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Abstract—This manual shows how boolean logic and digital design can be introduced to beginners through a hands on approach.

1 REQUIREMENTS

- 1) The course is of 1 credit and the hands on module should be completed in 15 hours.
- 2) Ideally, there should be no more than 40 students in the class.
- 3) Each student should have access to a Linux computer and the TLC Arduino kit.
- 4) The hands on sessions should span over 5 days, with a 3 hour session every day.
- 5) At least 4 Teaching Assistants (TAs) are required. These can be senior UG students or PG students.

2 HANDS ON SESSIONS

Hands on sessions are conducted through the following manuals.

- 1) [1] introduces the concept of hardware and software. This is done by using an arduino to drive a seven segment display to obtain a decade counter.
- 2) [2] introduces the binary number system, truth tables, boolean logic and sequential logic by designing a decade counter.

- 3) [3] explains Karnaugh maps and the finite state machine. The Karnaugh map is explained through the truth tables in [2] and the decade counter in [2] is used for introducing the state machine.

3 TUTORIALS AND EXAMS

- 1) [4] is a collection of problems in Boolean logic from past GATE papers which is shared with the students. In the tutorial session, students are asked to solve the problems in [4] in groups and the instructor and TAs help clear any doubts. The tutorial session is for 3 hours.
- 2) In the exams, each student is given a different problem in [4]. The student has to solve the problem on paper and verify her result by programming the logic on the arduino.
- 3) At least 3 such exams are conducted to assess the student's learning.

REFERENCES

- [1] G. V. V. Sharma. Arduino for school. [Online]. Available: http://tlc.iith.ac.in/img/gvv_a4s.pdf
- [2] ——. Digital design through arduino. [Online]. Available: http://tlc.iith.ac.in/img/gvv_afe.pdf
- [3] ——. Karnaugh map and finite state machine. [Online]. Available: http://tlc.iith.ac.in/img/gvv_kmap_fsm.pdf
- [4] ——. Gate exercises on boolean logic. [Online]. Available: http://tlc.iith.ac.in/img/gvv_dipak_gate_ee1110.pdf

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