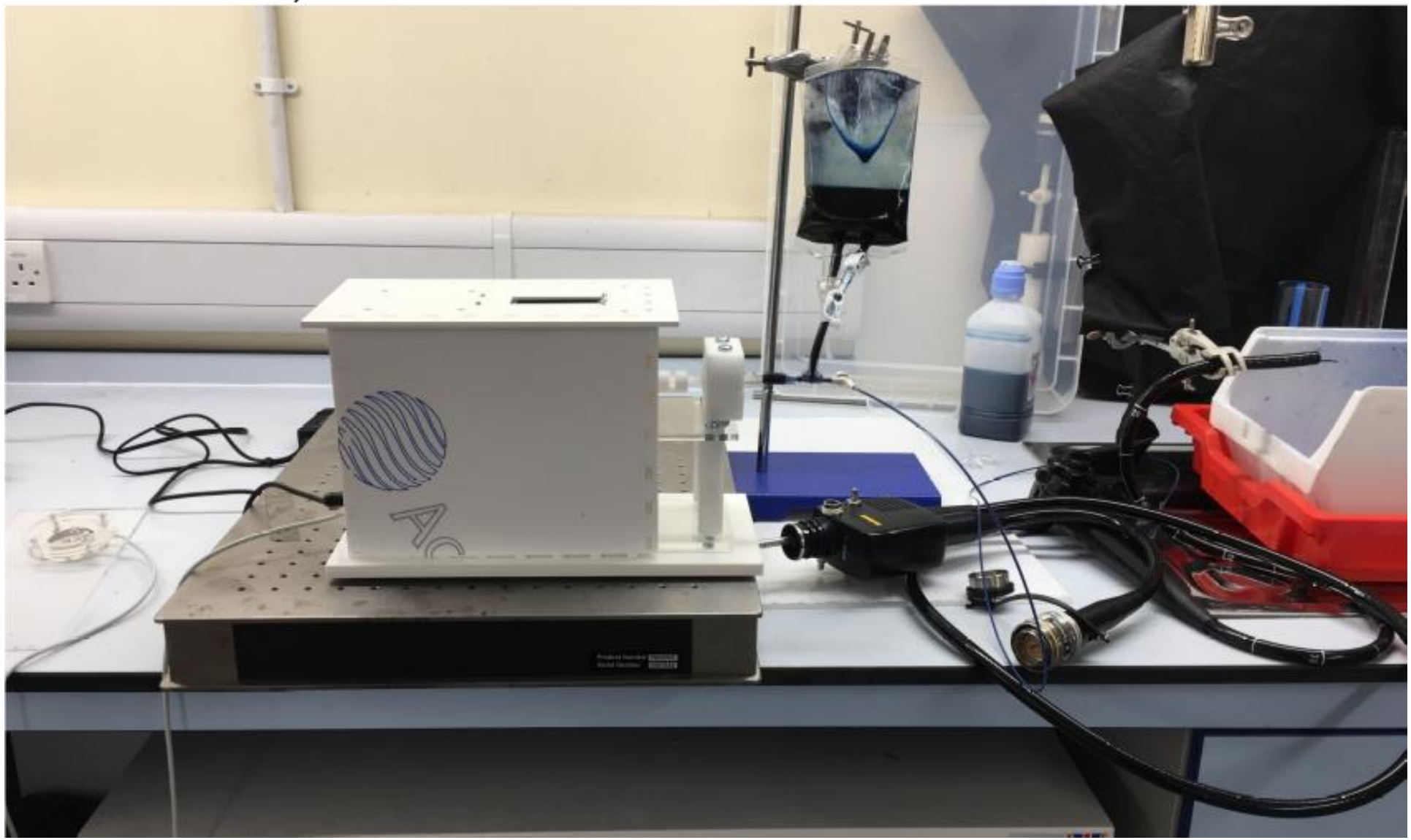
ChromoSpray v2

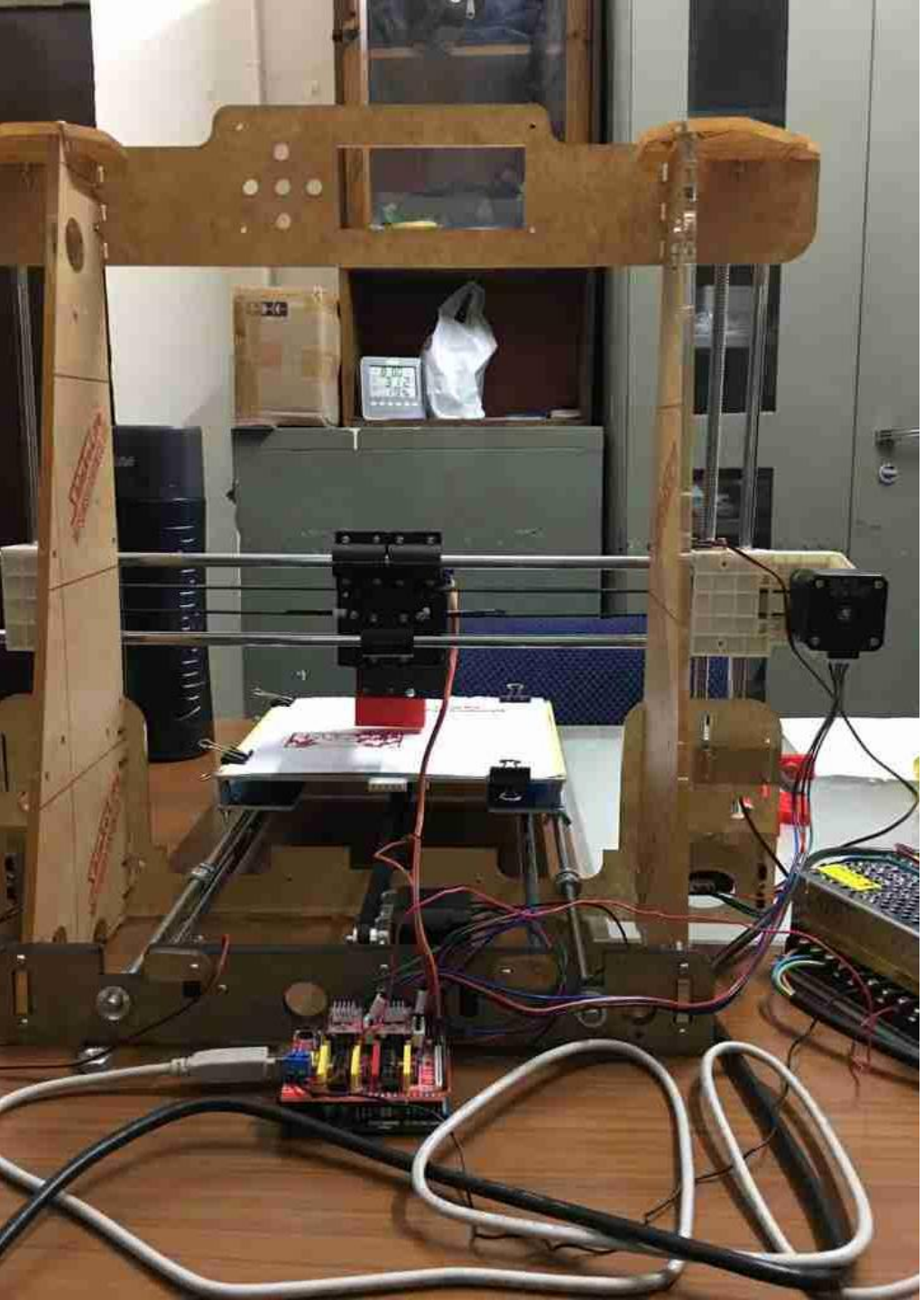


ChromoSpray v2 CAD model



ChromoSpray in Action (boxed and unboxed)



