

Arduino for Differently Abled

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Abstract

The total population of Indians across the globe is 17.5%. Among them nearly 6% are differently abled. In 6%, majority of people couldn't even walk and they need to depend on others for their entire life time in doing the very routine work of switching on and off of electrical gadgets. With the only intention of aiding them, we as budding engineers has emerged with the idea of using android platform to remotely control the electrical gadgets at home. Our device works based on arduino and amarino. Arduino is an open source board and it has Integrated Development Kit (IDE) in which user defined programs are coded. It acts as a microcontroller as well as a sensor. Arduino can receive external inputs from smart phone by using a Blue tooth module known as BlueSmirf. Amarino is software used to bridge between arduino and smart phone. Control signals are sent to the BlueSmirf and depending upon it, Arduino operates. Java acts as front end and Arduino programming language acts as backend.

Keywords

Arduino, Amarino, BlueSmirf Gold, Baud rate, Eclipse

I. Introduction

Among 1 in 5 people uses smart phone across the globe. It is said that the smart phone explosion is to take off this 2014. According to new forecast, India and China serves as hub for smart phone users targeting more than 500 million users in this current year. Despite the advancements in its technology, only a very few innovative techniques are available for smart phones to gain access and control external interfaces like hardware devices. For the smart phones to control a hardware device or to act as a heat or light sensor there is a need for an external circuitry that communicates between the phone and the client device. There are boards like DIY Shrimp, Beagle Bone Black, UDOO , Goldilocks which serves this purpose. Among the above stated boards, Arduino is used because of its flexibility, ease of usage even to the non – technical person.

II. Arduino

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. Arduino aims to make technology accessible and useful to new audiences such as artists, designers, or hobbyists. It strives for the dual goals of simplicity (so people can actually use the platform) and robustness (so they create things that work). The Arduino software consists of a development environment (IDE) and the core libraries. The IDE is written in Java and based on the Processing development environment. The core libraries are written in C and C++ and compiled using avr-gcc and AVR Libc.

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone or they can communicate with software running on a computer (e.g. Flash, Processing, MaxMSP).

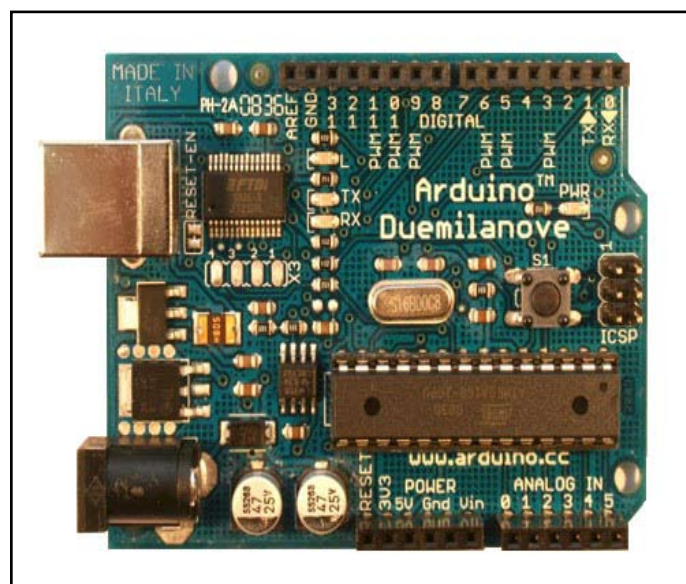


Fig. 1: Arduino Duemilanove

A. Features

1. Focusing on the official Arduino hardware
2. Emphasizing API design
3. Offering a small but easily-extendable core
4. Sacrificing (when necessary) elegance of implementation for ease-of-use
5. Emphasizing real use cases over theoretical possibilities
6. Recognizing that documentation is as important as code
7. Trying to get things right the first time (even if this takes longer)

B. Usage

It mainly proves handy in

1. Physical Computing projects / research
2. Interactive Installations
3. Rapid prototyping

C. Arduino Installation in Window

1. Download the latest IDE, unzip the file and open it where Arduino files and sub-folders will be visible.
2. Plug in your Arduino using the USB cable and ensure that LED turns on.

3. Move to Control Panel. Click on device manger. Arduino will appear in the list. Click on Arduino Duemilanove and choose Update Driver Software.
4. Choose Browse my computer for driver software and on the next window click the Browse button. Navigate to the Drivers folder of the Arduino folder then click OK and then Next. Windows will attempt to install the driver. Click Install driver software .

