



Harper Adams
University College

Mechatronics Teaching at Harper Adams University College and CLAAS Stiftung's Support

**David Clare
Senior Lecture -Mechatronics**



Introduction

- Harper Adams University College – Who are we?
- Mechatronics teaching prior to 2010
- CLAAS Stiftung's support
- Current status of Mechatronics Teaching

Harper Adams – who are we?



Harper Adams
University College

The leading provider of Land Based Higher Education in the UK

- Located in Shropshire
- Founded in 1901 by
Thomas Harper-Adams

Courses (degree level)

- Agriculture
- Engineering
- Rural Enterprise & Land Management
- Food Studies
- Veterinary Nursing



Harper Adams – who are we?



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Students

- ≈2400 Undergraduate students (full time equivalent)
- ≈700 on employer engagement (3rd year of 4-year courses)
- ≈130 post graduate students
- ≈2300 short course learners

Staff

- ≈470 Staff
- ≈110 Academic
- ≈120 Technicians
and academic
support staff



Harper Adams – who are we?



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University College

Facilities

- 16 ha campus
- 400 ha commercial farm
 - Pigs
 - Poultry
 - Dairy
 - Arable
- 500kW Anaerobic Digestion power generation unit
 - 50,000t Farm waste
 - 8000t Food waste



Harper Adams – who are we?



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Harper Adams – Engineering

Students

≈200 Undergraduate students (years 1, 2, 4 & 5)

≈60 on employer engagement (year 3)

Staff

- 18 Academic
- 7 Technicians and academic support staff

Courses

- 4 Courses

–Agricultural Engineering / AgEng with Marketing & Management
–Off Road Vehicle Design / ORVD with Marketing & Management



Harper Adams – Engineering



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Engineering Facilities

- Engineering design centre
 - 3 lecture rooms
 - 2 Tutorial rooms
 - >70 CAD workstations
- Workshops
 - Machinery teaching areas
 - Prototype build area
- Soil hall (0.3 ha indoor field)
- Machinery fleet
 - Agricultural machines
 - Construction equipment
 - Military Vehicles
- Off-road driving area



Harper Adams – Engineering



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Harper Adams Engineering Soil Hall



Mechatronics Teaching prior to 2010

Feedback from Industry

- The students have not got up to date mechatronics knowledge
- Teaching equipment is old
≈1970s / 1980s
- The facilities are too small for the increasing number of students
 - No dedicated Mechatronics teaching facility
 - Very small area in which students and staff can work

Actions - 2010



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Staff

- Additional Mechatronics lecturer
 - 20 years industrial experience in automotive control working for a large off road vehicle manufacturer

Teaching

- New subjects introduced in the 4th year modules
 - Controller Area Networks (CAN) / Human Machine Interface / Diagnostic Techniques / Safety Integrity Levels / Integrating Systems
- Updated student assignments
 - Greater relevance to modern control systems



Actions - 2010

Equipment

- Vector Canoe
 - CAN/J1939/ISOBUS analysis and development tool

- Locktronics teaching equipment
 - Basic electronics → control systems with CAN

Funding

- Approached CLAAS Stiftung for support



CLAAS Stiftung's support

Match funding for Equipment and Facilities

- Teaching equipment
- Fitting out of teaching facilities

Funds for additional Staff

- 2 additional staff for 3 years (50% funding)

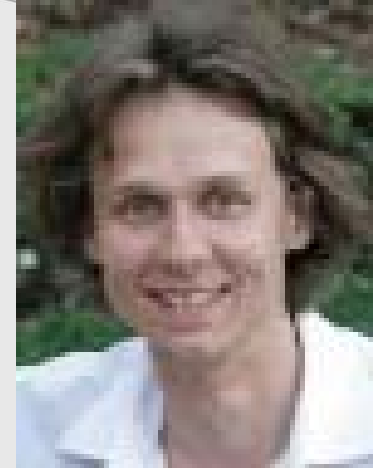


Current Status with Mechatronics Teaching

Staff

Dr Sven Peets

- Graduated from Estonian Agricultural University
 - BSc in 2000 / MSc in 2002
 - Agricultural Energy Engineering
- PhD in 2009 - Cranfield University
 - Thesis
 - “Specification, design and evaluation of an automated agrochemical traceability system”
- Started at Harper in September 2011

