

# Systems Modelling and Integration

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(Applied Formal Methods)

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# Background

- University of Leicester Graduate 2009
- MEng Electronics and Software Engineering
- Industrial Experience and Previous Projects
  - Embedded control of a helicopter trainer
  - TTE Systems – Core C libraries for embedded systems
  - Web interface to control embedded systems
  - IBM - Automated systems for software systems testing

# Systems Engineering Doctorate

- 4 year Doctorate (EngD) programme with the University of Leicester;
  - *Industrially focused PhD!*
  - *“a radical alternative to the traditional PhD, being better suited to the needs of industry, and providing a more vocationally oriented doctorate in engineering.”*
- (Series of) R&D projects motivated and driven by the industrial partner;

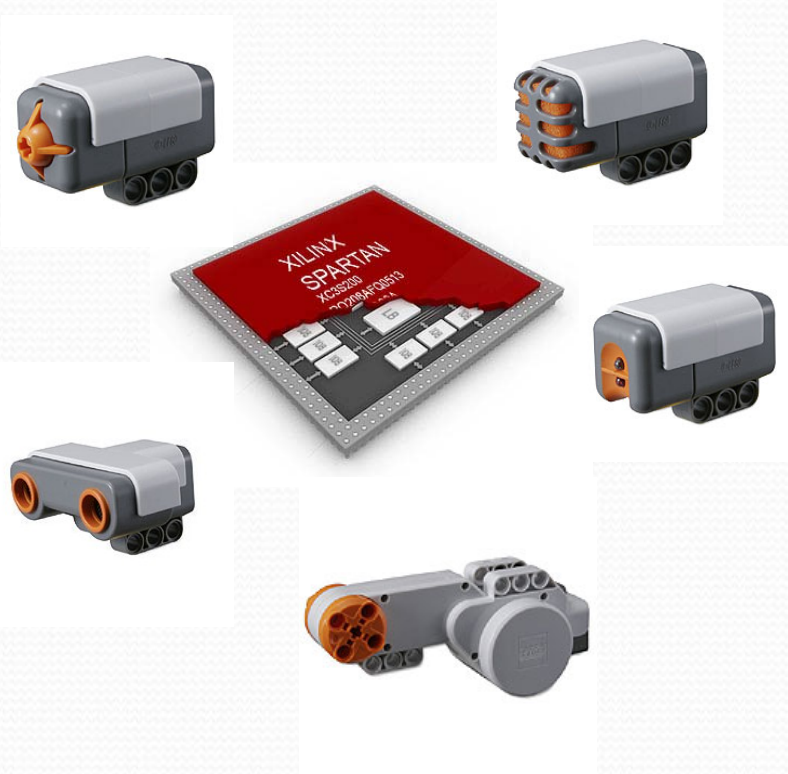
# Current project

- occam on Lego Mindstorm NXT



- Provide a platform for exercising previous CSP to occam/Handel-C approaches.
- Investigate *systems integration and verification* issues with embedded controller and peripherals.

# Current project



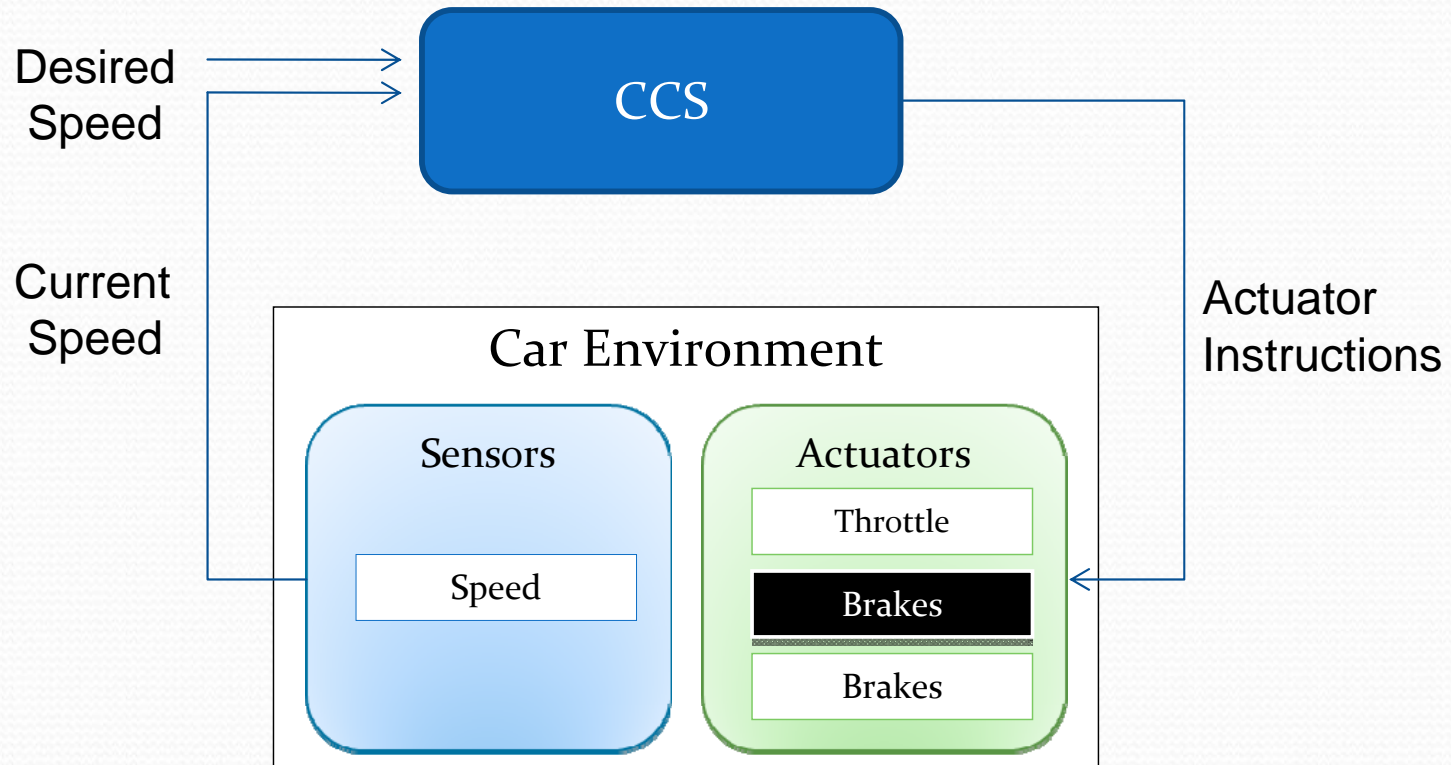
- Interface mindstorm sensors with an FPGA.
- Allow testing for tools translating to Handel-C-based systems.
- Useful and fun for teaching FPGA programming!