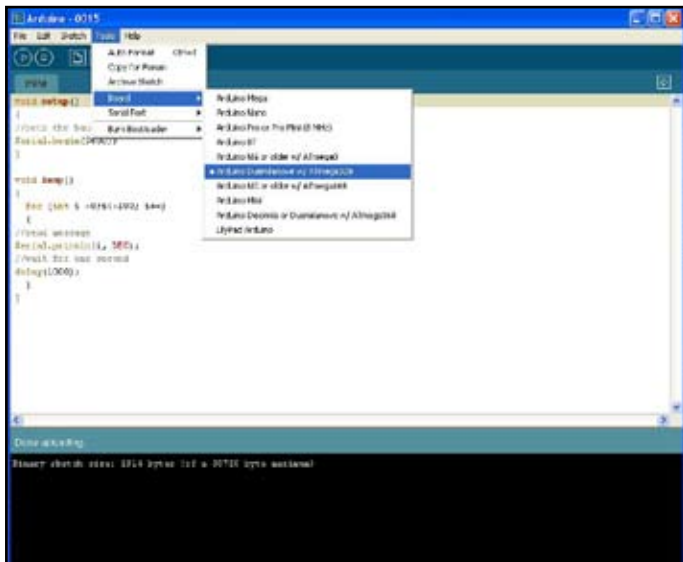


Fig. 2: Arduino IDE

III. Amarino

Amarino is a toolkit that enables the rapid prototyping of such applications by connecting the Android operating system to the Arduino microcontroller platform. It consists of an Android application, an Arduino library, and a collection of documentation and examples. This suite of tools allows users to: 1.access Android events (ie: compass orientation, accelerometer data, and text messages received) and send them to Arduino microcontrollers without doing any Android programming, and 2. quickly develop Android applications that receive data (ie: environmental sensor data) from (and send data to) Arduino microcontrollers. This paper introduces Amarino and presents the results of a preliminary user study. Amarino aims to facilitate the development of tangible interfaces to smart phones by eliminating several of the developments steps that are required to build them. In particular, Amarino allows Android-based mobile phones to communicate seamlessly with Arduino-based microcontrollers. It also allows tangible developers who would like to employ phone-based sensing in their projects to do so without engaging in any mobile device programming. The toolkit consists of two components, an Android [3] application, which runs on a mobile device, and a software library for the Arduino, which runs on a tangible device. Central to each of these is a communication protocol that allows a developer to focus on the behavior of his or her project instead of low level communication details. The current implementation takes advantage of most phones' built in Bluetooth radios and assumes that communication takes place over Bluetooth.



Fig. 3: Amarino bridging Android and Arduino

A. Sections of Amarino

1. Bluetooth Manager connects the wireless Bluetooth module (Bluesmirf Gold) with our android phone's Bluetooth. For security purpose we can also set authentication password to establish a safe connection and then pair the devices together.
2. Monitoring part keeps a record or log of all the recent activities that have been performed in the Amarino.
3. Event Manager contains a set of pre-defined events that can be used for our project.



Fig. 4: Different Sections of Amarino

Settings tab is used to can change the name of the new event and assign a new Bluetooth address to it for the BlueSmirf to communicate with our phone.

B. Tools Employed

1. Arduino Duemilanova ATmega 328
2. Amarino Toolkit
3. Blue Smirf Gold
4. Android mobile
5. 240 volts bulb
6. Relay circuit
7. Breadboard

8. Resistors
9. Transistors
10. Jump wires

C. Software Installation

Amarino – Android Application- to be installed on phone.
Amarino Plug-in Bundle- to be installed on phone.
Amarino Library- To be kept in computer- needed while installing the application on phone using Eclipse.

D. Trans - Reception of Data

For the smart phone to trans receive data blue tooth is available but for arduino to trans receive information we need an external hardware that is blue smirf gold. Blue smirf serves as blue tooth module for the arduino. For the operation of blue smirf its necessary to set the baud rate as 57600. Baud rate is the speed of trans receiving data.

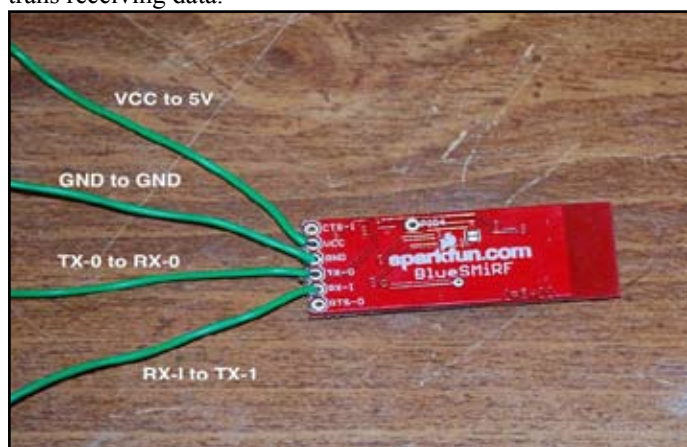


Fig. 5: BlueSmirf Gold

Following is the connection between blue smirf module and arduino :

1. Connect CST - 1 to RTS - 0
2. VCC - 3.3V
3. GND - GND
4. TX - RX (digital pin 0)
5. RX - TX (digital pin 1)

In order to change the baud rate , first add this device in the computer then in the blue tooth settings change its baud rate to 57600.