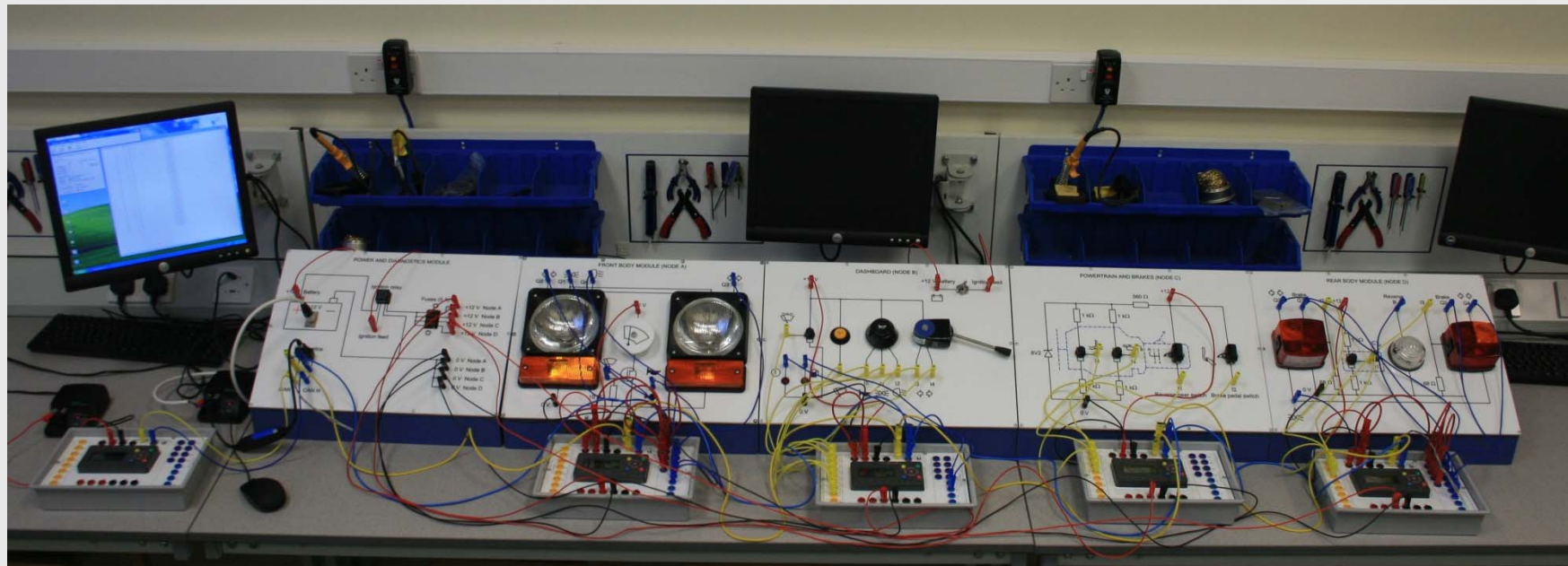




Current Status with Mechatronics Teaching

Teaching

- Introduction of 1st year electronics skill training
 - Circuit design and build
 - Use of test equipment
 - Controller Area Networks (CAN)

