

There are several errors that occur in the joints of high pressure pipes. For example, if we weld pipes at high currents, it can form a hole through which the metal will simply flow out [4]. To avoid this it is necessary to stabilize the value of the current so that the metal is cooled almost instantly after the progress of the electrode.

In conclusion it should be noted that today pipes of high pressure are irreplaceable in manufacture and their installation requires welding.

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ADVANTAGES OF USING THE INTELLIGENT LIGHTING SYSTEM «SMARTLIGHT»

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Nowadays, when the situation with natural resources is extremely important, there arises a question about the expediency of electricity consumption for permanent illumination of little used streets in night time.

There is two ways to improve this situation: to replace mercury arc metal halide light bulbs with new low-electricity-consumption diode ones, or to design the intelligent lighting system for the case of time-dividing usage of switching the lamps. The first way doesn't resolve the problem in a root. The second way is totally different, it is based on the principle of control the street lighting units' behavior depending on movement direction and speed.

Principle of work

Basic principle of «Smartlight» project's work consists of the following:

- Use the usual preinstalled equipment for illumination the streets with additional hardware:
 - Microcomputer (in the case of prototype it is Beaglebone Black);
 - Sensor (to detect a motion and send a signal to microcomputer);
 - PCB (to control the work of sensor and lamp);
 - Wi-Fi module in Ad-hoc mode;
- Establish a network (in which every unit will be unique);
- Establish a virtual topology with help of android auto-configuration application;
- Run the special premade software algorithm to control the switching of lamps depending on the object's movement parameters.

The scheme of work principle is shown in figure 1.

After the motion was detected, sensor sends a signal to the sensor control block via sensor connector on PCB; script within the microcomputer performs an algorithm of switching the lamp. The information about detected motion sends to the office via Wi-Fi module in Ad-hoc mode.

More detailed information about the components of the project can be considered further.

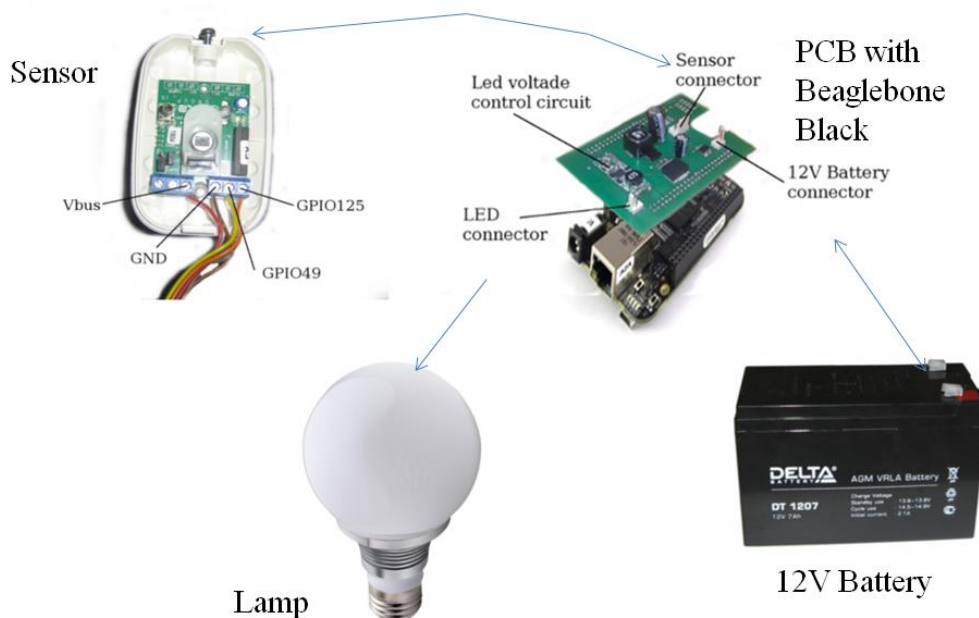


Figure 1 – Components of the project and principle of work

Beaglebone Black

Beaglebone Black (Figure 1) is a relatively low-cost open source development board based on the Linux operating system. It has all useful

interfaces and abilities which could be used in process of preparing the prototype. Within the frames of current project the usage of Beaglebone Black is formally, in future steps it will be replaced with less expensive analog. There are no licenses involved in the usage of the Beaglebone Black design materials. The usage extends to all areas of production, so there is no need to pay for using it within any commercial or private project.