IV. Building Arduino for Differently Abled (ADA)

1. Configure eclipse
2. Write the code for controlling electronic gadgets like light , fan , motor and store it as ADA
3. Open eclipse then open ADA folder
4. Select the version of android that matches with your smart phone. The current version of android is Kitkat 4.4
5. After opening ADA.java file in Eclipse and place BlueSmirf device number inside this line of code

A. Front End

1. Front end is with regard to smart phone. Connect your phone with computer via USB. In phone move to settings then applications and USB debugging.
2. Run ADA application via android.
3. When the dialog box of the AVD manager launches select your phone as the targeted device.

4. Launch this will install the ADA app to your phone.



Fig. 6: Front end in smart phone

B. Back End

Step up the minimum flowing current to 240v using components like transistor, relay circuit, battery.

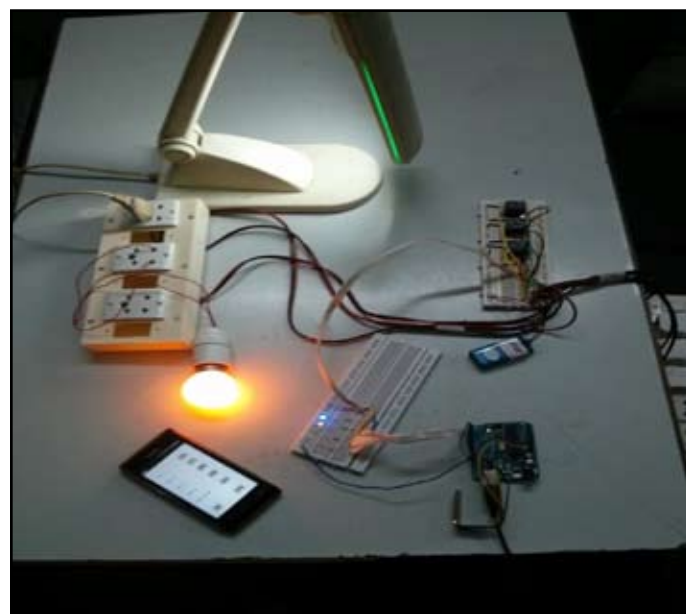


Fig. 7: Complete View of ADA

V. Conclusion and Future Work

Arduino for differently abled is developed to assist people in environment where they cant walk. Our main focus is to keep our tools easy to use so that they would be accessible to novices but also easily extendible so that they would be useful for experts. In our future work, we would like to provide users with access to higher level equipments, like motor, mixer for example. We would like to add support for communication via wireless LAN or WIFI in the case of large coverage area. Our functionality could be particularly useful in the home environment and handicapped people protection homes. Finally, we want to construct more prototypes to explore the seamless integration of smart phones into our personal environment.

VI. Acknowledgement

We would like to express our profound gratitude to our parents who permitted us to travel across for attending workshops , guest lectures and their consistent support and motivation during the

time when ever we faced the difficulties in implementing our project. We owe them a lot.

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Author's Profile

Haleema is pursuing IV year B.Tech Information Technology in Kongu Engineering College, Tamil Nadu , India. She has presented 7 papers in the national level symposiums and out of which she has bagged 4 awards. She has developed 5 projects and presented in the national and international expo and have acquired the best project award for 3 of her works. Most of her works are oriented towards assistive technologies. She have keen interest for extra curricular activities which involves inter personal skills , creativity and till date she has participated in more than 15 state and national level competitions like speech, debate, marketing, management event, creative writing and she has bat 8 awards. As an evidence of her leadership quality , organizing ability she is heading 4 cells of her college, she is representing IT department in the student council of her college, AICTE, NBA. She has served as the student ambassador of her college for too. She was the nominee for the best co-curricular award for the year 2013.

Naveedh Ahamed, pursues IV year B.Tech Information Technology in Kongu Engineering College, Tamil Nadu , India. He is passionate towards coding and his professional skill set includes C, C++, JAVA, HTML and PHP. He has presented papers on Cloud computing, android application. His project works are pH control systems for dying industries and smart home system. He has profound interest for android and most of his works are concerned with it. Moreover he is heading the android cell of his department where in-numerous students learn and develop many android apps. He has recently developed android app to view semester results of the students in an effective way. He has served as the joint secretary of IT department association. He has bagged many awards in web designing contest.