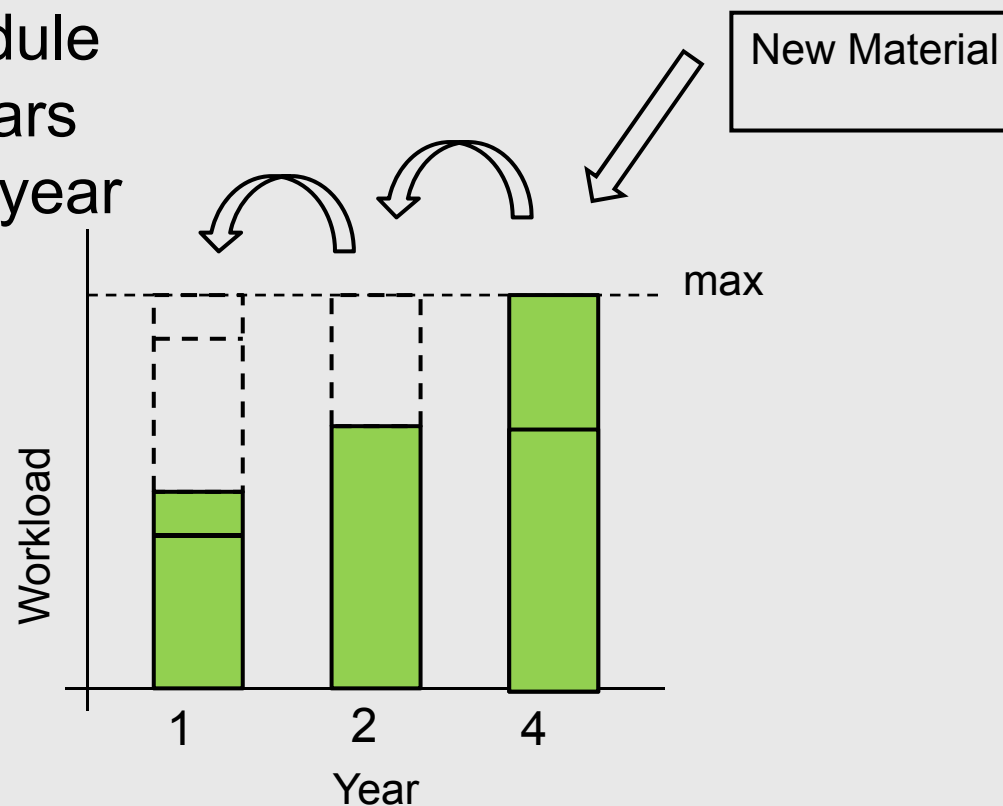




Current Status with Mechatronics Teaching

Teaching

- Bring forward subjects
- Additional 2nd year module
 - Load up 1st & 2nd years
 - New material for 4th year





Current Status with Mechatronics Teaching

Teaching

- Updated Assignments
 - 2nd year Instrumentation & Electronics
 - 4th year Robot Challenge
 - Greater student motivation
 - Apply what has been learnt



