

NoC DBT Mini-Project Initial Proposals

C.B.Price 20-12-23

General Points

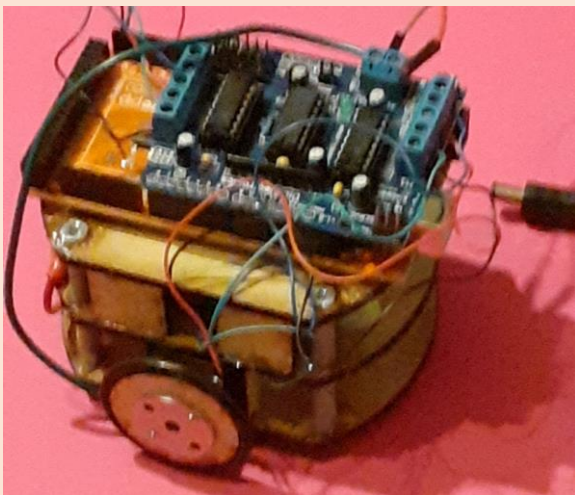
- Most projects will be graded for **investigation & planning** (80%) and there is a 20% **Learning Conversation**.
- You will be expected to work as teams (≥ 2 members) to share the workload.
- These 4 weeks are intended to be both useful and relaxing.
- All projects are closely linked to my research.
- For a top grade, you can hit the assessment matrix criteria, or I will allow you to disapply these and do something totally cool and original, perhaps at advanced masters' level.
- BUT, I expect you to be in class for all 4 weeks of this Unit.

Three Project Types

- Robot Vision using Albus (in house design) robot, Arduino-based.
- Some very cool electrical power production simulations.
- Natural Language – WeeBee Engine (maybe you saw this in your first year?)

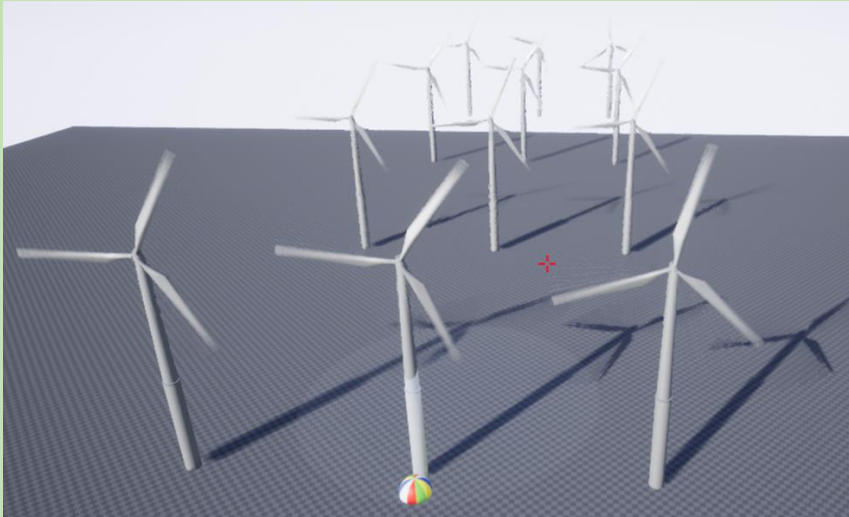
Albus stepper-motor robot

- Research question: How sophisticated can navigation approaches be coded?
- Equipped with 'HuskyLens' AI camera – can be taught objects, faces, QR-codes.
- Possible Projects
 - Navigation in fulfilment centre using QR codes.
 - Navigation on a road network recognizing road signs.
 - Navigation on an arena to recognize individuals and react to them. Like my cats.
- Medium amount of Arduino coding needed.
- Movement libraries are provided (including multi-tasking).



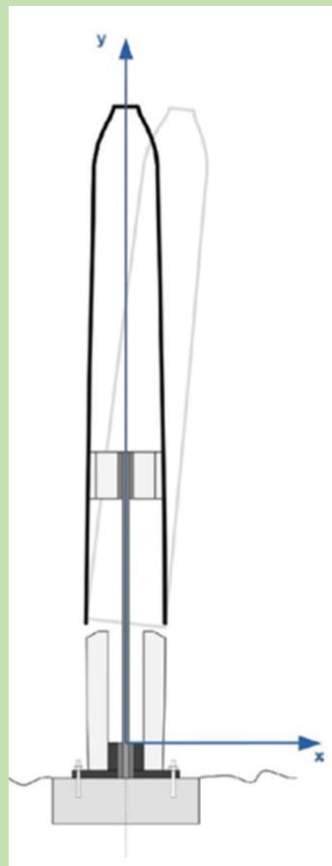
Wind Farms

- Research question: Where best to position N wind turbines in a given area, to gain optimal power production?
- Unreal Engine solution provided – only needs an input text file to define turbine locations.
- Parameters to vary in your investigations:
 - **Principal parameters:** the locations of the turbines.
 - Turbine parameters: blade radius, height above ground.
 - Wind parameters: user selected, simulation of real wind speed time-series.



Vortex Bladeless Wind Turbine

- Research question: How does a Vortex Bladeless compare with a classic 3-blade turbine? (Lots of hype for bladeless around)
- Unreal engine solution provided for both turbine types.
- Parameters to vary in your investigations:
 - Diameter and length of bladeless mast
 - Spring coefficient for bladeless mast
 - Power take-off device (think Maglev VEH)
- Can use steady wind-speed or simulated wind-speed time-series.



Power production from vehicle shock absorbers

- Research question: Is it feasible to harvest significant power from vehicle shock absorbers?
- Monster-truck revisited with electromagnetic power generators to replace the dampers.
- Parameters to vary in your investigations:
 - Details of the electromagnetic power take off device (think Maglev)
 - Vibrations induced by real road surfaces: potholes, resurfaced sections, ramps, speed bumps.



Tidal power production

- Research question: How does tidal power compare with wind, solar-PV or nuclear?
- Unreal engine solution for a rotor-based system.
- Parameters to vary in your investigation:
 - Rotor blade diameter
 - Rotor blade pitch angle
 - Length of containing cylinder (if used)
 - Water flow rate (varies with time since is tidal, and bi-directional)
 - Depth in sea (about 75% of power is contained within top 50% of sea depth)



Micro-Hydro power production

- Research question: How does micro-hydro work, and what could it power (rabbit hut, home, village, town)?
- Design is low-power suitable for rivers and streams where there are existing barriers (see 'Unlocking the River Severn' project).
- Unreal solution provided modelling the Voith 'StreamDiver' modular turbine.
 - Engineers at Voith have provided technical information.
 - Some information is confidential, so 'best guess' research models used.
- Parameters to vary in your investigation:
 - Location parameters: water flow rate and 'head' (water height drop)
 - Turbine parameters: drift tube length, generator parameters
- Could produce useful estimates of power available from hypothetical installations on the River Severn at Diglis, Bevere, Holt, Lincomb, Powick, Knightwick (river Teme).



VOITH

WeeBee Engine – Story-Writing-Coding

- Research tool to investigate whether Primary School children can code using Java.
 - They create stories through animated characters moving in a 2D world.
 - Assets are suitable for Primary.
- Project is to create new assets for a more mature audience (undergrads)
 - Assets include (i) backgrounds, (ii) scenery, (iii) actors, (iv) props.
 - jpg or png files easily incorporated into existing engine.
 - Assets created must be *cohesive* nothing must be out of place.
 - Could be totally out of this world, like 'Shen Yun'.
- Project will use new assets to create a short story (start, middle, end).

