AN EFFICIENT KART DRIVING CONTROLLER SYSTEM DESIGN FOR PHYSICALLY CHALLENGED PEOPLE

1M.Sakthivel, 2A.Logesh, 3D.Madhan raj, 4R.Suriya narayanan,5P.Venkatesh
1Professor, Department of Mechanical Engineering, KSR Institute for Engineering & Technology, Tiruchengode
2UG Student, Department of Mechanical Engineering, KSR Institute for Engineering & Technology, Tiruchengode

logeshar007@gmail.com
havocshaddyraj314@gmail.com
suryarajesh269@gmail.com
venkateshmuthu82@gmail.com

ABSTRACT

The objective of this project is to introduce the technology that helps to run a kart by a physically challenged person. A Bluetooth control setup is used to operate the starting motor attached with the engine. Servomotor control is used to vary the acceleration of the kart. This is the only kart used for the partially handicapped persons who are able to utilize their hands to drive the kart. The kart design has features as suitable for all kind of racers. It is more useful to avoid accidents on the track.

1. INTRODUCTION

There are many motor sports in the world. Bikes, Cars, Formula one are examples of them. The racers in these are very professionals and accurate.

They can drive it very fast. But there are also motor sports which do not need professional drivers and need no great speed. The vehicles used are also very cheap. Such a motor sport is Go-karting. They resemble to the formula one cars but it is not as faster as F1 and also cost is very less.

The drivers in go-karting are also not professionals. Even children can also drive it. Go-karts have 4 wheels and a small engine. They are widely used in racing in US and also they are getting popular in India.

But nowadays there are many new technologies are used in go kart. In our project our main aim is to give a chance for a handicapped people to participate in a race. So, with the help of the arduino kit we make a chance for handicapped people to race. The function of the arduino kit is to read inputs- ultrasonic sensor - and turn into an output- activating a motor. In our project servomotor is controlled by the arduino kit.

It guides and control the servomotor. And also the arduino kit connected with the mobile with the help of the Bluetooth connection. So, that we can able to on/off the engine with the mobile in limited distance.

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2. METHODOLOGY

write the programming using arduino IDE

Upload programming into arduino

Build hardware

Result

Figure 1. Methodology

The above methodology has been followed to program in arduino IDE and input to arduino board.

3. CHASSIS

A chassis consists of an internal frame work that supports a manmade object & all other components in its construction and use. Go-kart is the simplest form of motorsport run with small cars with essential shape. The essential shape refers to the tubular form of the frame. Because based on the study most go-karts are made from hollow steel tubing. Referring to the existing go-kart. The tubular iron used as the foundation of the chassis itself functioned as a suspension and has relatively high degree of flexibility. We designed a new chassis with newly improved on and off-road go-kart chassis to increase the flexibility and improve the go-kart handling.

3.1 MATERIAL SELECTION

Material selection is an important process in design and manufacturing. AISI 4130 alloy Chromium
molybdenum (CrMo) steel is the high strength material with very less weight. It’s used in manufacturing of aircraft and it’s cost is high. Based on the survey Table 1 has the properties of various materials and the material AISI1018 was chosen for the chassis. This material has been selected by the following factors cost, availability, strength, machinability.

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### Table 1 Properties of materials

<table>
<thead>
<tr>
<th>S. No</th>
<th>Material Property</th>
<th>AISI 1018</th>
<th>AISI 4130</th>
<th>AISI 1020</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Density (g/cc)</td>
<td>7.87</td>
<td>7.85</td>
<td>7.87</td>
</tr>
<tr>
<td>2</td>
<td>Cost (Rupees/m)</td>
<td>450</td>
<td>680</td>
<td>490</td>
</tr>
<tr>
<td>3</td>
<td>Hardness (HB)</td>
<td>126</td>
<td>217</td>
<td>111</td>
</tr>
<tr>
<td>4</td>
<td>Ultimate Strength (Mpa)</td>
<td>440</td>
<td>560</td>
<td>394.7</td>
</tr>
<tr>
<td>5</td>
<td>Yield Strength (Mpa)</td>
<td>370</td>
<td>460</td>
<td>294.8</td>
</tr>
<tr>
<td>6</td>
<td>Machinability (AISI 1212 as 100%)</td>
<td>70%</td>
<td>70%</td>
<td>68%</td>
</tr>
</tbody>
</table>

### 4. WHY ARDUINO?

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.

### 5. ARDUINO UNO FEATURES

Some people think of the entire Arduino board as a microcontroller, but this is inaccurate. The Arduino board actually is a specially designed circuit board for programming and prototyping with Atmel microcontrollers.