Current Status with Mechatronics Teaching



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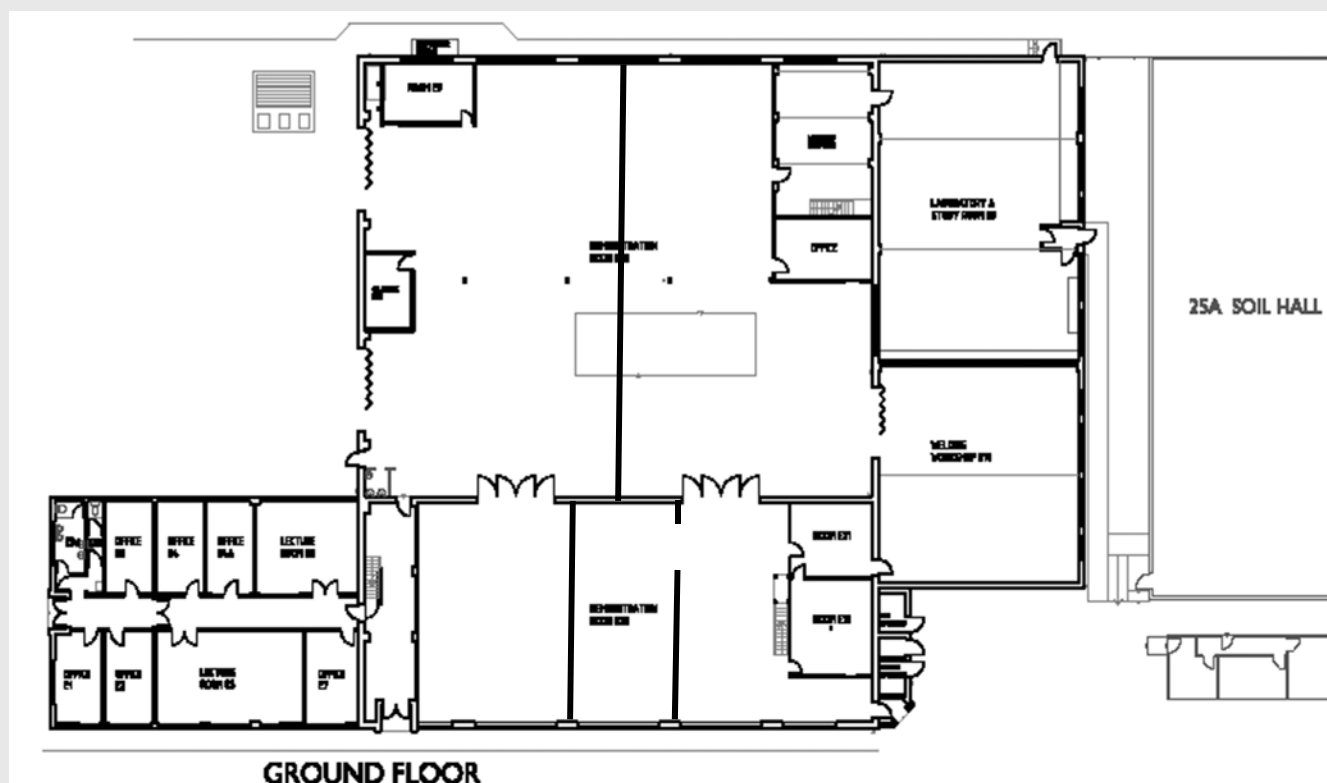




