

## ALEXA-The Thinking Car

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### ABSTRACT

Nowadays, high frequency of accidents are susceptible due to rollover. Numerous approaches have been attempted to detect and predict wheel lift off using on board sensing and a combination of automatic steering and also braking to keep the wheels on ground. Rather than focusing on how to keep the wheels on the ground, it is also usable to understand how to control the vehicle when two wheels are in the air. In case of rough surface there are chances of car to turnover due to imbalanced weight and uncontrolled speed. Thus by providing balancing features it is possible to reduce such accidents. In this paper, control strategy and sensor-based control of self-balancing vehicle is proposed. This understanding may allow the design of control laws that can safely return the vehicle to the ground after inadvertent tip-up. In particular, the focus is on developing software based technique which can be used to control and balance the car.

**Keywords--** Self-balancing, Sensor-based control, Arduino, Android, Mechatronic

significantly higher level of functionality or even a completely new functionality must be enabled.

This paper briefly presents the development of a balancing vehicle including mechanical parts, electronics and embedded control. The aim of the work was to build an open (both hardware and software) experimental platform for the study of algorithms and approaches (including fault diagnostics and other advanced model-based techniques) for vehicle control. [1]

During balancing, the vehicle is stabilized by adjusting its centre of gravity above the wheels. It is must to develop a model that can be used for both phases of the motion, and also to control law that can stabilize the vehicle in the balance phase. In fact, movie action car drivers are known for their skills to drive a car while balanced on two lateral wheels.[4]

**Arduino** is an open-source electronics platform based on compatible hardware and software. Arduino boards can read inputs - light on sensor, fingeron button, or Twitter message - and turn it into output - activating a motor, turns on an LED, publishing something online. You can tell your Arduino board what to do by sending a set of instructions to the microcontroller device on the board. For doing this you use the Arduino programming language and Arduino Software (Integrated Development Environment), depends on Processing. From many years Arduino has been the master of thousands of projects, from everyday objects to complex scientific instruments.

**Android** is a mobile operating system that was developed by Google, based on the Linux and designed for development of touch screen mobile devices such as smart phones.

## I. INTRODUCTION

Balancing vehicle is an ideal platform for the demonstration of most aspects of Mechatronics, including the modelling and identification of the electromechanical system and its embedded control.

Mechatronics is usually defined as a combination of mechanics, electronics and computer control. Often an interaction with an environment is emphasized: the mechatronic system senses the information from the environment; next it processes it and finally reacts through actuators. Furthermore, the system must have a

## II. IMPLEMENTATION

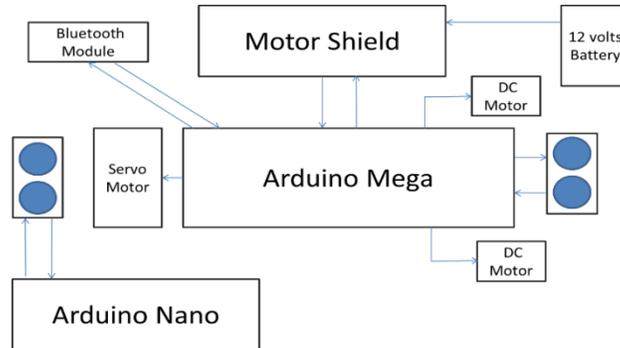


Fig 1 Data flow diagram

The car receives its power from the external power supply connected to the Arduino motor shield. We are using motor shield to protect our Arduino boards from over current caused due to the two dc motor. The Bluetooth chip is connected to Arduino mega which keeps track of the received commands. Depending on the received command the Arduino mega takes decision of whether to move forward or backwards take a right or left turn by using the front servo motor. On receiving the park

command the Arduinonano takes in charge of measuring the front obstacle distance continuously by using the front ultrasonic sensor. If any object comes close then it informs mega to move the motor backwards. Then mega check the reverse obstacle distance to see whether there is some space to move backwards. So in parking mode both the Arduino chips continuously communicate with each other to handle the car.

