

## ABSTRAK

### **DETEKSI *ANXIETY* PADA ANAK *AUTISM SPECTRUM DISORDER* (ASD) MELALUI SENSOR VITAL DAN ALGORITMA KALMAN FILTER DENGAN *SOCIALLY ASSISTIVE ROBOT* (SAR)**

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Deteksi *Anxiety* Pada Anak *Autism Spectrum Disorder* (ASD) Melalui Sensor Vital Dan Algoritma Kalman Filter Dengan *Socially Assistive Robot* (SAR)

(2025: xxii + 139 Halaman + 27 Gambar + 11 Tabel + 11 Lampiran)

Anak-anak dengan *Autism Spectrum Disorder* (ASD) memiliki kecenderungan mengalami kecemasan (*Anxiety*) yang sulit terdeteksi secara verbal. Penelitian ini mengembangkan sistem deteksi kecemasan berbasis sensor vital MAX30100 (detak jantung) serta MLX90614 (suhu tubuh), dengan algoritma Kalman Filter untuk meredam gangguan (*noise*) sinyal. Data yang telah difilter dibandingkan dengan standar normal dari PALS *Guidelines* WHO dan *American Heart Association* untuk menentukan tingkat kecemasan anak. Sistem ini diimplementasikan ke dalam *Socially Assistive Robot* (SAR) sebagai media interaksi non-verbal yang empatik. Hasil menunjukkan Kalman Filter efektif menstabilkan sinyal dan meningkatkan akurasi klasifikasi, di mana kecemasan tinggi ditandai oleh detak jantung dan suhu tubuh di atas ambang normal. SAR juga terbukti menciptakan suasana kooperatif selama pengukuran. Integrasi sistem ini berpotensi sebagai alat monitoring kecemasan yang adaptif bagi anak ASD.

**Kata kunci:** *Autism Spectrum Disorder* (ASD), kecemasan (*Anxiety*), Kalman Filter, sensor vital, *Socially Assistive Robot* (SAR).

## **ABSTRACT**

### **ANXIETY DETECTION IN AUTISM SPECTRUM DISORDER (ASD) CHILDREN THROUGH VITAL SENSORS AND KALMAN FILTER ALGORITHM WITH SOCIALLY ASSISTIVE ROBOT (SAR)**

Scientific paper in the form of Final Report, 2025

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Anxiety Detection in Autism Spectrum Disorder (ASD) Children Through Vital Sensor and Kalman Filter Algorithm with Socially Assistive Robot (SAR)

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Children with Autism Spectrum Disorder (ASD) have a tendency to experience anxiety that is difficult to detect verbally. This research develops an anxiety detection system based on MAX30100 (heart rate) and MLX90614 (body temperature) vital sensors, with Kalman Filter algorithm to reduce signal noise. The filtered data is compared with normal standards from the WHO PALS Guidelines and the American Heart Association to determine the child's anxiety level. The system is implemented into a Socially Assistive Robot (SAR) as a medium for empathic non-verbal interaction. Results show that the Kalman Filter effectively stabilizes the signal and improves classification accuracy, where high anxiety is characterized by heart rate and body temperature above the normal threshold. SAR was also shown to create a cooperative atmosphere during the measurements. This system integration has potential as an adaptive anxiety monitoring tool for ASD children.

**Keywords:** Autism Spectrum Disorder (ASD), Anxiety, Kalman Filter, vital sensors, Socially Assistive Robot (SAR).