



## Jobsite Mixer with Quality Control System

### Problem Statement

Mixing concrete using typical mixer requires manual water insertion which is a problem if the amount of water higher or lower than the optimum amount.

### Constraints

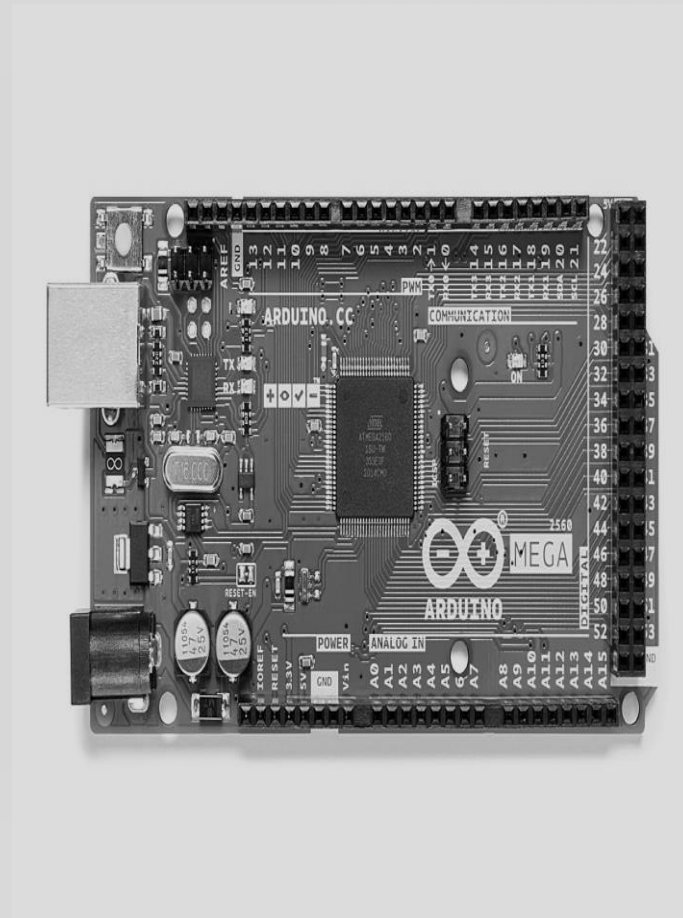
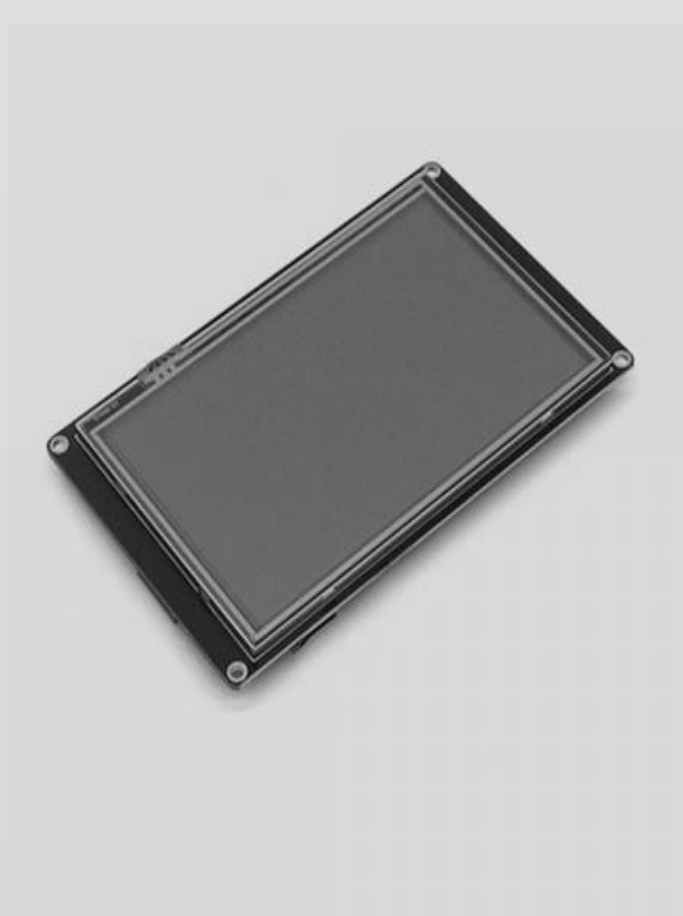
The mixer volume. Admixtures are not included in the calculations. Calculation provided for  $2400\text{kg/m}^3$  concrete.

### Target Specifications

- Provide job-site concrete mixer with 150 L capacity
- Provide water pump with flow rate of 6 L/min
- Achieve (+, -) 5% strength of concrete mixed using the prototype with respect to concrete mixed using typical mixer

### Validation

The user first selects the volume of concrete he wants from the HMI. To do this, HMI is needed to make the selection and to display the weight of ingredients and Arduino Mega is needed to perform the calculations and send the results to the HMI to be displayed. Moreover, the HMI will send a command to the Arduino Mega to send a signal to the water pump to start pumping the needed amount of water based on the result of the calculations found. Have the user inserted the displayed weights of cement, fine aggregate and course aggregate and commanded the HMI to start pumping the needed amount of water, the concrete produced can be said to in a good quality.



The mix proportioning follows the American Concrete institute specifically ACI 318-14. The testing of concrete samples follows the American Society for Testing and Materials (ASTM).

### Safety

The voltage revised by the HMI must not exceed the required voltage needed otherwise it will be damaged and burned. The water pump wires must not contact with water otherwise electric petition might occur. While mixing, no fall off concrete shall hit the pump and the HMI.

### Team Members

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The prototype must deliver its desired functionality by programing it to produce a concrete based on ACI 318-14 standards. The mix proportioning shall be based on the scientifically accepted method, which is the weight method. These ethical considerations must adhere to NSPE engineering code of ethics more specifically Professional Obligations section.