

## Method for Automating Medicare

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**Abstract** - *The paper aims at providing a method for automating Medicare for elderly patients. In today's times, many people do not get the desired amount of time to care for their elderly parents. Patients, especially elderly ones may be apprehensive in the presence of a nursing staff and might object to their presence. In several rural areas, the possibility of a nursing staff being available to tend for the elderly is less. Hence, to overcome these limitations and to provide timely medicines to elderly patients, a robotic arm is made use of which can dispense medicines in a timed manner and also ensure that in event the medicines are not being taken by the patient, it notifies the concerned person about the same. To facilitate this, a robotic arm using servo motors and Arduino Uno is designed.*

**Key Words:** Arduino, servo, motor, robotic arm, Medicare, bedridden, old parents, Medical Robotics.

### 1. INTRODUCTION

A Robot is a mechanical agent that is either controlled through a computer or electronic circuitry. Robotics is the study of robots which involves their designing, construction, operation and application.

Automation is the process of automatically controlling machinery and operating it with very little human intervention involved.

Robotics and automation has made a deep foray quite visible in several fields like industrial manufacturing, medicine and healthcare. Its impact has been advantageous to the medicine field especially in the field of surgery.

Earlier almost all operation were performed manually by doctors. But the amount of precision, time and cost was very high. Further, the mortality rate also used to be greater [1].

However, with the growth of automation, surgeons these days prefer using robots since the cost & time is less. It has also been observed that the medical precision is much higher. The recovery time of patients having undergone surgery using robots has also come down and the patients have quickly resumed their daily activities [1].

Application of robotics in all fields has been increasing at a huge pace. There has been consistent research in this direction.

### 1.1 Applications of Medical Robotics

Applications of Robotics in medical field have been quite wide ranging. As discussed above and in several other papers related to Medical Robotics [2], they are now being used by surgeons because of the robots consistency and amount of unwavering precision. Robots are also being used to assist the disabled, vision-impaired. The concept of smart wheelchair introduced by Rao at the University of Pennsylvania [3] has been a great work in this field.

The spawning interest and application of medical robotics has been due to the necessity and the success at performing infeasible interventions, the untiring nature, stability and greater technical performance in difficult procedures [2].

Medical Robotics has also been categorized into 1) Robotics for rehabilitation, 2) Robotics in surgery, 3) Miscellaneous applications [4].

### 2. OBJECTIVE

This paper aims to implement the advantages of using robots towards taking care and assisting elderly patients who are bedridden. Robotic arms can be deployed most preferably on side racks to assist elderly patients in taking their medicines on time.

The robotic arm has an enhanced freedom of movement i.e. degrees of freedom thereby which it can pick up the medicine box and provide it to the patients. This dispensing

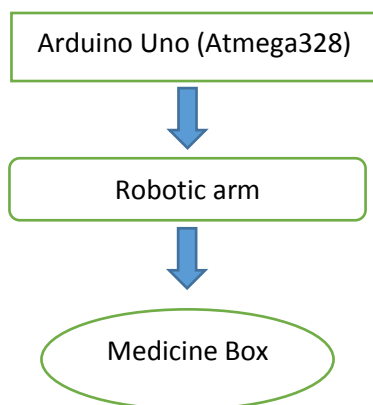
of medicine is in a timed manner with high precision. The patients are at comfort since they do not have to make any physical movement of limbs in getting the medicines. This also is an advantage to those who do not prefer to have any nursing staff to assist them.

### 3. PROPOSED SYSTEM

The Robotic Arm is to be designed in such a way that at a certain time of the day, the Arduino Uno will activate the servo motors which operate the arm and pick the medicine box. Then the medicine box is handed to the patient who takes the medicines and hands the empty box back to the arm. This way the robotic arm assists the elderly patients to take their medicines on time even if they forget to do so.

The proposed components and materials to be used for fabrication of the robotic arm includes acrylic sheets, servo motors, obstacle sensor and stepper motor.

The basic block diagram is as follows:-



Arduino Uno is used to interface with the servo motors, HCSR04 obstacle detection sensor. The robotic arm is operated by the servo motors. The motor controlling the gripper picks up the medicine box when prompted by the Arduino. It then hands over the medicine box to the patient. The obstacle sensor ensures that the medicine box is picked up by the patient and returned back within a certain timeframe. If not, then it assumes that the patient may not have taken the medicine and rings an alarm to notify the patient. Once the patient takes the medicine and hands back the box, the gripper places the box in its respective place and initiates the next round of assistance.



**Fig- 1** Basic Robotic Arm Setup

### 4. RESULTS & DISCUSSIONS

The Robotic Arm was timed according to the user requirements and was observed to provide the medicine on time to the patient. The patient was alerted through an alarm before the medicine was to be taken.



**Fig- 2** Robotic Arm in action.



**Fig-3** Robotic Arm Snapshot

This basic system can be greatly improved in the future by adding a user alert system in case the patient forgets to take the medicines. The arm can also be programmed to keep track of daily activities such as sounding an alarm when it is time to take food and medicines.

Further modifications can be made to its sensing abilities so that it can be ensured that the patient takes the medicine and not just pick up the capsule and forget to take it.

The robotic arm has been designed keeping cost in mind. Additional modifications can be made such as the material to be used, more strong and weight bearing motors.

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