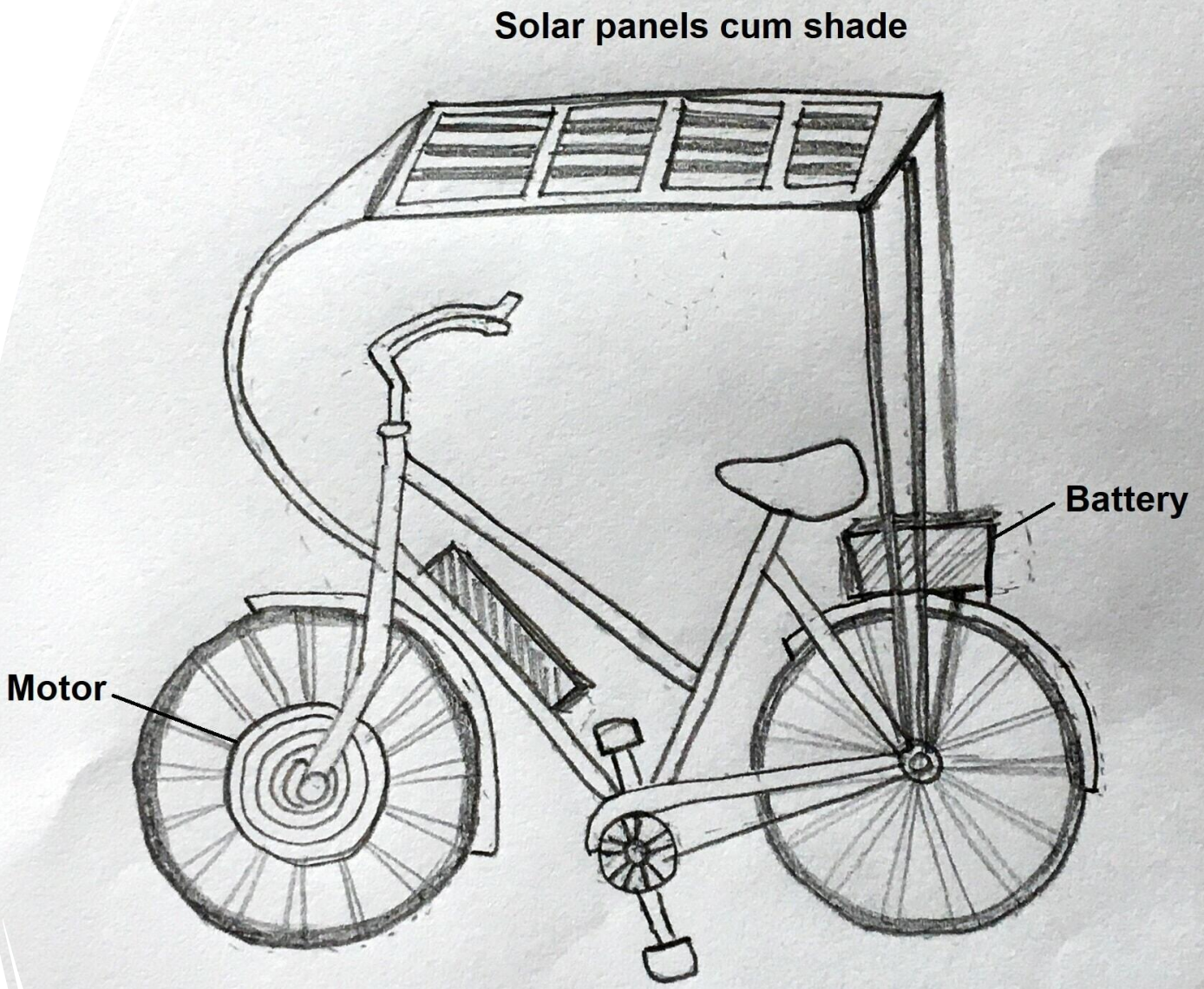


Design of a xy plotter

- Mechanical Design
- Machine Design
- Changed a 3D printer design to xy plotter
- xy direction motion control – basis for many CNC machines
- Pen lift mechanism with servo motor
- Timing belt and lead screw mechanisms