# Project directions

- Systems development, modelling, and integration:
  - Application of formal methods (CSP and Z) for complex (potentially closed-loop) systems incorporating software, hardware, and physical components.
  - Hardware faults are hard to predict!
  - Can modelling help detect problems that could occur in component integration?
- What about (potentially implicit) legacy requirements?

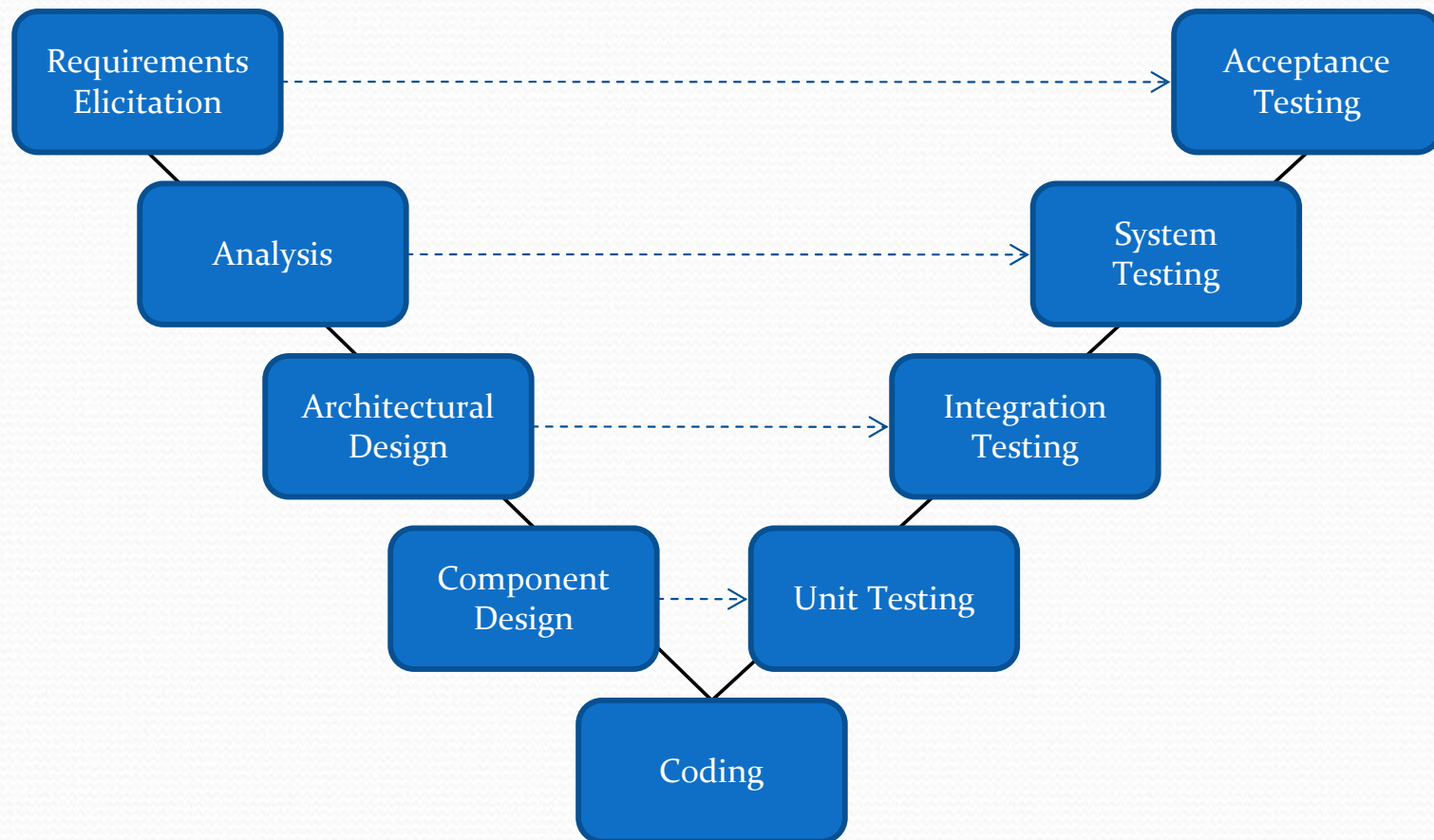
# Project directions

- Example: Cruise Control System



# Project directions

- Process review, resulting in product review





Questions / Suggestions / Feedback ?