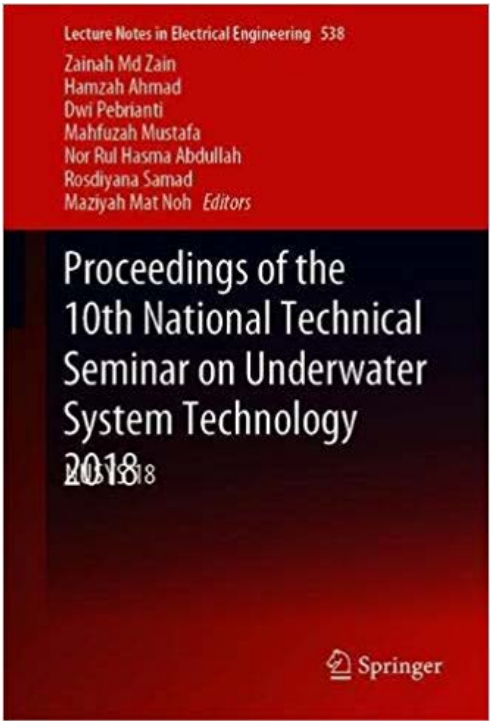

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Contents

PSpHT-II: A Water Strider-like robot with Cylindrical Footpad

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Abstract. Water strider or Gerridae is very lightweight insect and has a long leg that able to stand and even jump on the surface of water surface tension. Mimicking this creature become one of the favorable areas in the bioinspired robotics field. A Portable Striding pH Tester (PSpHT) is one of the robotics systems that mimick-ing water strider with quadruped mechanism. The first PSpHT design had successfully operated with real-time pH monitoring, and long-haul remotely control. However, weakness in its footpad still existed when the rapid spatial motions were not making PSpHT faster enough on the water surface. Therefore this paper presents the improvement progress on PSpHT and introducing its second version named PSpHT-II. In this progress, a new footpad with light cylindrical shape is proposed by considering the water surface tension. The polypropylene-based footpad hold with light aluminum alloy as a link of the spatial leg and the flat plate was added as the paddler on each side of the footpad as water surface breaker. The leg design is recalculating and fabricated regarding the Archimedes principle and surface tension theory by considering the balance forces between the air and water. According to the calculations and buoyed test, the proposed cylindrical footpad is less submerged compares to the previous footpads designed. On the other hand, the proposed spatial motion was simulated for verification. As for validation, PSpHT-II was validated by running the system on the lakeside of Universiti Malaysia Pahang, Pekan, Pahang Campus. The experiment shows the additional paddlers help PSpHT-II striding faster and stable although with a mild and windy situation.

Keywords: Water strider, cylindrical footpad, spatial striding gait pattern.

1 Introduction

Water strider characteristics have gained more attention and attracted among robots especially for those who focus on bio-inspired arthropods robot, to develop a bionic water strider systems or at least mimicking its biological behaviors [1-4]. Water Strider, or *Gerridae*, is an insect that able to stand, walk and even jump on the surface of water such as rivers, ponds and open seawater with weight 10 dynes and length at about