

Concrete Slump Quality and Volume Calculator using Raspberry PI - 5

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Abstract: Testing of concrete quality is very important in all construction projects for its strength, durability, and safety. In all construction projects, the concrete slump test is used most commonly for measuring the workability and consistency of fresh concrete. This concrete slump test is done manually by an engineer or worker; it takes much time, and accuracy depends on the skill level of the engineer or worker. By doing this test manually, there is no proper accuracy or consistency. In this paper, we have proposed an automated Concrete Slump Quality & Volume Calculator, which is based on Raspberry Pi 5 along with another network of sensors. This machine will have a DHT-11 sensor through which various environmental factors are being monitored, i.e., temperature and humidity are some factors that are responsible for concrete behaviour. A rotation sensor is used for measuring the slump displacement. The pressure gauge is used for measuring the force on concrete. Further to that, wireless communication is done through the ESP-32 module, by which data can be accessed from anywhere by smartphone or computer. The reading of various sensors is collected and then it is sent to the Raspberry Pi for further processing. And by using an appropriate algorithm, the value of slump is calculated, and the estimated volume of concrete is also calculated by this system. The whole system is portable and cost cost-effective, and easy to use for quality concrete onsite checking. Our experimental work shows that the system developed by us will accurately check the quality of concrete slump with an error of ± 5 as compared to manual methods of checking slump. By minimizing the role of humans, accuracy is increased, and results are obtained instantly as compared to manual methods. This system is better than traditional methods and helps to modernize the construction..

Keywords: Raspberry Pi 5, DHT-11 Sensor, Pressure Gauge, Rotation Sensor, ESP-32 Module, Concrete Slump Measurement, Concrete Volume Calculation, Environmental Monitoring, Wireless Communication, Real Time Data Processing, Portable Construction Device, 3.7V 5000mAH Battery, Sensor-Based Concrete Testing