Current Status with Mechatronics Teaching

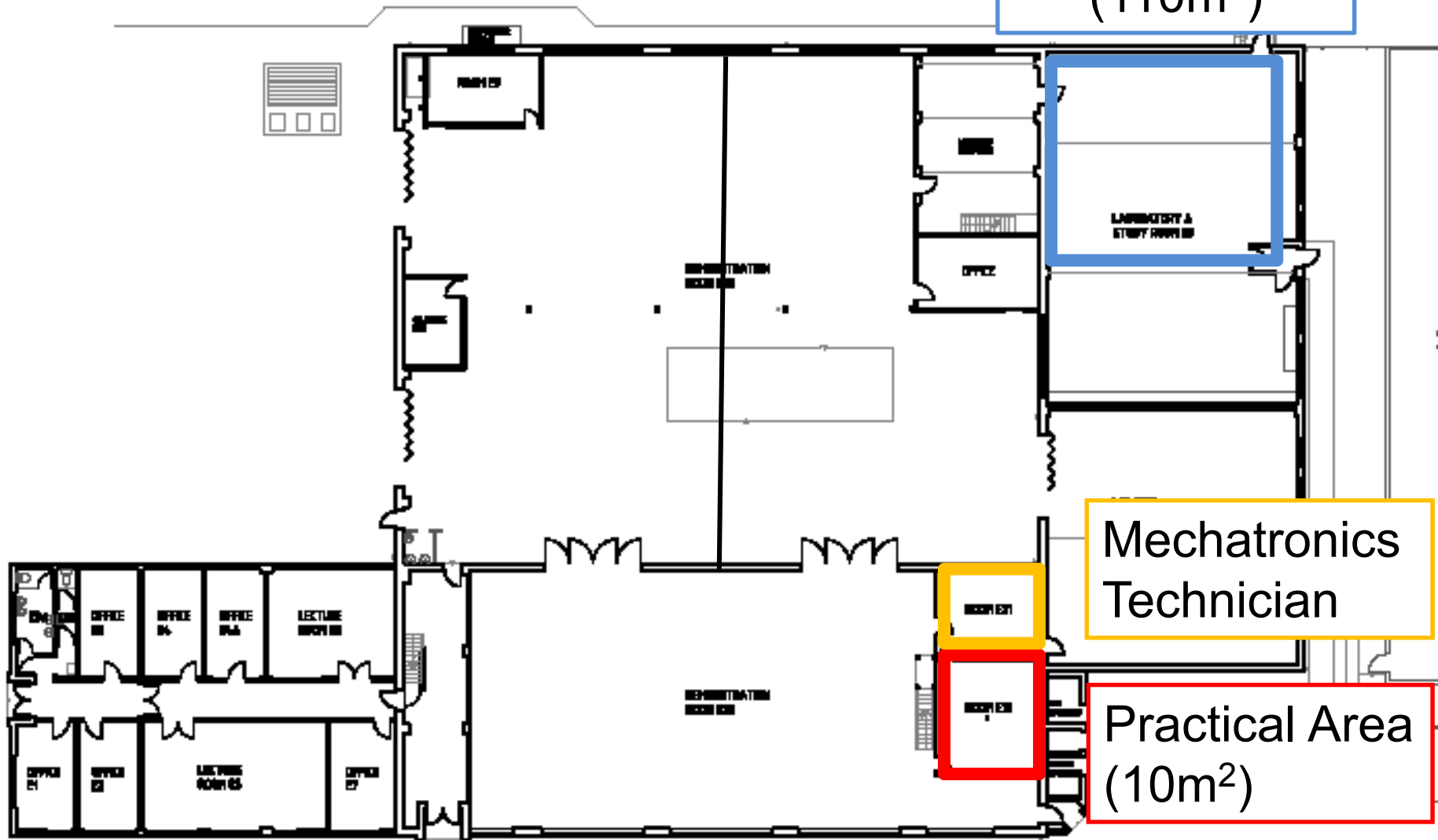
Facilities

- New Mechatronics Teaching Lab
- Additional Student Practical Area



Current Status with Mechatronics Teaching

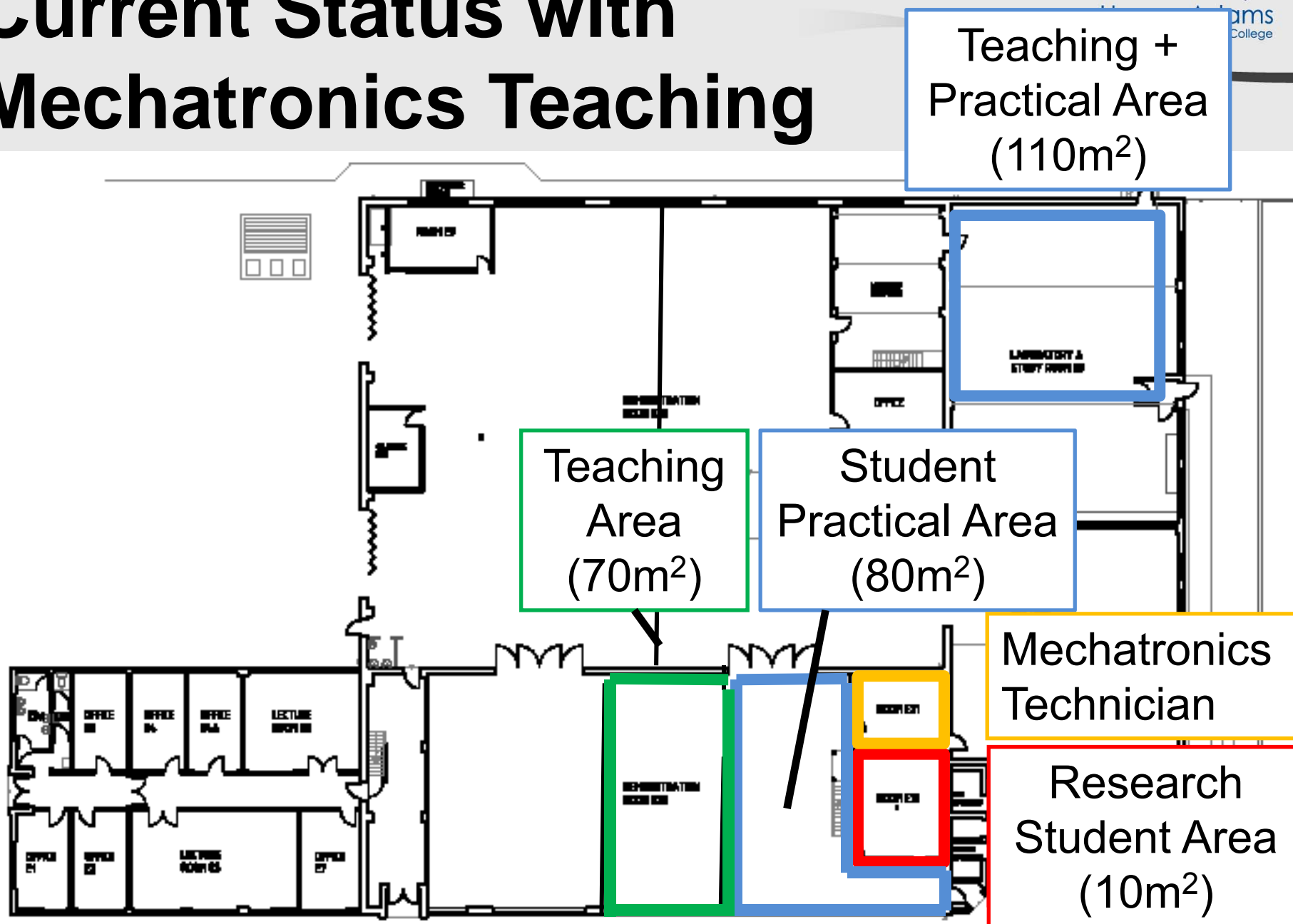
Teaching + Practical Area (110m²)



Mechatronics Technician

Practical Area (10m²)

Current Status with Mechatronics Teaching



Teaching + Practical Area (110m²)

Teaching Area (70m²)

Student Practical Area (80m²)

Mechatronics Technician

Research Student Area (10m²)

Current Status with Mechatronics Teaching



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Current Status with Mechatronics Teaching