*Software Application*

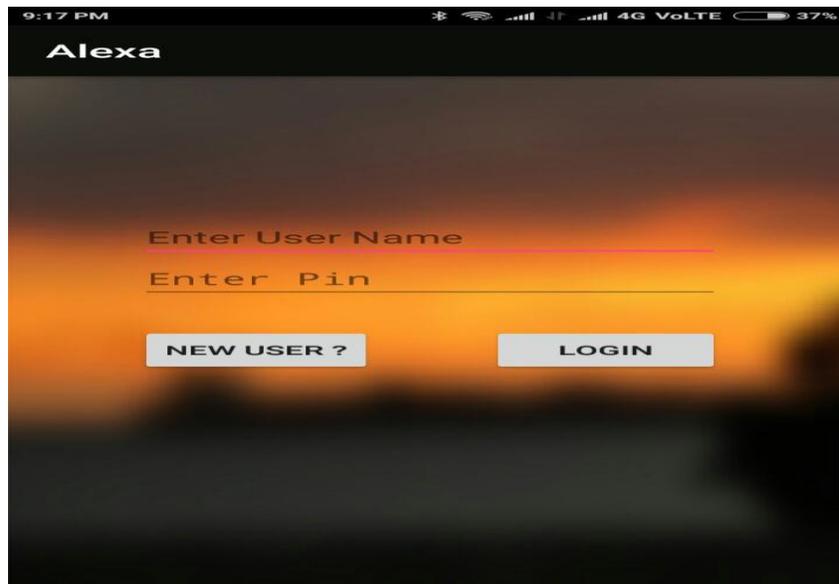


Fig 2 Login Screen

User must login himself in the application via this login screen, if login is successful then he could take

control of the car. New user will have to register himself before logi

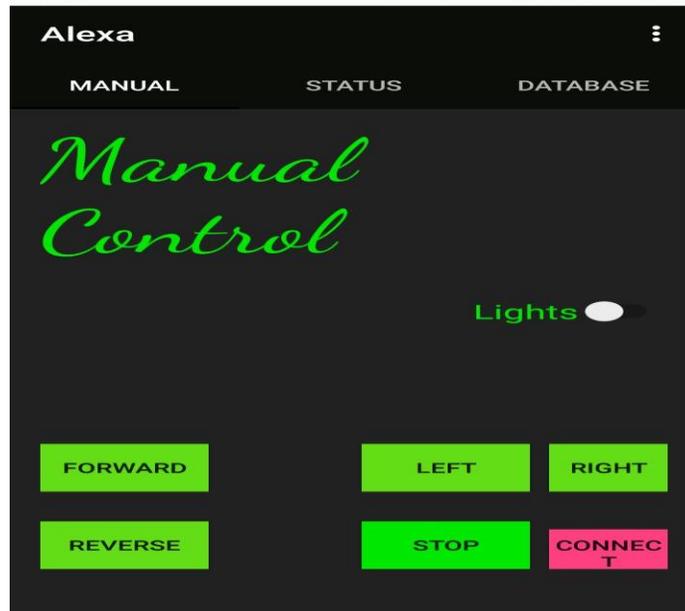


Fig 3 The controller screen

Upon successfully logging in the user would be provided with this screen so that he could control the car manually. In this step trust algorithm will work.

After granting driving authority to the user ALEXA will record users driving in her Status section and accordingly check the count value. If the count value crossed after certain limit, ALEXA won't allow that user to drive further.

Database section will maintain all the entries of registered users.

### III. PROJECT OBJECTIVE

The objective of the project is

- To create Artificial Intelligence based RC car which no matter whatever roads may be given would balance itself and provide safe driving.
- By using Artificial Intelligence improve some special skills that the vehicle can protect itself and to the owner from any danger by using sensor mode.
- To design a complete discrete digital control system that will provide the needed stability
- The objective behind the selection of the topic for our project is that we are trying to develop an vehicle which can acts smartly.

### IV. CONCLUSION

The project is to realize the smart living using Bluetooth Technology. Remote car and smart phones are a perfect match. As phones and mobile devices are every time extremely powerful, using them as remote for building car with advanced feature like tracking purpose. Android Bluetooth-enable phones and Bluetooth module via HC-05 and communication through Bluetooth devices. It is defined that smart living will turn into a reality that user can control their home remotely and wirelessly.

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