Arduino Programming for Specific Signal Output and Control, Water level measurement using ultrasonic sensors and info relay using TCP/IP protocol

Software Requirements Specification

1.0

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**1. Introduction**

The client requires two softwares to be developed, of which the first one caters to simulation of a desired wave/waveform of a given frequency using either ‘Arduino' or any other available softwares/microprocessors. The second software uses ultrasonic sensors coupled with ‘Arduino’ to measure water level in different containers and subsequently relay the measured water level reading across the internet to a remote PC through a secure login.

## 1.1 Purpose

The purpose of this SRS is to provide the end user the details about the operation of the products and all the specifications of the products. This is a comprehensive guide for anybody who is interested in knowing about the software in detail and/or wishes to pursue developing them.

## 1.2 Scope

The softwares to be developed are Wave Generator and Controller, and, Water Level Detection and Transmission System.

The Wave Generator and Controller will perform the task of generating a signal (i.e. sine wave, square wave, etc) as output. We will also be using the Arduino Programming in Java/C&C++ to control the hardware components of the device. This product is aimed to generated a consistent signal of a nearly fixed frequency that will be used in modulation. The equipment that is currently employed for the same is just affordable, and our product is designed to be cheaper and hence more useful.

The Water Level Detection Detection and Transmission System is going to perform the task of measuring the height of water level in a reservoir using Arduino Programming in Java/C&C++ and then transmitting the data to a system where it will get stored in a database (created using MySQL). This product is being developed to be employed in a lot of potential systems (like drought management in villages by wells, flood management in dams, etc.)

## 1.3 Definitions, Acronyms, and Abbreviations

|  |  |
| --- | --- |
| **Terms** | **Definition** |
| Arduino | An open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. |
| Stakeholder | Any person with an interest in the project who is not a developer. |
| Software Requirements Specification | A document that completely describes all of the functions of a proposed system and the constraints under which it must operate. For example, this document. |

## 1.4 References

The following resources will be referenced during the software development cycle:

1. <https://www.arduino.cc/en/Reference/HomePage>
2. <https://www.raspberrypi.org/documentation/>
3. <https://docs.google.com/document/d/1Y-yZnNhMYy7rwhAgyL_pfa39RsB-x2qR4vP8saG73rE/edit>

## 1.5 Overview

The rest of the SRS contains all the details of the projects. It starts with the general description of the project which specifies the factors that affect the products. It is followed by specific requirements which describe all the software and hardware requirements of the products.

**2. General Description**

## 2.1 Product Perspective

The Wave Generator and Controller aims to simulate waves of a given frequency on a PC coupled with a cheap micro controller such as ‘Arduino’.In comparison other similar products usually have a higher cost. So the end goal is to have a cheaper open source Wave Generator.

The Water Level Detection Detection and Transmission System is to be used in some novel way

by the client and, thus, would be highly customised as per the client’s requirements. The functionalities would, hence, tend to be a bit different than existing systems.

## 2.2 Product Functions

The Wave Generator and Controller will perform the task of generating a signal (i.e. sine wave, square wave, etc) as output. The Water Level Detection and Transmission System is going to perform the task of measuring the height of water level in a reservoir and access the data from a remote system.

## 2.3 User Characteristics

The Wave Generator and Controller is specifically designed to be used by professional people who are associated with the technical tasks in the field of electrical engineering, for example, in generating modulations.

On the other hand the Water Level Detection and Transmission System consists of hardware components which are designed to be used by laymen with nominal prerequisite technical skills.

## 2.4 General Constraints

*To be updated as soon as we finalize our hardware and software.*

## 2.5 Assumptions and Dependencies

*To be updated as we move towards finalizing the product and testing its compatibility with other devices.*

**3. Specific Requirements**

## 3.1 External Interface Requirements

### 3.1.1 User Interfaces

*This section is final for the moment and may need a few updates over time.*

For Wave Generator :

* Switches to toggle frequencies and waveforms.
* Display for prompting the generated waveform and frequency.

For Water Level Indicator :

* Web portal for secure login to the hardware interface.
* Database viewing portal for review of captured data.

### 3.1.2 Hardware Interfaces

For Wave Generator :

* Raspberry Pi3 or Arduino Due or both
* Breadboard
* 10 kilohm potentiometer
* 2 push buttons
* 2 x 10 kilohm resistors
* Jumper Wires

For water level indicator:

* Raspberry Pi3 or Arduino Due or both
* Breadboard
* Switches
* Arduino UltraSonic Sensor
* Wifi-router
* Jumper Wires
* Interface for secure data access with the setup

### 3.1.3 Software Interfaces

* Arduino IDE
* Jessie OS for Raspberry Pi3
* VNC Viewer
* PuTTY

### 3.1.4 Communications Interfaces

* TCP/IP
* FTP
* HTTPS
* SSH

## 3.2 Functional Requirements

*To be updated while we develop our product. For now the introduction and overview would provide a good idea about these requirements.*

## 3.4 Non-Functional Requirements

*To be updated soon. This is subject to change based on the capabilities of the developers and need of the clients.*

## 3.5 Inverse Requirements

*To be updated soon.*

## 3.6 Design Constraints

*To be updated soon.*

## 3.7 Logical Database Requirements

*To be updated as soon we start to build our database.*