DESIGN AND FABRICATION OF COIN OPERATED PORTABLE WATER VENDING MACHINE

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COLLEGE : ATME COLLEGE OF ENGINEERING, MYSURU
BRANCH : DEPARTMENT OF MECHANICAL ENGINEERING
GUIDE : PROF. RAKSHITH N.
STUDENTS : MR. D.V. RAAGU
MR. GAYAZ MOHAMED
MR. MD MOHIYUDDIND SHARIFF
MR. MOHAMMED YASEEN AHAMED

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Introduction:

The necessity for drinking water may arise irrespective of place. It is highly important to quench the thirst and can become number one priority before any other work. Our project aims on satisfying the public with its need for drinking water at any random place like bus stops, shopping centres or even street side by designing and fabricating a “Portable Water Vending Machine”.

Our further implications apart from reducing the size includes a massive reduction in capital investment of the machine in comparison with the Water Vending Machines installed by Indian Railway and Tourism Corporation at nine different locations across the country.

The machine is a result of integration of Mechanical and Electronic concepts to bring about a compact product. It would occupy space not more than 2x2ft. on the ground. It provides portable water at equal costs to that of the Water Vending Machines of the Indian Railway and Tourism Corporation. Also, the capital costs will be reduced 20x times in comparison to the prior.

Objectives:

1. To provide purified drinking water.
2. To provide portable water at economical cost.
3. To develop modelling and simulation.
4. To design and fabricate a portable machine using simple techniques.
5. To adopt simple design mechanism that can be easily maintained.
6. To make use of existing pre-purified water bottles (20lts can) as refills for vending machine.
7. To encourage local Entrepreneurs.
8. To extend drinking water facility for common public.
Methodology:

1. Understanding the need for the machine:
   - The present condition of water availability is scarce. So, it is important to use it in required amount only.
   - The quantity of plastic wasted in packing drinking water is very high, i.e. 50 billion bottles per year in U.S alone. Among that only 10% gets recycled. So, when 20lts bottles are widely used, usage of small plastic bottles is reduced

2. Defining the Problem:
   - The existing Water Vending Machine is an expensive machine that costs 2.5-3 lakhs.
   - The IRTC Water Vending Machine Occupies a large space of about 6x6x8ft.
In order to reduce cost of Pre purified drinking water and make it available at all places an problem is stated as to design and fabricate coin operated portable water vending machine.

3. Work Carried Out:
   • Designing of the product is carried out in CatiaV5.

   • The electronic components used are –
     A. Coin Acceptor (DG600F)
     B. Development Board: 89V51RD2 Flasher Board
     C. Microcontroller – Nuvoton W78E052DDG
     D. Direct Operated Water Solenoid Valve
     E. L293D
     F. L293D Dual H-Bridge DC Motor Driver Module for 8051
     G. 12V 1.2AH Rechargeable Battery
   • Materials Used for Fabrication are –
     A. Stainless Steel Sheet Metal for container
     B. Cast Iron for stand
   • Interfacing:
     A. Interfacing DG600F and Nuvoton W78E052DDG
     B. Interfacing Direct Operated Water Solenoid Valve and Nuvoton W78E052DDG
Programming and Burning the IC:
The microcontroller programming is carried out in Keil Version 5. The language ‘C’ is used to program the microchip. The Nuvoton W78E052DDG is burnt with the executed program with the ‘Nuvoton ISP Programmer’

Results and Conclusions:
The 20lts ‘Bisleri’ water can cost RS 70 in the market. So, the 20,000ml in the bottle can be divided by more than 70 times for a profitable trade, i.e. when the machine is programmed for anything less than 285ml per RS 1, it becomes a profit to the vendor/machine owner.

The set objectives i.e. to develop a compact and a portable water vending machine is designed and constructed. Which uses 20lts per purified water bottles as refill. This product when installed in public places it satisfies the drinking water needs of the public.