The nice thing about the Arduino board is that it is relatively cheap, plugs straight into a computer’s USB port, and it is dead-simple to setup and use.

Some of the key features of the Arduino Uno include:

- An open source design. The advantage of it being open source is that it has a large community of people using and troubleshooting it. This makes it easy to find someone to help you debug your projects.
- An easy USB interface. The chip on the board plugs straight into your USB port and registers on your computer as a virtual serial port. This allows you to interface with it as through it were a serial device. The benefit of this setup is that serial communication is an extremely easy (and time-tested) protocol, and USB makes connecting it to modern computers really convenient.
- Very convenient power management and built-in voltage regulation. You can connect an external power source of up to 12v and it will regulate it to both 5v and 3.3v. It also can be powered directly off of a USB port without any external power.
- An easy-to-find, and dirt cheap, microcontroller "brain." The ATmega328 chip retails for about $2.88 on Digikey. It has countless number of nice hardware features like timers, PWM pins, external and internal interrupts, and multiple sleep modes.
- A 16mhz clock. This makes it not the speediest microcontroller around, but fast enough for most applications.
- 32 KB of flash memory for storing your code.
- 13 digital pins and 6 analog pins. These pins allow you to connect external hardware to your Arduino. These pins are key for extending the computing capability of the Arduino into the real world. Simply plug your devices and sensors...
into the sockets that correspond to each of these pins and you are good to go.

- An ICSP connector for bypassing the USB port and interfacing the Arduino directly as a serial device. This port is necessary to re-bootload your chip if it corrupts and can no longer talk to your computer.
- An on-board LED attached to digital pin 13 for fast an easy debugging of code.
- And last, but not least, a button to reset the program on the chip.

5.1 Hardware Specifications

Introduction to Arduino by Hans-Petter Halvorsen

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 50mA
- Flash Memory: 32 KB (ATmega328)
- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock Speed: 16 MHz

![Figure 2. arduino UNO board](image)

6. SOFTWARE FOR PROGRAMMING

The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board’s firmware.

7. POTENTIOMETER

A Potentiometer is a commonly used variable resistor. Turning the knob, you vary the output voltage between 0 and 5V. This value is sent through the middle pin of the pot. Output: This module outputs 5V when turned in one direction, and 0V when turned in the opposite way. When connected to an input on the Arduino using the TinkerKit Shield, you can expect to read values between 0 and 1023.

8. SERVO MOTOR

This library allows an Arduino board to control RC (hobby) servo motors. Servos have integrated gears and a shaft that can be precisely controlled. Standard servos allow the shaft to be positioned at various angles, usually between 0 and 180 degrees. Continuous rotation servos allow the rotation of the shaft to be set to various speeds. The Servo library supports up to 12 motors on most Arduino boards and 48 on the Arduino Mega. On boards other than the Mega, use of the library disables analogWrite (PWM) functionality on pins 9 and 10, whether or not there is a Servo on those pins.
Servo motors have three wires: power, ground, and signal. The power wire is typically red, and should be connected to the 5V pin on the Arduino board. The ground wire is typically black or brown and should be connected to a ground pin on the Arduino board. The signal pin is typically yellow, orange or white and should be connected to a digital pin on the Arduino board. Note that servos draw considerable power, so if you need to drive more than one or two, you'll probably need to power them from a separate supply (i.e. not the +5V pin on your Arduino). Be sure to connect the grounds of the Arduino and external power supply together.

**9. ARDUINO BLUETOOTH MODULE**

![Arduino Bluetooth Circuit](image)

The Arduino BT is a microcontroller board originally was based on the ATmega168, but now is supplied with the 328P (datasheet) and the Bluegiga WT11 bluetooth module (details and datasheet. It supports wireless serial communication over Bluetooth (but is not compatible with Bluetooth headsets or other audio devices). It has 14 digital input/output pins (of which 6 can be used as PWM outputs and one can be used to reset the WT11 module), 6 analog inputs, a 16 MHz crystal oscillator, screw terminals for power, an ICSP header, and a reset button. It contains everything needed to support the microcontroller and can be programmed wirelessly over the Bluetooth connection.

**3.2 SPECIALIZATION**

Developing go-kart racing and support services for people with disability to ensure they have equality of opportunity within the community. To create awareness of disabilities issues through racing consultative services and research. To give the opportunities for physically challenged peoples to drive a go-kart.

**10. RESULTS AND DISCUSSION**

The go-kart frame has been designed and assembled in solid works. And the program for Bluetooth, servo motor control was successfully done by arduinoIDE. Then input the program to arduino UNO and check the working of the hardware’s

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