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ECE 511 PROJECT REPORT ON

SMART SUITCASE

*Submitted by*

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11. ABSTRACT:

The objective of this project was to come up with the next evolution of the travel experience for travelers. Most of the times, it is difficult to carry/drag all the luggage with you. To overcome this problem, we developed a basic model such that we can control a suitcase simply by using an android application via Bluetooth. We made use of MSP 430G2553 to interface a Bluetooth module and the DC motors. Our model will work basically for Business people because we control only one suitcase model in our project. Thus, we could move the suitcase in our desired direction. No more of carrying is required.

1. MOTIVATION:

As per the present statistics and data, travel and tourism has become a huge industry which almost contributes to more than 10 trillion U.S. dollars to the global economy. Business travel is a large part of this industry, making a total global economic contribution of 1.11 trillion U.S. dollars during the same year. Business travel managers from many countries expect business travel to increase in the coming years.

Ever since wheels were introduced, there were no other changes seen in the suitcase. Building such a suitcase with the smart features will definitely see a huge changeover in this technological era. It becomes difficult to traverse through the airport while travelling. This led us to the development of several ideas and techniques for self-propelled luggage.

1. SOLUTION:

The basic solution for such a problem is to install a proper system on the luggage to remotely control and navigate it. Thus, the luggage is made into a portable motorized suitcase that can be operated in both manual and automatic mode. The motor and movement of the suitcase is controlled by a smart phone via Bluetooth signal. The distance range can be in several feet.

1. BLOCK DIAGRAM:

Android app

Bluetooth Module

UART

TX/RX

Batteries

MSP 430

PWM

Motor Driver IC L293D

1. DESCRIPTION:
   1. H-Bridge controller:

The H-bridge controller used in this project is the IC L293D. It boosts current to drive the DC motors.

This IC is mainly used for changing the direction of rotation of DC motors.

The inputs for L293D are connected to MSP 430 at pins P1.4, P1.5, P1.6, and P2.1 for four DC motors.

Two 9V batteries are connected to it.

* 1. Bluetooth Module:

The Bluetooth transceiver we used is HC-05. It requires 3.3V

The inputs for HC-05 are the UART connections from the MSP430 at pins P1.1 and P1.2 for TX and RX, respectively.

* 1. DC Motors:

We have used 4 motors and gave 18V supply with the batteries. By using the MSP 430, PWM signals are generated. These signals control the motors using the L293D motor driver IC.

1. FLOW CHART:
2. RESULTS AND CONCLUSION:

The Smart Suitcase is connected through Bluetooth to an android app. After a connection is established, the suitcase is successfully controlled with the navigation bars in the android app. Every component was interfaced successfully as planned originally.

Lessons learned from this project:

* UART interface
* Usage of Timers and Interrupts
* Controlling motors using PWM

1. FUTURE SCOPE:

* Locking and Unlocking of suitcase using Android phone
* Suitcase following the user automatically using foot sensors/GPS
* Suitcase which can avoid obstacles and come back to normal path with required pace
* Controlling multiple luggage where every suitcase and phone are all communicating with each other
* To alert the users when the distance from the suitcase and the user is increasing, possibly preventing theft

1. BIBLIOGRAPHY:

* https://www.google.com/patents/US20140107868
* <https://e2e.ti.com/support/microcontrollers/msp430/f/166/t/380636>
* [http://longhornengineer.com/code/MSP430/UART/uart.c](http://www.google.com/url?q=http%3A%2F%2Flonghornengineer.com%2Fcode%2FMSP430%2FUART%2Fuart.c&sa=D&sntz=1&usg=AFQjCNEw7nAySZqOCaHPq3WmXw-vU9RzGw)
* [http://longhornengineer.com/code/MSP430/UART/uart.h](http://www.google.com/url?q=http%3A%2F%2Flonghornengineer.com%2Fcode%2FMSP430%2FUART%2Fuart.h&sa=D&sntz=1&usg=AFQjCNG7r25DTxYFgQj4_fGWB1NdIx245A)
* <http://www.ti.com/product/MSP430G2553>

1. APPENDIX:
   1. Task Division:

Muktar Usman: Coding, final testing, and report writing.

K.V.N.S. Bharat Vamsi: Coding, debugging, soldering, final testing, and report writing.

Chien Hung Su: Application development, final testing, and report writing.

Sam Aquila Siddani: Motor testing, interfacing, final testing, and report writing.

Bhargavi Vidapanakanti: Hardware assembly and integration, final testing, and report writing.

* 1. List of Components:

Component Quantity Manufacturer Cost($)

MSP 430Launch pad 1 Texas Instruments 19

Bluetooth Module (HC – 05) 1 Tower-pro 3.5

H-Bridge Motor Controller IC (L293D) 1 Vishay 3

Batteries 6 Duracell 5

Chassis (including motors) 1 N/A 25

Connecting Wires N/A N/A N/A

PCB Board 1 N/A 3.5

Total Cost 70

* 1. Schematic Diagram:

