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An Integrated Arduino UNO WiFi Microcontroller as an IoT-enabled Smart Household Hydroponic System

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Abstract - This paper integrated an Arduino UNO WiFi microcontroller with a household hydroponic system as a smart system for household farming. The light and water temperature factors affect the growth of selected leafy greens, and the IoT-enabled smart system helps monitor these conditions. Adequate growth of leafy greens enables households or individuals to access fresh and nutritious food at home, reduces dependency on external food sources, and aligns with the United Nations Sustainable Development Goals (SDGs) 2 (Zero Hunger) and 12 (Responsible Consumption and Production). The specific objective of the study is to integrate Arduino UNO WiFi microcontroller as an IoT-enabled smart household hydroponic system. An Arduino UNO WiFi Microcontroller, a water temperature sensor (DS18B20), and an analog pH sensor meter were deployed as part of an Internet-of-Things (IoT) system integrated with a household hydroponic system for the present study. The light intensity and water temperature were monitored and recorded via a cloud system. The monitored test results demonstrate that a range of 29 to 30 degrees Celsius and 16 hours of LED light enhanced plant growth by 20 percent compared to other conditions. The study shows that the use of IoT sensors provides a better-controlled environment and helps to improve the efficiency of hydroponic systems in an urban household setting..