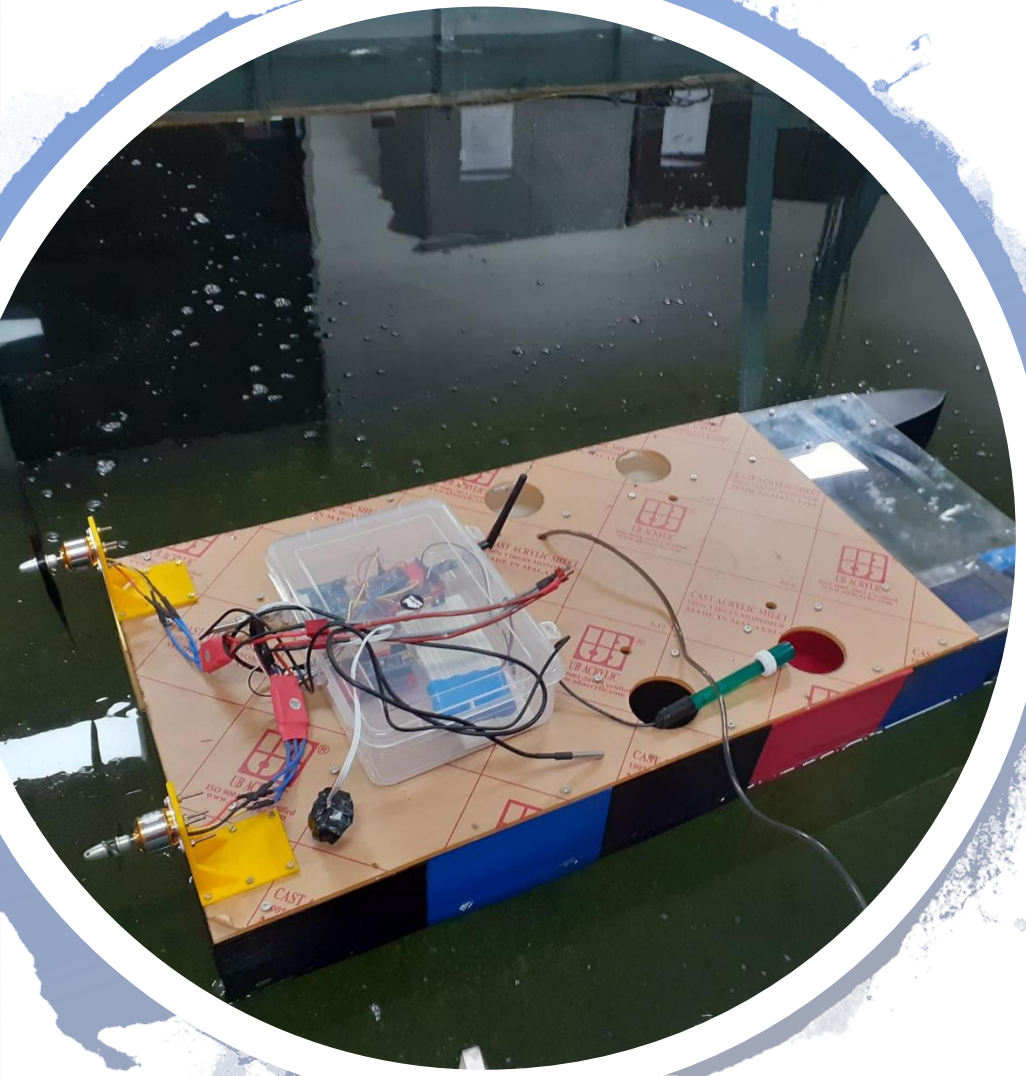
Electric bike controller

- Project proposal
- Final project
- Spiral development – 1st spiral (e-bike kit), 2nd spiral (arduino based individual components), 3rd spiral (arduino based integrated working), 4th spiral (PCB based components), 5th spiral (PCB based LED strip working), 6th spiral (PCB based motor working).



DSL 732 Autumn 2019 projects

- Icarus Lamp
- Interactive Musical Bench
- Mirror Clock
- Stair Climbing Robot
- Self-stabilizing Box

