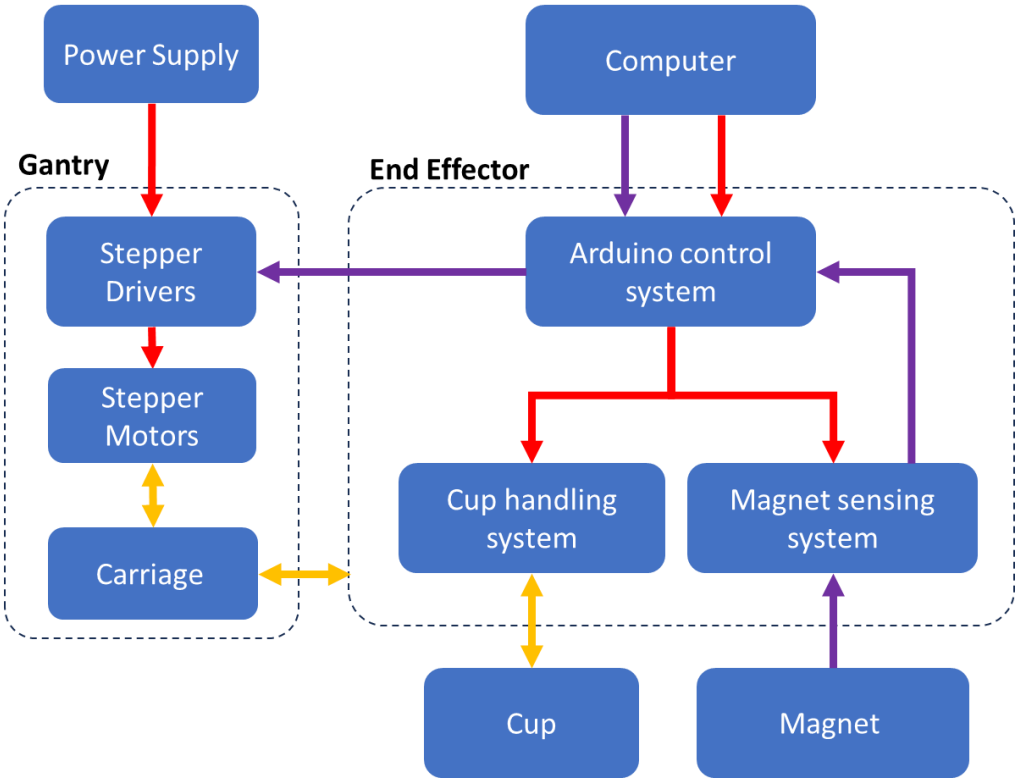
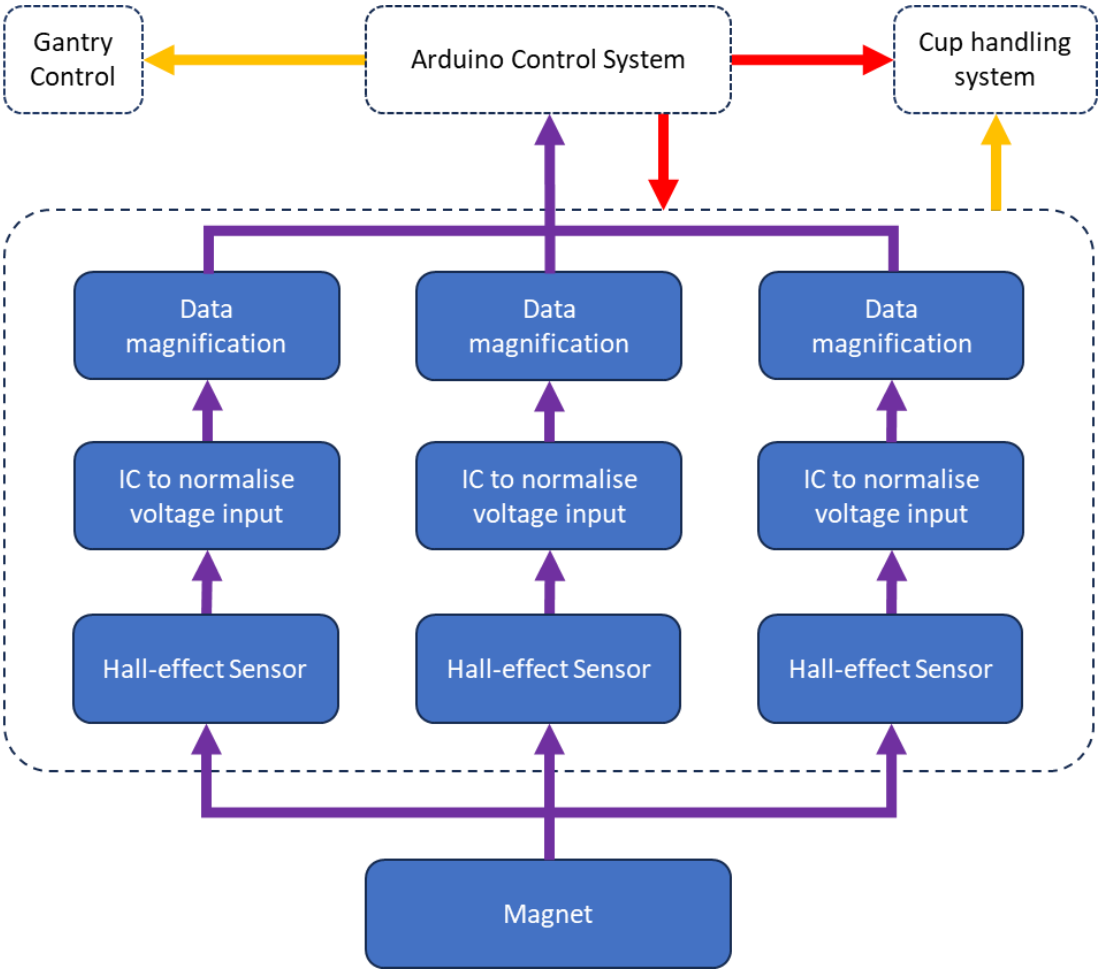
System Architecture

