

# Automated Monitoring and LoRaWAN Control Mechanism for Swiftlet Bird House

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**Abstract-** Farmers in Malaysia are moving into edible swiftlet bird nest cultivation simply because it's another potential growing industry with high income in South East Asia. The biggest challenge in this industry is how to simulate the swiftlet's habitat inside the bird house to attract more birds. The suitability of the environment especially inside these houses are largely unknown due to very little research effort in this new area. This paper presents how wireless sensor networks (WSN) such as LoRa and video analytics techniques are utilized to simulate a conducive environment for the birds to stay in this artificial bird house. The wireless sensors are installed in the bird houses to collect humidity, temperature and oxygen data. With the combination of above data plus the number of birds entering and leaving the bird nest will be used to simulate an optimum environment inside the bird house. The bird counting algorithms developed throughout this project shows an accuracy of 92.5%.

**Keywords:** Swiftlet Farming, Wireless Sensors, Video Analytics, LoRa, Temperature, Humidity, Oxygen, WSN

## I. INTRODUCTION

The swiftlets make their nests using their own saliva compared to other birds that uses grasses and mud as their material in building nests. The edible swiftlets bird nests can enhance and improve the immune system and the health of the human body. The swiftlet is one wild birds that is able to provide humans with economic benefit. The swiftlet farming industry in Malaysia today has great potential. Ministry of Agriculture and Agro-Based Industry in Malaysia is working together with other related agencies to encourage the growth of this industry [1].

Besides, promoting good health and longevity, the Edible Bird Nest (EBN) is rich in nutrient, minerals

and anti-oxidants [2,3]. As such, the demand for EBN has increased exponentially. In general, countries in Asia has the highest demand for EBN. China is the largest consumer of the EBN [4]. Malaysia is the second largest EBN producer country in the world, behind Indonesia with the total production of 228-tonne metrics in 2016 [5].

The five most common species of Swiftlets found in Malaysia and Borneo Island are *H. Gigas*, *C. Esculent*, *Asian Palm Swift*, *A. Maximu* and *A. Fuciphagus* [6,7,8]. The swiftlet farming industry is expanding and need an automated system to monitor, control, provide feedback and early prediction to create a more suitable environment. This project investigates the feasibility of deploying LoRaWAN for monitoring and controlling a swiftlet farm. Figure 1 shows a smart swiftlet bird house built in Terengganu, Malaysia.



Figure 1. Swiftlet bird house in Terengganu, Malaysia

Internet of Things (IoT) can be understood as a global network platform that integrates the physical components in this world. It is estimated that in 2020 the number of connected equipment will grow to 50 billion [9]. LoRaWAN is a very important component in IoT and integrates the knowledge of sensors, control, digital network transmission, information storage and processing. Low Power