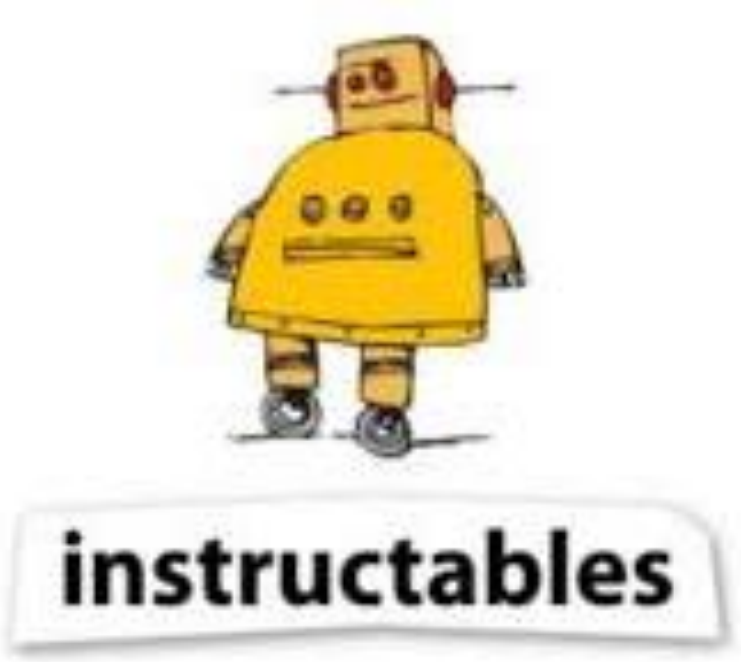


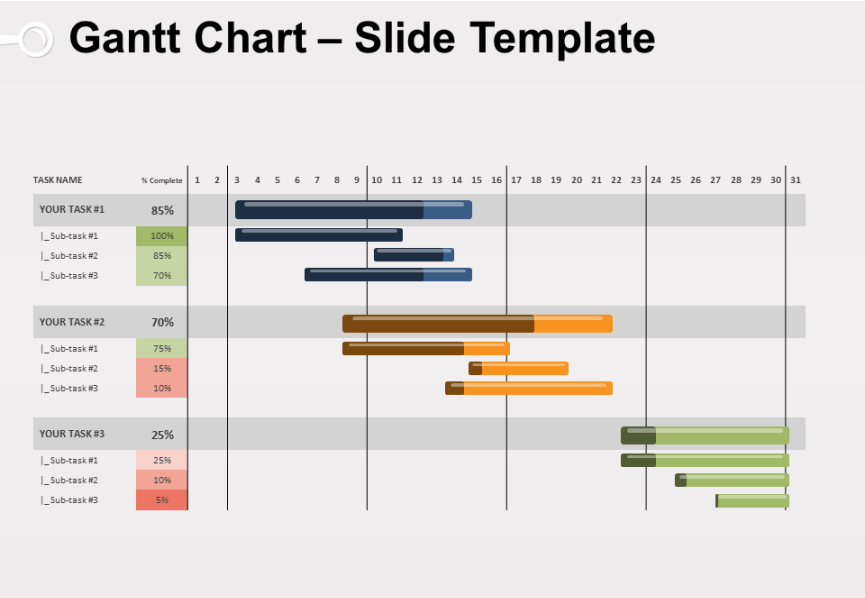
Project examples

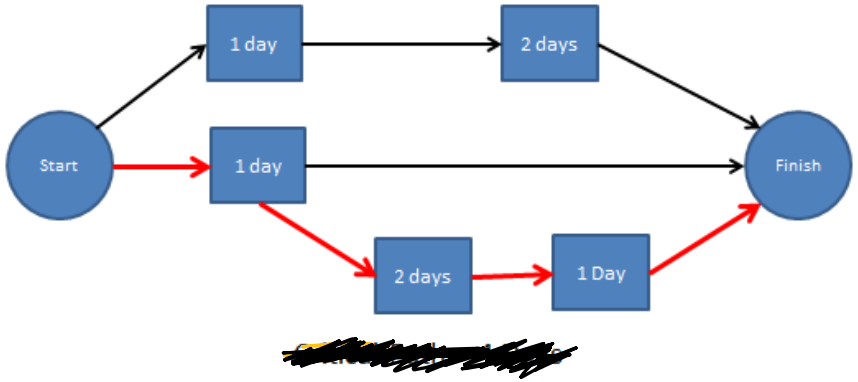
- Development of a semi-autonomous water quality monitoring and surveillance boat (Cdr Venkat Aditya, Lt Cdr Chetan Gowda)
- Fab Academy projects Karan Tanna
- Fab Final Projects 1 Fab Final Projects 5
- Fab machine making projects
- Projects on Instructables Smart Garbage Monitoring
- Projects from architects, engineers
- Projects from young and old.

Searching for projects

- Fab academy navigation Fab house, Boat, Weather station, other keywords?
- Press fit furniture Another attempt
- David Mellis (cell phone)
- Instructables (keywords = Arduino, bicycle, agriculture, etc.)
- http://techpedia.in/ (Search projects)
- Other DIY sites
- Flying Man







Critical Path Method

Project Management tips

- Fab Academy Notes Video (29:40-39:40)
- Triage
- Demand side vs. Supply side Time Mgmt.
- Serial vs parallel development
- Spiral Development
- Bottom up vs. Top down debugging, modularity
- Document as you work

Assignment 1: Project Proposal

- Sketch your final project idea(s)
- Describe what it will do and who will use it
- In this course, design phase would be short of a week. Focus on prototyping.
- Challenges foreseen, Components required, Skills used, Timeline
- Your project should use your CAD, additive/subtractive fabrication and electronics skills.
- Groups of two/three projects (individual mastery of skills and independently operable). Complete project – it should do something, Rigor.
- Evaluation criteria