**ECTE250 Deliverable 4 Breadboard Prototype**

The fourth deliverable of ECTE250 is a Breadboard-based Prototype and a Short Technical Report. Teams are required to use breadboard and electronic components to build, test and troubleshoot all analog/digital hardware and software components of the project. Prototype testing and building are assessed against the functional specifications of the proposed system. The breadboard prototype must demonstrate the key functionality, not the final assembly. However, all circuits must be integrated in a single functional circuit. Teams should demonstrate how the prototype reacts to inputs from user (local or remote via Internet) or from environment (sensors), changing state and eventually producing the necessary outputs (e.g. motors, LED, LCD, speaker, remote messages via Internet). The deadline to show the simulation to Mentor and Tutor is during the laboratory session in Spring-W4. Teams are encouraged to book an appointment to demonstrate their work earlier than that and then focus on other project deliverables. Teams must also submit a report file (MS Word document). The report must include a picture of the breadboard prototype, the schematics of all the circuits implemented, an example timing diagram which shows multiple (2 or 3) system cycles against which to test the state machine breadboard design. Length should not exceed 1000 words. About 500 words should be spend discussing your testing results with respect to the required system functionalities. The remaining 500 words (unless otherwise communicated) of your report should address Mentor’s feedback on Deliverable 3. All team members must attend and participate in the demonstration. The peer evaluation (PE) session must be completed by 8:00 pm, one day after the demonstration.

*Checklist and Marking Criteria*

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| --- | --- |
| **Element team needs to demonstrate** | **Checked** |
| State machine with state signaled by LED, input from buttons/sensors/Internet |  |
| Arduino with Network I/O and LCD display |  |
| Sensor circuits |  |
| 4-bit Analog to Digital Converter |  |
| State Machine Clock/Oscillator |  |
| 555 Time Circuit (with triangular waveform and Arduino reset) |  |
| Switches/Push button de-bouncing |  |
| Motor driving circuit (with H-bridge or Optocoupler) |  |
| Power supply circuit (with preliminary power analysis) |  |
| Example timing diagram and state chart to verify the system functionality |  |
| Size do not exceed one large breadboard plus Arduino small breadboard |  |
| Power supplied through +/- 15V only (except for Arduino subsystem) |  |
| Report files submitted |  |

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| --- | --- |
| **Marking Criteria on Deliverable 4 - Bread-boarding of the system** | **Score** |
| All elements of the checklist were satisfactory. The bread-boarded system appeared to  function as per the project brief for the state machines, and ALL modes were functioning as per example timing diagrams (which was definitely a good model for the  provided project brief) and also seem to be functioning in a logical manner given the defined inputs and outputs of the system AND team was able to demonstrate ALL  possible scenarios OR show that their system would cover (recover from) ALL possible fault states that may arise due to faulty external switches and sensors where it was physically practical to demonstrate this using the laboratory test equipment. The layout  and wiring of the breadboard prototype is neat and tidy (e.g. efficient use of breadboard | **5** |

|  |  |
| --- | --- |
| terminal strip, no flying wires, consistent color coding of wires). |  |
| All elements of the checklist were satisfactory. The breadboard appeared to function as  per the project brief for the state machines, and most modes were functioning as per example timing diagrams and also seem to be functioning in a logical manner given the  defined inputs and outputs of the system, no obvious glitches or circuit malfunction or noise seen on measurement devices (Oscilloscope). | **4** |
| All elements of the checklist were satisfactory, most functions of the bread-boarded  circuit were shown to be working, but not all. There were discrepancies between the example timing diagram and the operation of the bread-boarded system, or there were  obvious glitches (eg due to no use of decoupling capacitors? Or due to de-bouncing  circuits not working?). Or it was clear that the provided timing diagram did not implement a system which was requested by the original brief. | **3** |
| All elements of the checklist were satisfactory, bread-boarded circuit could be powered  up and some functionality was able to be shown to the demonstrator, but clearly many functions still not implemented in breadboard prototype. | **2** |
| Comment and reflection and photo files present, but team cannot show any significant  progress on getting any part of the bread-boarded circuit to function. Many sections of the checklist for deliverable 4 were incomplete or absent. | **1** |
| No student in team turns up to show bread-boarded circuit for Deliverable 4 – if here  whole team needs to see Coordinator but subject outline specifies receive a mark of ‘0’ | **0** |

**Complexity Factor**: the complexity factor will award 1 extra marks if the complexity is 4 (or above)

and the team score at least 4 (or above).

Name of Student(s) in team who were present at the Deliverable 4 demonstration: