MECHATRONICS BOOK SERIES

SYSTEM DESIGN AND SIGNAL PROCESSING

VOLUME 2

Editors
Md. Raisuddin Khan
Md. Mozasser Rahman
Muhammad Mahbubur Rashid
Shahrul Na'im Sidek

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CHAPTER 17

INTELLIGENT EGG INCUBATOR: MECHANICAL DESIGN

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17.1 Introduction

In the previous chapter, some introduction to the egg incubator system was presented. This chapter will look into the details of the design of an egg incubator system and the proposed mechanical design of our incubator system. Knowing the design is important in designing a better and more intelligent egg incubator. Firstly, it is important to know the basic system requirement for the eggs incubator. From the previous chapter, it is highlighted that an egg incubator should be able in maintaining the temperature and the humidity within the incubator to let the egg in an ideal condition to be hatched. Moreover, the eggs also need to be turned daily in order to ensure that the eggs embryo will grow up healthy. Moreover, we also need to ensure the egg incubator have a good ventilation during the incubation. There also some different conditions that needs to be fulfilled whenever the eggs get older depending on the stages of their development.

17.2 Incubating conditions

In order to get good result of hatching the eggs, there are some major conditions which must be considered including maintaining the temperature, ventilation system, controlling the humidity as well as the eggs turning mechanism [1]. All these variables must be properly controlled so that the good hatching environment can be preserved.

17.2.1 Temperature

Incubating temperature is one of the most critical aspects to be controlled as the improper temperature may cause bad result in developing the embryo in the eggs [3]. The most suitable hatching temperature is 37.5°C with tolerance of ±0.275°C. In particular, the temperature must be kept and maintained at 37.5°C and must not be below 37.2°C and exceed 37.7°C [4]. Low temperature can cause longer time for the eggs to hatch while high temperature will cause short time of hatching.

17.2.2 Relative Humidity

Generally the humidity in air is measured as the fraction of the maximum amount of water that air can absorbed at a certain temperature. At atmospheric conditions and a given temperature this fraction can vary between 0 (absolute dry) and 100% (the point where condensation will begin to form). The Relative humidity is a term used to describe the amount of water vapor that exists in a gaseous mixture of air and water vapor. The relative humidity (*RH*) of an air-water mixture is defined as the ratio of the partial