PCB

The PCB (Figure 1) and Python script for it were specially made to control the work of sensor and lamp on the main prototype of street lighting equipment. The principle consists in consumption the power from 12V battery to supply sensor and lamp. The signal from sensor goes to predefined input port of Beaglebone Black where it processes by script which was mentioned above. Led voltage control circuit (LM3406 1.5-A, Constant Current, Buck Regulator for Driving High Power LEDs) protect the lamp from over current situations.

Prototype

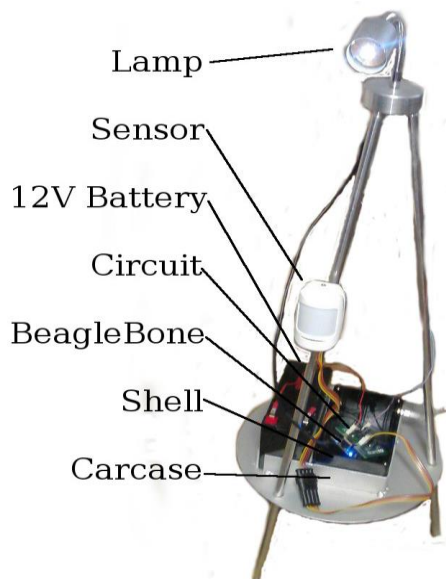


Figure 2 – Main components of «Smartlight» prototype

Prototype of «Smartlight» project (Figure 2) is used to simulate real working circumstances. Within this simulation appears a possibility to debug scripts and program for control the main project's work, before it will become commercial.

Also it is useful to demonstrate the abilities of this project to potential customers.

This prototype consists of lamp, IR sensor, 12V battery, circuit for control the work of LED and sensor, Beaglebone, shell for Beaglebone and carcass for all of it.

Ad-hoc

As an inter-node communication in project was taken wireless connection using WI-FI in Ad-hoc mode.

Ad-hoc network is a self-configurable network. That means it should not be planned beforehand, two hosts can start an ad-hoc connection without

having predefined IP/IPv6 addresses. After establishing the connection there becomes an ability to connect directly to every unit in this network via Wi-Fi without establishing additional external LAN line. That is the reason and advantage of using Ad-hoc.

IPv6

The IPv6 configuration is used to give every lighting unit a unique network and geographical address in the way to locate it in respective area and identify it in the software as an object with determined parameters.

IP (Internet Protocol) provides delivery of packets with data between any network nodes through random quantity of interim nodes. The main difference of IP version 4 and version 6 is in the amount of bytes which could be assigned to a network client as an address. The dependency is so that the more bytes in the protocol could be encoded as an address, the more addresses could be made out of these numeric combinations. That is why IPv6 was chosen to be used in the address structure for this project. For comparison, IPv4 consists of 32 bits and IPv6 – of 128 bits, that means, IPv6 can provide 2^{128} addresses, what is equal to about 340 sextillion addresses. This is a very big advantage, because it makes every lighting unit in the «Smartlight» system really unique, what allows to unite all separated pieces of this system in one with single office to control the working process and technical status.

Conclusion

All things considered in «Smartlight» project there are three main advantages which are not found in any of competitor's projects:

- Implementation of a very complex network, with the possibility to work in global network all over the World;
- Usage of IPv6, which allows to make every unit really unique to every other device in the World;
- Establishing a unique virtual and physical topology of network with very complicated algorithm for control the work of lamps in dependency with the object's motion direction and speed.

As a result, after debugging and final preparation of software for prototypes, the project will be ready for commercialization.

Usage of this project will seriously reduce the consumption of electricity for illumination the little used streets in night time and make our life more environmentally friendly.

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OVERVIEW OF THE MARKET OF PARTICLE ACCELERATORS USED FOR NON-DESTRUCTIVE TESTING

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Introduction

Currently, radiation technologies are an inherent part of everyday life. Many people do not even realize how often they encounter products and products derived from the use of radiation technologies. There are tropical fruit, tires and a chip in a mobile phone, and aviation turbine blade as part of the aircraft. All these products have one common thing: they have been processed on the particle accelerator. The flow of particles (or ionizing radiation), which is generated by an accelerator or ion source ensures the destruction of insect pests in mango, "bonding" of polymers in the rubber material for tires, form a new semiconductor layer of the material for the chip, provides the test turbine blades for cracks. Further accelerators have become the basis for inspection systems that allows detection of the baggage and cargo of weapons, explosives and drugs, fissile materials. These systems