

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Nowadays, street lighting is essential for all areas whether urban or rural since people know that a street light is an alternative during the day night in order to keep the safety of the road users. Street lights management control is quite simple, yet as the urbanization, the number of streets increased rapidly.

The first experiments in electrical illumination were made by Sir Humphry Davy, chemist and inventor, in the 19th century. He took a filament, made from platinum strip, and connected it to a battery, the biggest one in the world at the time and in 1802 made first prototype of an incandescent lamp. Electric current ran through platinum filament, heated it and filament started emitting light. Platinum was used as a material because of its high melting point. Lamp didn't lasted long because heat burned the filament very quickly, but it was a starting point on which 20 and something inventors relied their ideas until we got first electric lamp that could be used for a longer time and with adequate strength of light.

Prototype of a first electric arc lamp was made in 1809, again by Sir Humphry Davy and became basis for another type of electric lamp. In the years to come, many inventors experimented on the design of electric light. They changed materials of filament and tried different atmospheres inside a bulb - from better vacuum to noble gas.

Sir Joseph Swann and Thomas Edison independently made first commercially usable electric light in 1870s. Main design idea, that prolonged working of the electric lamp, was using of carbon filament in better vacuum. That kind of electric lamp worked longer, up to 1200 hours, and gave better, stronger light. After that, filament was made from tungsten and used in the atmosphere of noble gas, which lessen evaporation of filament and gave longer lasting and even brighter light. At first, only few used electric lamps because of their high price but in time their use spread and it is estimated that by 1885, in the United States only, some 300000 electric lamps were sold. Electric light spread across the world and is still here today as necessity. It has wide spectrum of uses in many parts of our lives from home to street lightning.

Street lighting is important in order to ensure the safety to road user especially during at night. Street lighting can be define as the artificial illumination of street when natural light drop below pre-determine level (A.Lavric et al.,2012).

In recent years in the U.S. alone, outdoor lighting uses about 1200 tera watt-hours of energy and mostly to illuminate streets and parking lots. That's enough energy to meet New York City's total electricity needs for two years. International DARK-SKY Association (IDA) estimate that least 30 percent of all outdoor lighting in the U.S. alone is wasted, mostly by lights that aren't shielded. Besides that, that add up to \$3.3 billion and release of 21 million tons of carbon dioxide per year. To solve this problem, we has introduced a design of smart wireless street light system (DSWSLS) with energy saving consumption which provides the flexible and efficient system in order to control the street lighting autonomously. This systems is controlled by one main sensor which called Passive Infrared (PIR) motion sensor. Generally, the PIR motion sensor is used to sense movement of animals, human or even other objects. The basic idea of the system is when any object that passing through the street light, this PIR motion sensor will detect and send the signal to the microcontroller (Arduino UNO) and will control the on and off the street light.



Figure 1.1 : Normal street light in highway

Smart Streetlight Systems

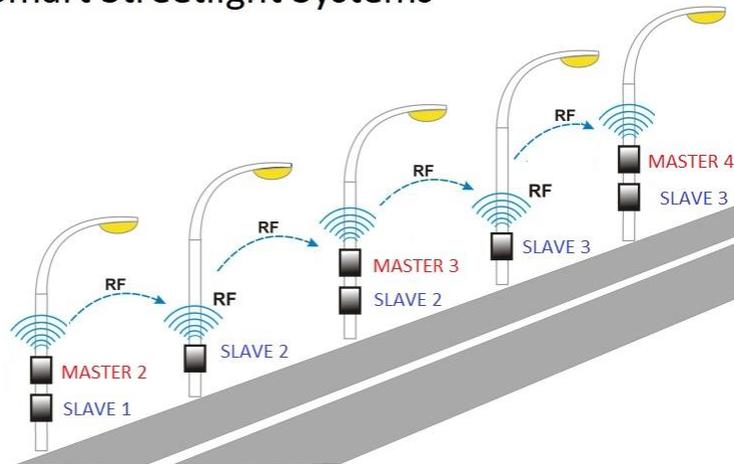


Figure 1.2 : Smart street light system

1.2 PROBLEM STATEMENT

It is very common to see the street light alight all night, which can cause a great waste of energy. The power consumption and energy waste from this are relatively high day by day. Some of the streets are not fully occupied such as the main city streets, as well as at the highway. Sometimes, they are empty for a certain period time like in a middle of night. For example, the highway beside the Universiti Malaysia Pahang (UMP), only during the day it fully utilized but at night the road less user.

Based on the problem, the observation of street lighting was done to improve the street light system to make sure the street light can be operate more efficient. In response to this problem, the study purposes to investigate several options that can increase the efficiency of street light. The usage of motion sensor as well as arduino uno as the main controller will provide some change in electricity consume by the street light.