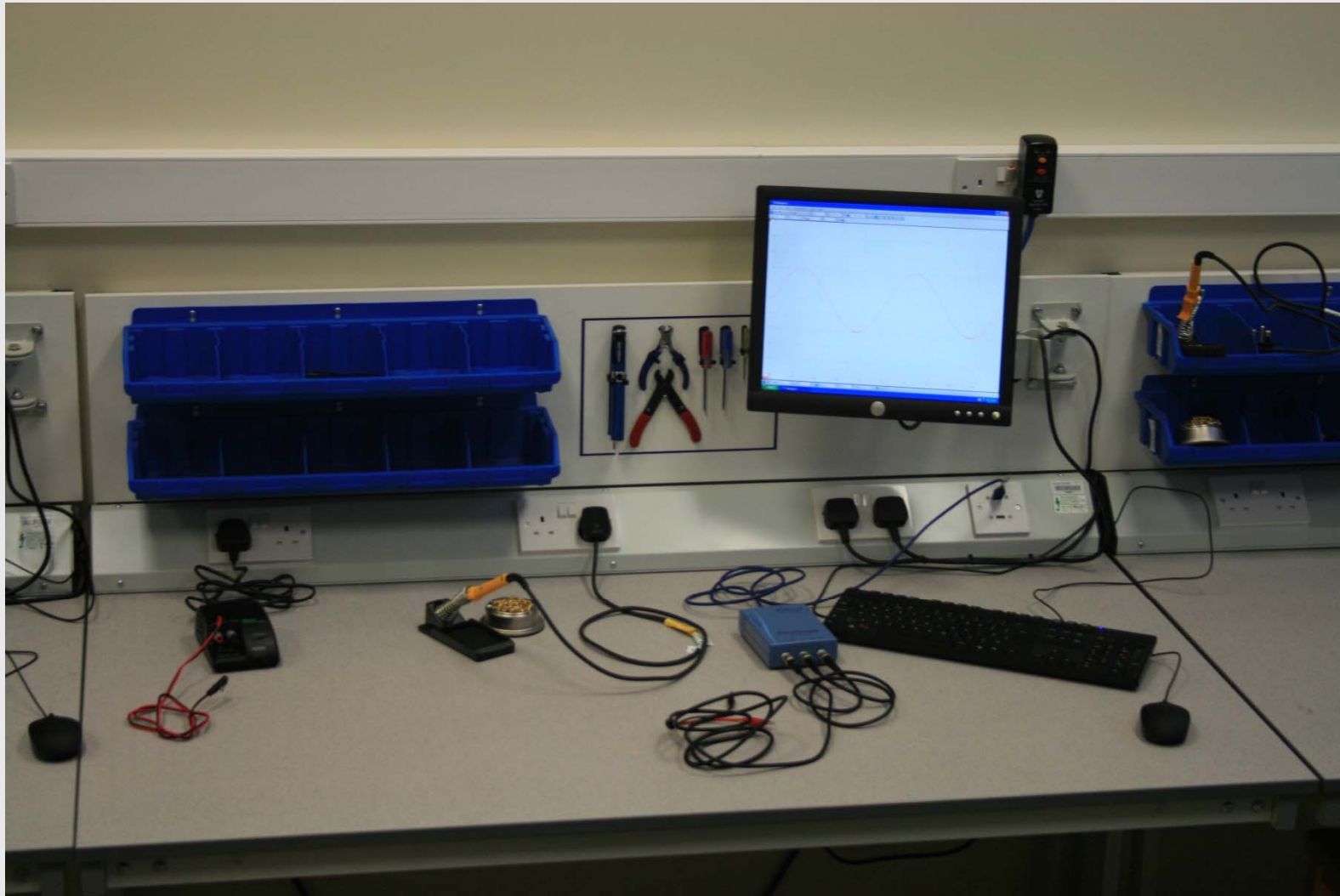
Equipment in the Teaching Area

- 15 student workbenches (+ lecturer's)
 - Computer + software
 - Electronic circuit design and simulation
 - Circuit board design
 - Microcontroller programming
 - Low voltage power supply
 - Oscilloscope & Signal Generator
 - Soldering equipment
 - Tools
 - Cables
- Hydraulics strip-down bench
 - Dedicated area for the Hydraulics Teaching Rig

Current Status with Mechatronics Teaching



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Current Status with Mechatronics Teaching

Other equipment

- Texa diagnostics tool
 - Agricultural machines
 - Car
 - Trucks
- WebTec data loggers and pressure transducers
 - Hydraulics diagnostics
 - General data logging





Current Status with Mechatronics Teaching

Work on going

- Fitting out of the student practical area
 - Work benches
 - Computers
 - Tools and test equipment

Teaching

- Continuously updating teaching
 - New technology
 - Monitor feedback from industry



Thank you
And
Any questions