SAMI 2021
Conference Office

elfa, s.r.o.
Park Komenského 7,
040 01 Košice
Slovakia

tel.: + 421-55-625 3839
fax: + 421-55-726 5195
e-mail: elfa@elfa.sk
http://conf.uni-obuda.hu/sami2019

Transfer and Visualization of the Data in Intelligent Environment

Jakub Palša, Martin Havrilla

Abstract — The aim of this paper is to create intelligent environment based on prototype platform, which is applicable in the area of the Internet of Things. Created intelligent environment allows to receive and send data in real time between the given setting and the user. Communication takes place between prototype platform Raspberry Pi created by us which communicates via script in Python and subsequently sends measured data to cloud service Firebase. Part of the intelligent environment consists of multiple sensors, which are used to control and collect data. Part of the implementation is also a web interface with the help of which the user can display the current measured values, which are visualized for better clarity. We can confirm that we do not need overpriced equipment to create appropriate intelligent environment and that we can substitute them with cheaper alternative, which this research proves.

I. INTRODUCTION

The Internet of Things is widespread throughout the world. All these things provide us new ways how to improve our daily lives. The Internet of Things has been widely used in the professional sphere, such as healthcare, the automotive industry and stores. Change is important and a technological trend towards a new generation, which is growing exponentially every year, is currently being built. An important part of this trend is the processing of data transfer. User security comes first, so the way the transferred data are protected is very important [1]. Visualization does not play any key role, it is just some kind of convenience of the user, who communicates with the system [2]. In this work we create a modern intelligent environment in order to demonstrate the possibility of substituting overpriced systems with a cheaper alternative. The advantage is to achieve the same successful results as when buying expensive equipment. We focused on secure data transfer due to the constant communication between the web client and the cloud service. Apart from data transfer, we have created a web interface which communicates with the Firebase cloud service in real time. We use sensors to obtain data and visualize the measured data with the help of a web client for easier communication with the user.

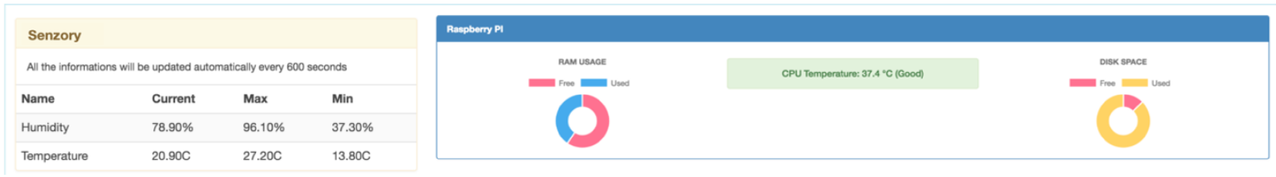
VI. SYSTEM IMPLEMENTATION AND VISUALIZATION OF THE DATA

The combination of a prototyping platform and Firebase leads to an efficient intelligent automation system. All of this is made possible by sending and receiving data in real time. Firebase disposes of many different usable functions, but one of the main ones is the NoSQL database working in real time. It focuses on processing and using of data without worrying about the number of repetitions or crashes.

The aim was to design a system for visualization of transferred data in real time. That will provide us some basic and customized charts, according to our needs. Creating a thorough web interface for the user, for more convenient monitoring of measured values and control of intelligent environment. An important part of designing data visualization is an overview of existing data, as well as exploring of perspective of data efficient for visualization. The solution is divided into two main parts. The first one is **design of web interface**, while the second one deals with the **system implementation**.

A. Design of web interface

The design of the web interface we can see in the Figure. First, what we can see is the web interface and visualization of transferred data that are automatically refreshed every 300 seconds. The interface consists of only one home screen, Two charts, a table of information about the last database up datein real time.



B. System implementation

System consists of two parts. The first one is for description of the user environment as well as charts and tables using open source programming language php, which is used mainly for programming client-server applications. The second part helps to communicate with our cloud service.

VII. CONCLUSION

By connecting suitable prototyping platform and required sensors, we have reached communication, the transfer of which is enabled by a script written in the Python language and is visualized by means of web interface. Using wiring diagram, we constructed necessary hardware part. Communication transfer runs in real time using the Firebase cloud service, which handles preprocessing as well as the processing of the JSON format itself . Proper functioning was tested based on ongoing communication between prototyping platform with several sensors and the Firebase cloud service. Then the visualization using web interface verified the accuracy of the solution by creating charts in real time. So the resolution presents cheaper version of today's intelligent environments, which are used to control and monitor the required values in a particular environment. They are no different, but only have a larger number of sensors that our prototyping platform can handle.