Key:
- Mechanical
- Power
- Data



Magnet Sensing Sub-System Architecture

Circuit



Design Specification

No.	D/W	Requirements	Evaluation Method	Responsible	Changes
1.		**Overall System**			
1.1	D	Cups shall be autonomously retrieved from an initial location without loading manually.	Visual Inspection	TT	
1.2	D	System shall use a hall-effect sensor and shall not use more than 3.	Circuit analysis	AEM	
1.3	D	The control system shall be implemented using an Arduino.	Circuit analysis	AEM	
1.4	D	The software shall be coded using MATLAB.	Software check	TT	
1.5	D	The cup handling and magnet sensing systems shall move on a 2-axis gantry.	Visual	TT	
1.6	D	Placed cups shall completely encompass the magnet.	Physical test and visual inspection	JG	
1.7	W	The system shall scan at a minimum rate of 3500mm^2/s.	Timing with a stopwatch	TT	
1.8	W	The cups shall be raised above the silicone floor in transportation.	Visual	JG	
1.9	W	The total time of operation shall be less than 120s.	Time with a stopwatch	TT	
1.10	D	The end effector shall not apply excess moments or forces on the carriage.	Calculation/ Testing	JG	
1.11	W	The end effector shall be simple to assemble and mount to the gantry.	Design evaluation/test assembly	JG	
1.12	D	A functioning protype shall be created by 08/12	Visual/ physical testing	All	

NO.	D/W	REQUIREMENTS	EVALUATION METHOD	RESPONSIBLE	CHANGES
4.		**Magnet Sensing System & Electronics Integration**			
4.1	D	The system shall magnify hall-effect sensor inputs.	Circuit analysis	AEM	
4.2	D	Wiring motors for appropriate power and control in the cup handling system.	Visual Inspection	AEM	
4.3	W	The system shall use op-amps.	Circuit analysis	AEM	
4.4	D	The system shall normalise hall-effect sensor inputs.	Circuit analysis	AEM	
4.5	D	The sensing system and the handling system shall be powered with a 5V input.	Visual check + circuit analysis	AEM	
4.6	W	The integrated circuit shall use diodes to prevent negative values.	Circuit analysis	AEM	
4.7	D	The gantry will be powered via the mains.	Visual Inspection	AEM	
4.8	D	The sensing system shall have equal circuitry for all 3 hall-effect sensors.	Circuit analysis	AEM	